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DATA, INFORMATION AND KNOWLEDGE MANAGEMENT

Editors
Asst. Prof. Dr. Gözde Mert
Assoc. Prof. Dr. Erdal Şen
Asst. Prof. Dr. Osman Yılmaz

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DATA, INFORMATION AND KNOWLEDGE MANAGEMENT

Editors: Asst. Prof. Dr. Gözde Mert - Assoc. Prof. Dr. Erdal Şen - Asst. Prof. Dr. Osman Yılmaz

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PREFACE

From past to present, knowledge has shaped the existence of all humanity, the formation of civilizations, wars, modes of production, forms of administration and traditions of being state. Knowledge has been at the forefront of human development. People started to live in societies when they started to grow from Hz. Adem. When people started using information, they started living together. Scientists classify people's lives together as 4 different societies. These societies are primitive society, agricultural society, Industrial Society and Information societies. It is purely information that forces people to constantly change and increase their development from one level to another. Continuous development of knowledge has been effective in the way people work. It is not possible to accept that the information was produced in modern times. The history of knowledge is very old. Information has the property of accumulation. People have constantly improved themselves using these features. Information management is used effectively in many areas mentioned below. Among the main goals of developing countries are important issues such as realizing economic development, improving the quality of life of the society and spreading the well-being. One of the main elements of development goals is undoubtedly knowledge education. We witness that societies with advanced knowledge are economically developed. In this context, universities and research institutions have important duties. When intellectual capital and industrial practices are combined in universities, high value added products and services are created. Today, we all follow closely that the definition and understanding of the University has changed. While it is expected to produce only information from universities in the past, today a model of the university is expected to use information efficiently as well as creating resources for new productions. Furthermore, it is being investigated how to use information economically. Universities, which are seen as research and teaching centers, should become know-how centers by merging with industrial and other research institutions in order to become the incubation center of local, regional, national and international science and technology based commercial activities where global competition is seen in every field. In this study, the University of Batman and faculty members from other universities in Turkey, overall business practices in knowledge management and innovation as important issues by doing valuable work have created this book. Undoubtedly, this book is considered valuable by me in that it reflects scientific studies of more than one academician consisting of innovative ideas. In terms of book information management and innovation, businesses use

effectively in many fields; "Organizational Culture, Information Management and Learning Organization, Intellectual Capital, Supply Chain Management, Big Data, Data Mining, Super Smart Society, Strategic Management, Competitive Strategies, Digital Marketing Strategies, Management Information Systems, Strategic Decision Making, Production Information Systems, Information Security, Information Management Organizational Innovation, Business Information Systems, Corporate Performance, Corporate Memory in Information Management "is considered important. This multi-disciplinary research book is considered to be important in that it contains both qualitative and quantitative examples. I hope that the topics in the book will guide the researchers who are interested in the future research. I would like to thank all the authors of the department, academicians and researchers, who have spent important time in the formation of the book and who made important researches, for their efforts and continued their success.

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CHAPTER 1

MEASUREMENT AND EVALUATION OF SCIENTIFIC KNOWLEDGE

Ufuk Karadavut

INTRODUCTION

The first thing to do when starting the research is to have healthy and reliable knowledge about the subject. Knowledge has the ability to quickly change all the systems that change and move with it on the basis of knowledge. Actually, when we try to do it, we can determine the change. If there is change, there is improvement. The important thing is to determine the amount and level of change. Change can be good or bad. Change will always happen. We have no power to interfere with this. However, we may have some efforts to make the change good or bad. It is preferred good way for any time. Since change is very fast, there is a problem of adapting to change in every field.

All the sectors that have caught the change and have been able to keep up with its pace can be successful. Sectors that do not keep up with the changes have to lag behind. However, the basic condition for keeping up with the change is to reach the information and use the knowledge in the most appropriate way. The unused knowledge is actually located in our body as if a humpback. It is always with us but instead of taking advantage of it, we carry it as a burden. In order to use the knowledge and make the best use of it, it is necessary to have a good measurement and evaluation strategy (Çömlekçi, 1989). It should never be forgotten that the most important source of life for businesses today is knowledge and determining the level of competition between businesses. Businesses that want to survive in the competitive struggle have realized how important the knowledge is and have followed the knowledge.

Numerous studies have been carried out on accessing and using knowledge since the day humanity was created and still more is being done. The most im-

portant issue was how to measure the knowledge and how to evaluate the measured knowledge. Scientific foundations have been created to do this according to certain rules. Anchersen, originally a Danish historian, has made the scientific data available for the first time in the 1600s, making it possible to process the knowledge. This is the first step to contribute to making the knowledge more tidy with the data that was charted. In 1692 and 1693, John Graund and Edmund Halley worked on life data schedules (De Vaus, 2014). J. Bernoulli made the real turning point in the measurement of knowledge by developing the concept of large numbers law and subjective probability in 1713. By 1778, in the Bernoulli family, D. Bernoulli made a great contribution by developing the "most likelihood method". It is the basis of most of the estimation methods used today.

The book "On Normal Distribution", written by Moivre in 1733, has surpassed all work done to date. Moivre did not confine oneself to with this and continued its contribution by developing the binomial approach to the poisson distribution and the normal approach to the binomial distribution. Based on this knowledge, Gaus (1809) drew the normal distribution curve that is still actively used even today. Laplace worked on probability theory and as a result of his central probability studies, he developed the central limit theory in 1810 and made a great contribution to transforming the data into scientific knowledge (Al, 2008). In addition, Gosset (1908) developed the student t distribution, Pearson (1900) Chi-square, Fisher (1922, 1923) developed the F test and the general use and variance analysis. In addition, researchers such as Kolmogorov (1933) and Wald (1945) have made studies to make knowledge more valuable and useful by gaining a measurable quality (Karadavut, 2019b).

In order to reach knowledge and have knowledge scientific in our country, studies started to be carried out towards the end of 1800s. However, some efforts that could be considered very inadequate and undersized did not improve due to the intensity of wars and internal conflicts. Even the studies done scientifically with the concept of "non-religious" developed by someone were terminated before the beginning (Al, 2008). Those who carried out such studies were either executed or deported. As a result, Turkish society has postponed the opportunity to meet development and change. This process continued until the establishment of the Republic of Turkey. However, the necessary infrastructure has to be established to create and develop scientific knowledge. Of course, this took some time and slowed down scientific progress.

1. PROPERTIES OF MEASURABLE KNOWLEDGE

There is a lot of knowledge in human life. These can be counted as daily knowledge, technical knowledge, patience knowledge, religious knowledge, philosophical knowledge, and scientific knowledge. However, only scientific knowledge differs seriously from others. Because scientific knowledge is knowledge obtained through various forms of experiments and applications. For this, we will not aim to measure every knowledge in life and we will make an effort in this direction. The important thing for us is that scientific knowledge can be measured. However, it should be known that the actual knowledge is measurable. This can be done by knowing the properties of measurable knowledge (Ercan & Kan, 2006). We can list the properties of measurable knowledge as follows;

1) First, the knowledge must be understandable. If people believe that knowledge has an incomprehensible nature, it becomes harder to reach. As a result, knowledge is left to someone's use only. However, knowledge is too valuable to be left to the initiative and direction of someone. It should be known that it should be universal and open to everyone.
2) It should be plausiblel. It should not be forgotten that irrational approaches that are not plausible can carry science to different dimensions.
3) Knowledge must be processable. Knowledge that cannot be processed is not usable knowledge. The processing and availability of knowledge is related to its ability to be measured in a healthy and safe manner. It is clear that the knowledge that cannot be processed will not benefit anyone, especially the knowledge owner.
4) Knowledge should be guiding. The change and development that will lead to good and beauty can only be thanks to the guiding knowledge. Societies that are unable to perform their development and transformations properly are backward or regressed communities.
5) Scientific knowledge should be objective. It should not change according to the perspectives, needs or worldviews of people. If there is such a change, scientific knowledge cannot be mentioned.
6) Continuity in knowledge is essential. In other words, as knowledge is produced, new knowledge is needed along with it. There is no "enough" point for knowledge. Finding such a point results from the inadequacy

of the researchers. Researchers who do not research, read enough and are afraid to update themselves try to research for the old again, as they cannot produce new things. As a result, rather than advancing, recession and then decline come first.

7) Scientific knowledge contains a special structure in itself. It progresses with the systemic structure and the knowledge obtained becomes very valuable in this respect. Failure or disruption of the system causes the result to go wrong.
8) Building practice or experiment is the basis of scientific knowledge. If there is no experiment, what is put forward as scientific knowledge does not go beyond personal opinions and thoughts rather than scientificity. Of course, the data required to set up an experiment should be systematically collected, organized and analyzed.

2. PREREQUISITES FOR THE MEASUREMENT AND EVALUATION OF KNOWLEDGE

Before measuring the knowledge, it is necessary to know how to measure it. Because there are three types of research. These; basic research, practical research and developer research. Whichever study mentioned is planned to be studied, data should be collected accordingly and the necessary measurement should be made. Data should be collected for the scope of the work done and the intended purpose (Serper & Aytaç, 1988). The measurement will vary depending on whether the study is qualitative or quantitative. Depending on the research method chosen, the selection of the statistical test will be made. Because the tests to be used for qualitative research and qualitative research are different from each other. The distribution of the data is effective in determining this. Because there are some basic assumptions necessary for the qualitative and quantitative analysis.

While measuring, it should be considered in terms of knowledge management. It is necessary to create new knowledge, to know whether access to knowledge produced from other sources, to what extent this knowledge will be used in decision making processes, to what extent the measured knowledge will participate in the production processes and the amount of its contribution. The measured knowledgeshould be stored in the most appropriate and secure way. Measuring the knowledge will add value to it and to the enterprises in terms of knowledge management. There will also be changes in knowledge management

depending on the amount of knowledge measured. Because as the amount of knowledge increases, its management and evaluation will become more complex. Businesses that do not have any knowledge measurement and management strategies cannot be successful. Because the basic condition of being an knowledge society is to measure the knowledge correctly, to preserve it and to use it in the most appropriate time when necessary. Companies that can make and control this process in the best way can maintain their strong structure.

First of all, the employees should have the same feeling and thoughts about the subject. Having the same emotions and thoughts means that individuals adopt and internalize it. Applications that are not internalized cannot be successful. At the same time, those working in the enterprise should feel the same about the value and importance of measuring the knowledge. They should be able to deduce the same meaning. Different interpretations about measurement may cause different understanding of the available data or may cause differences in the order of priority. It is necessary to know how important the knowledge obtained by measuring is really for the business. Because the care and attention shown during the measurement process must be shown during the processing and use of knowledge. This will also be regarded as a measure of the value given to measurement. Besides, it should be kept in mind that the measurement values can be used in different ways and can change the perspective of the business for different applications. Having a lot of data will be more important in the future as it is important today. As the amount of knowledge increases, it will develop depending on its processing and evaluation and will have an impact on increasing the power of competiton (Bruning & Kintz, 1987).

3. MEASURING PROCESS

Measuring explains asmeans making sense by giving it numerical values or symbols in order to define the subject in the best way. The measurement process occurs as a result of a certain process. Knowing and controlling every stage of the process is a prerequisite for the healthy execution of the process. The measurement process is shown in Figure 1. When the figure is examined, it will be seen at which steps the measurement process is performed. Of course, first of all, it is necessary to determine what knowledge will be needed for the measurement process. Determining the “target knowledge” will be the first step. The collection of unnecessary knowledge can also be collected with the idea that it will be needed over time. However, this cannot be our priority. What is meant by "target knowledge" will be to determine what kind of measurement is

needed. Once this is determined, the variable to be measured will need to be determined. It is clear that we will face many features in practice. Among these features, it is necessary to determine which feature or features to measure. Because the content and shape of the measurement to be made may vary depending on the feature selected (Karadavut, 2019b).

Figure 1. Processes of measurement

After determining the feature to be measured, the location of the measurement should be determined. Not all measurements can be taken everywhere. Special locations may be required for some measurements. For example, you need to know the places where you need to take samples in order to determine the protein ratio in the milk samples you will receive from an agricultural enterprise that produces milk. Because sampling is a prerequisite for the measurement to be performed in a healthy and safe manner. Good sampling and reducing the sampling error whenever possible will always increase the reliability of the study.

The rules of measurement should be determined during the measurement process and they should never be exceeded. The measurement rule is to determine the amount and value of the character to be measured while measuring is done (Karadavut, 2019a). For example, if the measurement is length, it is necessary to determine which standards the length will be. If the scale is to be used, it should be known what this scale is and the study that can reflect the knowledge that the scale will provide should be done.

Depending on the character studied, the idea that measurement can be done from anywhere is not correct. If the place to be measured is not determined well, the results of obtained will increase the probability of not reflecting the truth. This is because measurements are not taken from the right place. While it is necessary to meet with the employees in the production department, if you try to measure with the employees in the marketing department, you will lose the chance of obtaining healthy knowledge about the production at first. After determining the place where the measurement will be made, the tools and equipment to be measured should be determined. Not all measurements can be made with every device. For this, the tools and equipment or scale to be used should be prepared and used. There will be changes depending on the nature and content of the measurement. Since researchers will know this, they need to prepare in advance. Especially, the scale types to be used in the enterprises should be determined well.

Then, the person who will take the measurement will need to be determined. It is important to always have the measurement taken by the same person or persons. This is also recommended. Because the constant change of the person making the measurement makes it difficult to detect errors that can be made. In fact, we often cannot find the possibility to detect this (Serper & Aytaç, 1988). However, if the same person always makes a measurement, it will be easier to detect and overcome it since the error he made will always be the same. In addition, it is preferable that the person taking the measurement has knowledge about the subject and even gained experience by making some applications beforehand. An experienced person will be able to keep calm and find solutions by not worrying if there are unexpected situations while doing the study. Those who do not have enough experience may not be able to measure what they need by making a fuss, they can measure in wrong or incomplete ways. Inaccurate and incomplete measurement is often considered as not measuring at all. This will be reflected in costs as a waste of time and money.

Finally, the time to be measured should be determined. Not every measurement can always be taken. It is necessary to know the appropriate time and

do it on time accordingly. If you are going to work with agricultural enterprises growing cereals, harvest and threshing losses as the subject, you should work in this period as the harvest time is summer months. It is very difficult to work with and measure with people. Because human psychology is always under influence, and even minor influences can change thoughts. When you come to work in the morning, eating a traffic penalty, getting angry with your friend or missing the bus will spoil your psychology immediately. For this reason, when they want to measure by conducting bilateral interviews with people, they should ensure that the individual they will measure is comfortable while choosing a comfortable environment. It is important to determine the appropriate time for this.

After all these processes are done, the measurement process is started and completed. There are some issues to be considered while measuring (Armitage et. al., 2002). These can be listed as follows;

- The researcher must be patient first. Attempting to perform the measurement process by making efforts such as quickening the job or finishing the job immediately may lead to the wrong measurement and to obtain the wrong knowledge. Sometimes we may have little time to obtain the data. However, the short duration should not require us to rush the job. As Ghandi says, "The person in a hurry should go slow".
- Care should be taken when measuring. Even if you know the subject well, minor carelessness may cause you to deviate from the goal. If you deviate from the purpose, it may cause you to get out of the subject and consequently get unnecessary knowledge. Especially when working on the work done, it is necessary to avoid any stimulation that may come from other directions. For example, it is important to turn off the phone while taking measurements and remove other visual and auditory stimuli to avoid distraction.
- The person making the measurement should take care when measuring. Care and attention are closely related concepts. In careless measurements, errors arising from carelessness increase. Taking care also means giving importance to the work done. The fact that the person taking the measurement gives importance to the work he / she means adopts it. The done transaction will be done more accurately and regularly.
- The fact that the person to take the measurement is non-bias is the most important feature. Being unbiased will also cause the knowledge to be obtained as a result of the measurement to be non-biased. Non-biased

results cannot be obtained with a biased measurement. If the measurement is started in a preconditioned condition, it indicates that all the procedures done from the beginning of the process are also biased.

- The person making the measurement must trust the work he does and himself. It is important to have a determined attitude in this. Indecision will be the starting point of doing wrong. "The worst decision is better than indecision" can be a guide. Those with sufficient experience are unlikely to remain undecided. However, the self-confidence of the people who will make the measurement can be increased with the importance and support to be given.

After the measurement is done according to the rules, they should be recorded as necessary. Care should be taken when data input. Inaccurate or incomplete spellings can put the whole process in trouble, especially when writing the measurement values. If it is possible after registration, it is useful to check before evaluation. Because during the analysis of these, these inaccuracies will have the power to affect the results significantly.

4. SCALES

Scale is the name given to some of the measuring tools. It provides assignment of numbers to the features studied on the scale and definition of how to use these numbers. For example, when we want to evaluate the general condition of plants while working in the field, we can know their situation by giving them a scale of 1-5. If it is defined as 1 very good, 2 good, 3 medium, 4 bad and 5 very bad, it can be known how the plants are. If it is done on businesses, sometimes between 1 and 9 values can be given. Opening the break means an increased sensitivity. The scale also allows for identification on some length measurement tools. Scales can be evaluated in different ways. If we only give meaning to each value, it is defined as sameness. When each value can be changed from one person to another person and size is the absolute zero representing equality between the values if the equality between the values is the same. These are expressed in scale types. Scales are examined in four parts. These are classification, sorting, equally spaced and proportional scales.

4.1. Scales In Measurement Process

The expression of the measurement results made for the subject we are studying according to certain rules is called a scale. Scales are evaluated in four

main groups. These can be expressed as Classification (Nominal) scale, Ordinal Scale, Equal Interval scale and Ratio scale. Let's briefly explain these scales.

4.1.1. Classification (Nominal) scale

Classifier scale type is the scale that only classification can be done. Groups verbally defined units. While determining the gender of the employees working in any business, classifying the marital status of the employees working in the same business as married and single are examples for this scale. However, there is an issue to be considered here. Some researchers unknowingly use variables as scales. For example, they can give the marital status as “marital status scale”. However, marital status is a variable. It can mean never scale. It can be said that the marital status variable was measured with a classifier scale. The same is true in gender. For the data obtained with such scaling, only the frequency calculations or the mode can be determined and the accumulation places of the data can be determined. This scale can be used to distinguish a product produced in an enterprise as error-free. Apart from this, no statistical evaluation can be made in order to evaluate the data obtained. These are generally defined as categorical data (non-numerical but suiably data by classification), counting data or frequency data.

4.1.2. Ranking scale

While the ranking scale has all the features of the classification scale, it also takes into account the properties of the variables. When you go to an official building, you see numbers in the rooms. These are considered as the ranking scale. Plates of the vehicles are also evaluated with the ranking scale . Apart from that, it provides the opportunity to make comparisons in the form of biggeness or smallness according to the value of the variables. For example, evaluation can be made using the five-point Likert scale in the institutionally study. In this, a) I don't like at all, b) I do not like it, c) Partially I like it, d) I like it, e) I like it very much. These results will give us a classified form of corporate tastes. You may want to know the taste status of a newly produced beverage or you may want to see the acceptance status of the work done. These are data that can be evaluated with glazing scale. In the ranking scale, the degree difference between the rows does not have to be equal. For example, according to the time of the people doing a job, early, normal time and or late evaluation can be made. From the point of view of health, the state of the disease can also be listed in this way. Median (median), percentile calculations and correlation analysis can be done in the data obtained with the ranking scale.

4.1.3. Equal Range (Interval) scale

It is a type of scale that can be expressed in numbers. However, it is not right to establish a relationship between the numbers. It is not correct to make a comparison, since there is no absolute zero point. Equal spacing scale is the most suitable scale that can be used in situations where the difference between the measurements is important. For example, there are degrees such as Celsius, Fahrenheit, Kelvin, Planck, Romer, Newton and Delise. They all measure the temperature and show it to us. As looking at the most commonly used celcius, fahrenheit, kelvin; The boiling temperature of the water is 100 degrees in Celsius, 373 degrees in kelvin and 212 degrees in fahrenheit. When we look at the absolute zero point, it is seen that it is -273 at the degree of selcius, -920 degrees at the kelvin and -920 degrees at the Fahrenheit. Similar exchanges are valid for calendars. There are changes in the Hijri, Rumi and Miladi calendars, which are used extensively today. In this type of data, average, standard deviations and some statistical values can be calculated.

4.1.4. Ratio cale

With this scale type, all variables such as length, weight, area and volume can be measured successfully. It has an absolute zero point and is the same for all measurements. If the difference between the rates obtained as a result of the measurements in our studies makes sense to us, the rate scale can help us. As with the equally spaced scale, there is no change. It is the most advanced and most useful scale known. With any data obtained with this scale, they can provide very useful knowledge as any statistical process can be performed. The ratio scale is always the most reliable and preferred scale if the variables are suitable for this.

Each data obtained has different properties. The feature of the data should also be taken into account when measuring. The data is structurally sequential, discrete or continuous. The ordered variable is the variables in which the measured values can be sorted. Good-not bad-bad situations are ordered data. It can be listed as large-medium-small. Discrete data is the case when the data from the variable being studied is integer. Being an integer means discontinuity. For example, you can say 5 or 10 to the question how many people work in your business. However, you can never say that 5.8 or 10.5 people are working. This is not realistic. In continuous data, there is an infinite number of values between two integers. For example, you can say 175.2 while measuring height. When measuring weight, you can say 50.83 kg. Accordingly, it is necessary to know which data is categorical and which data is continuous during the study. It

should be known that if they are used interchangeably, they will be wrong and the results will not reflect what they should reflect.

5. ERRORS IN MEASUREMENT PROCESS

An error is always made in the measurement process. The important thing is that the error in the measurement can be kept as low as possible. The measurement error expresses the difference between the measured value and the actual value (Ercan & Kan, 2006). This difference is never zero. However, it can be reduced as much as possible with due diligence and attention. There are three types of errors in the measurement process. We can explain them as follows (Karadavut, 2019b);

5.1. Constant Errors

These types of errors generally do not change from measurement to measurement. The source of the error can be detected. If detected, correction is possible. It does not affect the reliability of the study, but does affect its validity. It is a constant mistake that the teacher who gives a lesson gives 10 points to all students who take the exam. Likewise, a 50 gram missing scale will always weigh missing. It can be corrected by interfering with what has been detected.

5.2. Rough Errors:

They occur after unexpected events or developments, although very rare. Cases such as making arithmetical operation errors, misunderstandings, wrong and incomplete data writing or writing to other places, wrong marking can be encountered.

5.3. Systematic Errors

This is called regular errors. They vary depending on the size of the character being measured, its structure or basic characteristics. It may decrease according to the person measuring it, or may show increase. When the teacherin gives plus 10 points to some students in a lesson, it can be defined as a systemic error . Here, the source of the error can be determined. There is always the possibility of correcting the error. It reduces the validity of the study but does not directly affect its reliability. Systematic measurement error will be equal to the difference between measurement error and random measurement error. Sys-

tematic error and measuring error and random error change inversely. Whichever increases, it reduces the other side.

Rational approach and uncertainty analyzes are carried out to determine whether there are systematic errors in the studies conducted. In the rational approach (Commonsense Basis), all instruments and equipment used in the measurement process are considered to be faulty. Accepted error is the highest possible. In the uncertainty approach (Uncertainty Analysis), a range is specified for errors and we try to provide a solution.

5.4. Random Errors

The amount of error can increase as well as decrease according to the characteristics of the measurement. Since it is completely random, it is not possible to know the source of the error. It reduces the reliability of the study. It is mostly found in irregular measurements. It may be effective that researchers do not have sufficient knowledge about the subject and want to use initiative incorrectly. The random measurement error is equal to the difference between the measurement error and the systematic error.

6. SOURCES OF ERROR

In the meantime, it is useful to briefly explain the concepts of reliability, validity and usefulness. Reliability shows how precise the measurement is measured and how free the measurement results are from random errors. Validity indicates whether the instrument, scale or method used for measuring successfully measures the variable to be measured. The usefulness refers to the usefulness of the measurement tool in terms of application time, success, evaluation of the results and cost of the chosen method. There are some factors affecting the reliability, validity and usefulness criteria.These are the factors that result from the test itself, the factors that result from the rating or scoring during the application, those that result from the answers given by the participants and the characteristics of the variables that are the basis of the study. It can be one of them or in some cases more than one can be seen.

Of course, there are sources of these mistakes. Knowing the sources of errors is important in terms of not making mistakes or minimizing them. Because no matter what kind of work is done, theoretically zero error can be said, but in reality there is no such thing as resetting the error. Now let's see the sources of the error (Karadavut, 2019b);

6.1. Errors originating from the measuring person

It is essential that the person making the measurement know about the subject and understand the importance of the work. If the person who will do the study has not grasped the importance of the subject, it is inevitable to make a mistake. In addition, the problems such as being physically insufficient, being too young or too old in terms of age, not having sufficient education, the intensity, malaise, anger and insomnia that they have for that moment are preparing an environment for making mistakes..

6.2. Errors originating from the measurement location

In some cases, the measurement location may be chosen incorrectly. Increases are also seen in mistakes made in the wrong place. For example, inadequate lighting, hot or cold weather, and wind can make working difficult. When you want to ask the status of the managers, you need to know that you cannot get the correct answer if you want to ask the employees by taking the manager with you.

6.3. Errors due to the time measured

It is similar to the errors originating from the measurement location. A timing error is also made here. If the people working in plant production do their work in the morning about plant weight, there will be more than necessary due to dew or frost. It shouldn't be provide in mind that being in the wrong time and place will cause us to unable to get the right result, which will always increase the mistakes made.

6.4. Errors due to the measured character

Sometimes there may be errors due to the characteristics of the measured character. It is necessary to know the properties such as the loosening of metals with hot in summer and becoming more tight in winter. For this reason, knowing the characteristics of the character to be studied is important in terms of being healthy measurement.

6.5. Errors due to measuring devices

The researcher can use different measuring devices when making measurements. If these are corrupt or out of adjustment, errors increase. For example,

using an incorrect scale can cause serious data and knowledge loss. An incomplete measurement device may mislead us in choices for length.

7. EVALUATION OF MEASUREMENTS

Evaluation constitutes the final stage for the measurements made. However, the measurement process must be considered successful before the evaluation is made (De Vaus, 2014; Karadavut, 2019a). In this, it should be ensured that the following conditions are met; a) Whether it is easy or difficult to apply, b) If there are problems in the application, whether it affects the results, c) Whether the data obtained will be rated and scored, d) Whether the data will be interpreted in a meaningful way, e) It should be known whether it will have to exceed the budget . Since the existence of one or more of these features may disrupt the morale of the researchers, there may be difficulties in the reliability of the measurements. For example, the fact that the cost is higher than the calculated will cause a change in attitudes and behaviors as well, and it may cause a waiver of some measurements to be made.

In order to start evaluating, the measurements obtained must be correct. In order for the measurement value to be accurate, the person who performs the measurement needs to do its job exactly and measure impartially. It is valuable if measurements are made exactly as desired. It should include useful knowledge and useful knowledge in the measurements. It also needs to be reliable (Büyüköztürk, 2002). Measured values should be not costly economically.

After the measurement operations are made, classification processes are performed depending on the characteristics of the data. After that, their distribution is looked at to see how they are distributed. Because the shape of the distribution will be important in terms of directing the study to be conducted. After this is done, descriptive statistics should be determined. For this, first, the central tendency and spread are examined. Central tendency and spread measurements will give the measurement of the aggregation of the measurement values towards the center. Accumulation towards the center or their distance from the center will provide valuable knowledge about the reliability of the measurement values and results in the study.

While the high central trend indicates that the measurement values of the data are close to each other and the similarity may be high, the higher the central spread means that the difference between the measurement values is high and the similarity decreases. Giving descriptive statistics is important for mak-

ing a general definition of the study. What needs to be done next is the stage of editing the data. Measurement values are arranged in charts or graphs to make them more understandable. Every chart or figure made will make the measurement value a little more understandable and usable.

After the data is arranged, the necessary test statistics and materiality analyzes will be done. However, before starting the analysis, it is necessary to determine whether there are excessive values or outliner values in the measurement values. If there are outliers or extreme values, necessary measures should be taken accordingly. Outliner or extreme values are generally caused by measurement errors. However, in some cases it may also be due to the characteristics of the character being measured. If excessive values are caused by measurement errors and this can be corrected, it should be corrected immediately. If there is no possibility for correction, the evaluation of the excessive value will not be correct and should be left out of the evaluation.

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CHAPTER 2

BIG DATA AND DATA MINING

Kazım Karaboğa

INTRODUCTION

In the age of digital economy, data has become a valuable product. Internet traffic, social networks, corporate automation systems (for suppliers and customers), geographical information systems that track shipments, online surveys and many other data sources provide data to businesses continuously. This data has the potential to provide important information for many aspects of business management and marketing researchers. The following examples can be given to these areas; processes, customer preferences and perceptions and new product designs. In addition, in a study conducted by Forbes magazine in 2015, senior business executives stressed that "data-driven marketing practices" are critical to the success of marketing. At a time when data and data processing are so important and direct competition between businesses, they should design their processes and automation systems in a data-driven manner. Thus, the data must take advantage of its power (Karaboğa, 2020).

Today, many businesses are interested in data analysis and mining. Those businesses may be for consulting, training, or direct data mining. The main reason for that interest is that data mining implementations offer significant gains to economic and financial markets in areas such as process management, business performance management, and customer relations (Gorunescu, 2011:6).

In this study, the concepts of big data, data analytics and data mining are explained in general. In addition, frequently used data mining methods are defined conceptually. Finally, for the marketing applications in business administration; customer lifetime value, customer segmentation, cross-selling and referral system and direct marketing concepts are explained.

1. RELATIONSHIP OF BIG DATA AND THE PROCESS OF BUSINESS MANAGEMENT

In the information age, businesses operate in a “data tsunami era” that a significant amount of data is constantly being produced and recorded on an increasing scale through the enormous improvement in information and communication technologies. The exponential increase of potentially valuable data gathered with the Internet, social media, cloud computing, sensors, radio-frequency readers, and new types of mobile devices is often referred to as "*big data*". Big data can be a new infrastructure for developing medical research, global security, logistics and transportation solutions, ensuring operational effectiveness and efficiency, and defining terrorism activities, and dealing with socio-economic and environmental issues. Because a significant amount of data is produced and recorded every day in these areas. Big data can be primarily created through five main types of data sources (Kantardzic, 2020: 18-19):

- *Operational data*: It comes from traditional intrabusiness transaction systems, where flow data coming from large numbers of sensors is usually monitored.
- *Gray (Dark) data*: It is a large amount of data that businesses already own, but not use in their current decision processes. It can include emails, contracts, and various written reports.
- *Commercial data*: It is available on the market and can be purchased from some companies, private social media sites, and even government agencies.
- *Social media data*: It is social data from Twitter, Facebook, and other general social media.
- *Public data*: It is data such as economic, socio-demographic, or weather data.

In today's business world, executing decision processes without analyzing and understanding the existing data may cause very important administrative problems. Also, decisions taken without considering the data may cause the loss of some opportunities and thus the competitive advantage. “Data-driven organization” is not only a state-of-the-art concept in the modern business approach but also an organizational structuring form that contributes to the improvement of business outcomes. Today's businesses operate in the modern analytical era. The most obvious trigger of the modern analytical era is “big data.” Calling that

concept as “big data” is not only because businesses record large volumes of data, but also the complex relationships between those data can be defined (Kotu & Deshpande, 2015: ix).

Today, more data can be recorded through the development of information and communication technology, and that means establishing new and more complex infrastructures. It requires the generation of large and new storage areas and new access routes for those infrastructures whether the data is structured or not. In today's business world, the data is generated so fast that sometimes there is no time for storage. Thus, the data in the source are directly analyzed. This situation makes the concepts of “Real-time Analytics”, “Stream Mining”, and “the Internet of Things” come true. Only recording the data has no meaning in data oceans with such large and complex relationships. It is valuable to produce hidden patterns and meaningful information based on those data and complex relationships. Accessing those hidden behavior patterns and meaningful information is no longer an option for specialists. It has been the most decisive element of administrative processes for all managers and experts (Kotu and Deshpande, 2015: ix).

Big data is defined as the collection of large, heterogeneous, and complex datasets that are difficult to process using traditional tools and applications. Typically, it is possible to define big data with the following features (Hallikainen, Savimaki, and Laukkanen, 2020: 91):

- Volume (the scale and quantity of data)
- Velocity (the frequency of data production and speed to be analyzed)
- Variety (different formats of unstructured and structured data)
- Value (extracting information from data)
- Veracity (data assurance, the accuracy of data)
- Variability (the constantly changing meaning of the data)
- Visualization (presenting the data inseparably)

Although the term “big data” has gained great popularity in recent years, it has not been defined sufficiently. One of the most common definitions identifies big data based on the following four dimensions: volume, variety, velocity, and veracity. This definition is called as the 4V model shortly (Kantardzic, 2020: 19-21):

Volume: It refers to the size of the data. A size expressed as big data today may not be considered large enough soon. Because, storage capacities increase, larger data sets can be found, and new analysis methods and techniques are developed day by day.

Variety: It refers to the structural heterogeneity in a data set, including the use and benefits of structured, semi-structured, and unstructured data types in different types and formats. Textes, images, audios, and videos are examples of unstructured data, which are dominant data types with more than 90% representation in today's digital world. These different forms and data quality clearly show that heterogeneity is a natural feature of big data and such data is difficult to understand and successfully manage.

Velocity: It refers to the speed at which data is produced, analyzed, and performed. Smartphones, digital devices with available and relatively inexpensive sensors, have caused the capacity to generate unprecedented data in real-time. That rapid data generation process may require new information technology infrastructures and new methodologies that support the growing demand for real-time analysis.

Veracity: It can be expressed as the unreliability of today's digital data and some sources. The need to deal with this imprecise and ambiguous data may require adjustment of data collection tools and analytical methodologies applied.

Big data alone is not a key management activity, on the contrary, it may be considered as a raw material that must be converted into business insights (Zhenning, Gary, & Edward, 2016). Data analytics generally refers to removing hidden behavior patterns from the data to create business information, referring to advanced knowledge and insights of business processes and business environments (Gandomi & Haider, 2015). As a result, big data analytics of business processes and customers means collecting, storing, processing, and instantly discovering the business value and forecasts in a various variety of full-time, customer-related data that aim to create meaningful information for the business to make decisions (Hallikainen, Savimaki, & Laukkanen, 2020).

Data mining is about the analysis processes of huge amounts of data collected with different formats, formats and paths called big data. Data mining, in order to classify and evaluate the information obtained through technological means; It is the step that enables interaction with the user and the database after the stages of data cleaning, integration, selection and conversion. After this phase, implicit relationships are tried to be revealed by reviewing the relationships between big data in data warehouses (Alabay, 2014).

2. THE RELATIONSHIP BETWEEN DATA MINING AND CONCEPTS OF BUSINESS INTELLIGENCE AND BUSINESS ANALYTICS

Business Intelligence can be defined as a data analysis process that uses a series of technology, statistics, and algorithm information to convert the data to meaningful information. Business Intelligence is used for management and decision making in different business problems by using new technologies such as artificial intelligence that uses the thinking / working styles of the human mind. The emergence of Business Intelligence as management technology and tool in a business started with the transformation of significant amounts of collected data into meaningful information. An integral part of risk management and decision-making processes is data analysis and mining. Business Intelligence implementations are also the use and reporting of data mining in different ways. Many approaches offered by data mining are used in Business Intelligence processes. Comprehensive Business Intelligence processes using data mining methods in business processes are used as decision support systems, called Knowledge Discovery in Databases (KDD) (Mishra, Hazra, Tarannum & Kumar, 2016: 86).

Business Analytics concept is the practice and art of using quantitative data in decision making for business processes. Business Analytics includes several data analysis methods. That concept which can be defined as business intelligence today is an analytical approach used to be aware of data visualization and reporting, and to understand "what is what for business processes". In Business Analytics, graphs, charts, and dashboards are used to view, review, and discover data. Apart from static reports, real-time data can be accessed, inferences can be made from those data, and new inference dashboards and mechanisms can be used in a user-friendly way in business analytics. Dashboards provide a tool for administrators to quickly view inferences that are linked directly to business data and cannot be easily seen in a large and complex database. Business Analytics includes data analysis methods such as statistical models and data analysis algorithms used to explore relationships between more sophisticated measurements, calculate numerical values, and discover (infer from) data. Successful business analytics requires an accurate understanding of data mining practices and techniques for values that need to be revealed for the business (Shmueli, Bruce, Stephens, & Patel, 2017: 3-4).

Business Analytics is an important part of the Business Intelligence approach. Data mining and business intelligence directly assist business analysis. Business Intelligence analyzes data using different methods and deduces meaningful information from those data. Business Analytics is a term that includes a series of application of skills, technology, and different data mining algorithms. Business Analytics generates valuable insights to help managers make better decisions about their business and have appropriate control over their business operations. Business Analytics function has two blended main aspects. Those are detecting models, patterns, and the relationship among data groups through data mining implementations and blending those results with various information and executive reporting metrics (Mishra et. al., 2016: 86).

3. THE CONCEPT OF DATA MINING

Data mining has emerged to meet the needs depending on the development of information and communication technologies. Data mining has followed an evolutionary path as follows depending on the developments in database technologies:

- Data collection and database creation,
- Data management (including data storage and retrieval, and database transaction processing)
- Data analysis and data mining concept (data warehouse and data mining)

To illustrate, the historically early development of data collection and database creation mechanisms has led to the development of capabilities such as data storage, retrieval, and querying. The development of those capabilities has also become a prerequisite for the development of effective mechanisms for data processing and analysis. Accordingly, the next step has been to analyze data in databases and deduce meaningful conclusions from the data. Especially the development of heterogeneous database systems and their emergence in internet-based global information systems has made important contributions to the emergence and development of the information industry (Han & Kamber, 2000: 3-5).

Data mining can be defined as processing large amounts of data through automatic or semi-automatic methods to find meaningful patterns. It can be said

that scientific disciplines where data mining is fed the most are statistics and machine learning. Besides, studies in artificial intelligence also contribute to data mining. Although data mining, machine learning, and artificial intelligence are often used interchangeably, they are scientific disciplines that have different purposes but can use common tools.

Data mining has been a concept of great interest most recently. That close interest in the information industry originates from the broad availability of large amounts of data, and also the need to turn such data into useful information and knowledge to make effective decisions for businesses. The information obtained as a result of analysis finds many implementation areas in businesses such as business management, production control, market analysis, engineering design, and science research.

Data mining is becoming an important part of business operations and management in various forms. Today, many business activities and implementations include data mining processes. For example, decision support systems and business intelligence applications, and business activities such as supply chain optimization, demand forecasting, customer relationship management, and product diversity optimization directly use data mining applications. But many business managers are concerned with data mining practices only if they help them get better. They are also not concerned with technical details and problems such as the integration of data, systems, and databases. However, implementing a successful data mining application and increasing the efficiency of business processes are directly related to successful integration. Issues such as project cost-effectiveness, manageability, sustainability, software integration, ergonomics, and restructuring of the business process are of great importance for a successful data mining operation. It must have a financial or operational efficiency for data mining to be useful in business processes. For instance, it should contribute to the core goals of the business such as reducing costs, increasing profitability, improving customer satisfaction, or improving the service quality. Moreover, data mining cannot replace skilled business people or scientists. Its main function is to provide new information and tools to improve the work done by business people or scientists. Today, businesses can record large amounts of data about their shareholders, customers, products, employees, and their operational and financial systems (Kantardzic, 2020: 22-23).

Data mining, also known as "Knowledge Discovery in Databases (KDD)", has three basic origins in terms of terminology and technique (Gorunescu, 2011: 2-3):

- *Statistical Methods*: It refers to Exploratory Data Analysis methods used to define systematic relationships between variables and classical statistical methods. Exploratory Data Analysis methods frequently used in data mining are as follows:

  - *Computational Methods*:
    - Descriptive statistics: distributions, classical statistical parameters (mean, median, and standard deviation, etc.)
    - Multiple frequency tables
    - Correlation analysis
    - Multivariate Exploratory Techniques: cluster analysis, factor analysis, basic components and classification analysis, and discriminant analysis, etc.
    - Advanced linear / nonlinear regression models (linear / nonlinear causality relationship methods / forecasting, etc.)
  - *Data Visualization*: It aims to represent information visually and can be considered one of the most powerful and attractive data research methods at the same time. The most common visualization techniques can be listed as follows: any types of histograms (column, cylinder, cone, pyramid, pie, and bar, etc.), box charts, scatter charts, matrix charts, etc.

- *Artificial Intelligence Applications*: It has contributed to the development of data mining through information processing techniques based on the human reasoning model. It represents an extremely important scientific discipline in the development of data mining using Machine Learning techniques, which are closely related to artificial intelligence.
- *Database Systems*: It is considered as the third root of data mining and provides information by using the methods mentioned above.

4. THE IMPLEMENTATION PROCESS OF DATA MINING

Data mining is related to looking for hidden relationships and models between different data groups. Data mining is different from OLAP queries that predefined certain pattern or relationship queries are made to process the data in the database. Uncovering hidden patterns, courses of action, and models though data mining can provide significant benefits in innovative decision making to businesses. The main purpose of businesses is to maximize their financial returns by offering better services and/or products to their customers. Customer perceptions, customer behaviors based on operational data and other external data, or relationships and behaviors related to product performances can be defined through implementations such as data mining. Thus, products and customers can be managed more predictably (Mishra et. al., 2016: 86). So, that contributes to the success of business management.

It is necessary to accept that there is a standard set of procedures in the implementation process of data mining as in all other disciplines. The general experimental procedure adapted to data mining problems includes the following steps (Kantardzic, 2020: 10):

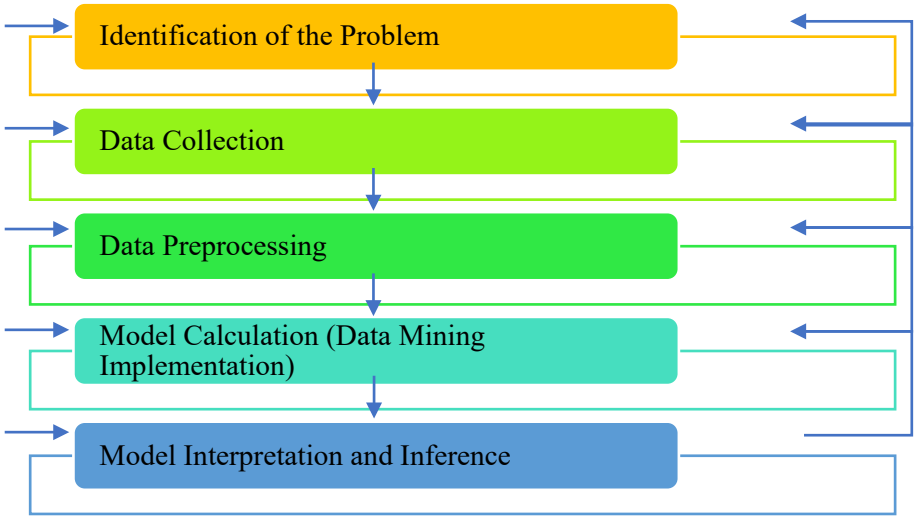

Figure 1. The Implementation Process of Data Mining

Source: Kantardzic, 2020: 10

Many large businesses including automobile manufacturer Daimler-Benz, insurance provider OHRA, hardware and software manufacturer NCR Corp., and statistical software manufacturer SPSS, Inc. identified and standardized an approach to the data mining process in 1999.

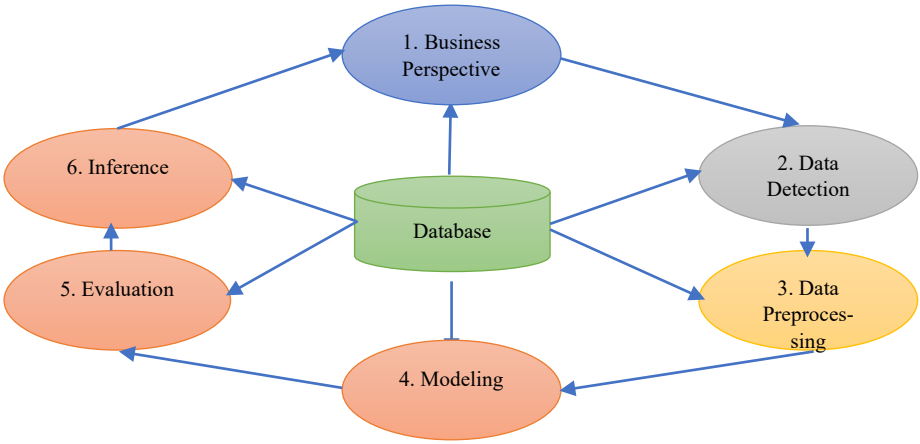

Figure 2. Cross-Industry Standard Process for Data Mining (CRISP-DM)

Source: Kantardzic, 2020: 10

The CRISP-DM methodology offers a structured approach to planning a data mining project. Several data mining implementations provide practicality, flexibility, and usability while using analytics to solve complex business problems.

5. METHODS AND TECHNIQUES USED IN DATA MINING

The methods used in data mining can generally be examined in two groups as supervised and unsupervised learning models (Kotu & Deshpande, 2015: 8):

Supervised data mining methods: Those methods try to extract a function or relationship based on labeled training data and use it to map new unlabeled data. Supervised data mining methods are used for information retrieval and inferring if a well-defined or exact target is in question. The value of the output variables is estimated based on a series of input variables in supervised techniques. To implement this, a model is developed from a training dataset that input and output values are already known. The model generalizes the relationship between input and output variables and uses it to estimate the data set that

only input variables are known. The predicted output variable is also called a class label or target variable. Supervised data mining requires a sufficient number of labeled data to learn the model from data.

Unsupervised data mining methods: Unsupervised or undirected data mining reveals hidden patterns in unlabeled data. There are no output variables to be estimated in unsupervised data mining methods. The purpose of this class of data mining techniques is to reveal patterns in the data based on the relationship between data points themselves. An application can use both supervised and unsupervised techniques.

It is possible to classify data mining techniques as follows.

5.1. Exploratory (Descriptive) Analysis

The first step in the data mining process is exploratory data analysis. This analysis is used to identify courses of action or patterns based on the experience. Information about the data sets can be obtained systematically at first glance through the exploratory data analysis techniques. On the other hand, it can assist the pre-processing process and choosing the data analysis method. Basically, Exploratory Data Analysis is the basic statistical method that deals with reviewing, arranging, and using data in other analysis methods if there is a low level of information about the situation under study. Exploratory Data Analysis can be investigated in three different ways as basic statistical methods, advanced exploratory methods, and multivariate exploratory methods. Some of the exploratory data analysis methods are as follows (Gorunescu, 2011: 57-58):

- Descriptive statistics (mean, standard deviation, mode, median, etc.)
- Correlation matrix analysis
- Data visualization
- Variable distributions analysis (symmetry, normality, multiple modes, etc.)
- Advanced linear and nonlinear causality models
- Multivariate discovery techniques
- OLAP -Online Analytical Processing

5.2. Cluster Analysis

It is the process of automatically assigning the samples in a group to several clusters according to the measure of similarity (or difference) relationship.

Input for cluster analysis is a measure of similarity (or difference) between a group of samples and two samples. Euclidean distance, which can be applied in other similarity measurements, can be used to find out how close or far one cluster is from another. For example, a useful implementation of cluster analysis is to identify different customer clusters in the market for businesses. Cluster analysis can be used to apply different marketing strategies to each of the sub-clusters of consumer clusters in the market. This will help to find customers' cluster quality by observing the difference in the purchasing patterns of customers in one cluster compared to customers in the other cluster (Mishra et. al., 2016: 85-86).

For example; It is possible to determine the clusters of each customer by analyzing their geographical information about the lifestyle.

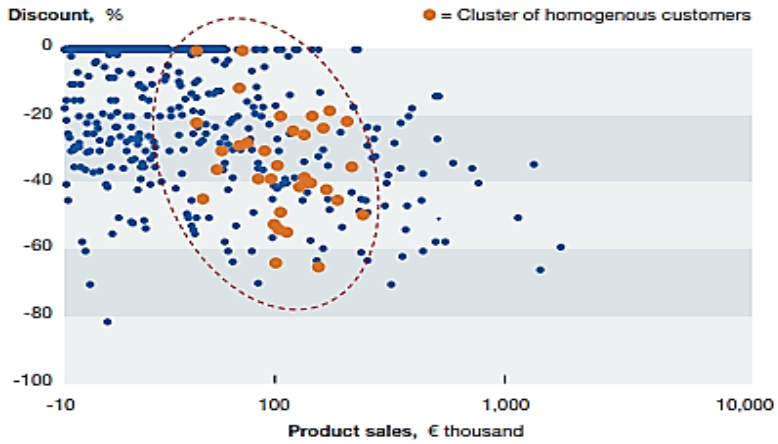

Figure 3. An Implementation of Cluster Analysis based on Discount Rate and Product Sales

Source: McKinsey, 2015

The cluster analysis figure above is important as it reveals opportunities for price differentiation at the customer-product level based on the willingness to pay of customers.

Cluster analysis may be used for many different purposes. Some of them are as follows (Kotu & Deshpande, 2015: 217-218):

- Marketing: It can be used to find common customer groups according to all past customer behaviors, potential customers' characteristics, and/or

purchasing models. Cluster analysis used in marketing helps to segment customers, identify prototype customers, and prepare different marketing strategies according to customers in each cluster.

- Document Clustering: It is a common text mining implementation. The main purpose is to divide documents into groups on similar topics.
- Session Grouping: In web analysis, clustering is used to understand consumers' clickstream patterns and discover different types of clickstream profiles. On e-commerce sites, clickstream groups can be customer groups that "know what they want and continue the process until payment" and/or "review products, read consumer reviews, and then go to the payment process." That grouping helps e-commerce businesses to understand customer behavior and develop new promotional efforts.

Clustering methods based on the membership of data in an identified group in a database can be listed as follows (Kotu & Deshpande, 2015):

- Exclusive or strict partitioning clusters
- Overlapping clusters
- Hierarchical clusters
- Fuzzy or probabilistic clusters
- Prototype-based clustering
- Density clustering
- Model-based clustering

5.3. Classification Analysis

Classification analysis is the process of assigning data items to a predefined class in a dataset. Classification analysis methods are used to implement information discovery in data mining. To illustrate, it can be used to classify trends in financial markets, and to automatically group and define objects in image databases for image processing (Weiss & Kulikowski, 1991; Fayyad, Piatetsky-Shapiro, & Smyth, 1996: 44). Analyzes are performed with output variables that have a categorical or polynomial measurement level in the classification analysis. For example, the yes or no decision to approve the loan is the two-choice measurement (Kotu & Deshpande, 2015: 9).

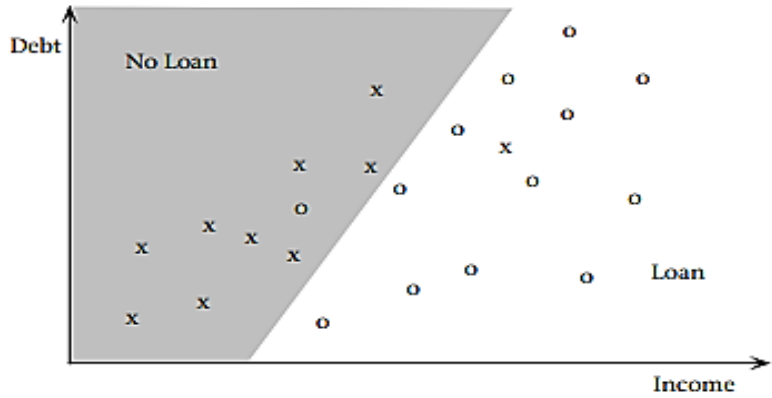

Figure 4. Income Level and Credit Debt Ratio Relationship

For example, a bank may want to investigate whether it will be possible to give credit to customers in the future. Here, which customers will be in which class can be determined by the classification method.

5.4. Regression Analysis

Regression analysis is a statistical method used for predictive modeling of variables measured through continuous measurement. In regression analysis, the aim is to estimate the best model that can relate input variables (independents) to output variable (dependent). The most common reasons for applying regression analysis are as follows (Kantardzic, 2020: 175):

- Measuring independent variables (inputs) is relatively cheaper than measuring the dependent variable (output).
- Generally, it is necessary to estimate the output variable while it is more possible to collect information about the input variables.
- The behavior of the output variable can be controlled by observing the changes in the input variables.
- It may be necessary to define the causality relationship and level between input and output variables.

It is an analysis method to search the cause-effect relationship (the causality) between at least two variables. It is used to estimate the direction and strength of the relationship between defined variables. Regression analysis can

use different forms and techniques such as simple linear, nonlinear, and multiple regression methods (Nakip, 2013).

Regression analysis can be used to predict a patient's probability of survival through the results of some diagnostic tests or to forecast consumer demand for a new product as a function of advertising spending (Fayyad, Piatetsky-Shapiro, & Smyth, 1996: 44).

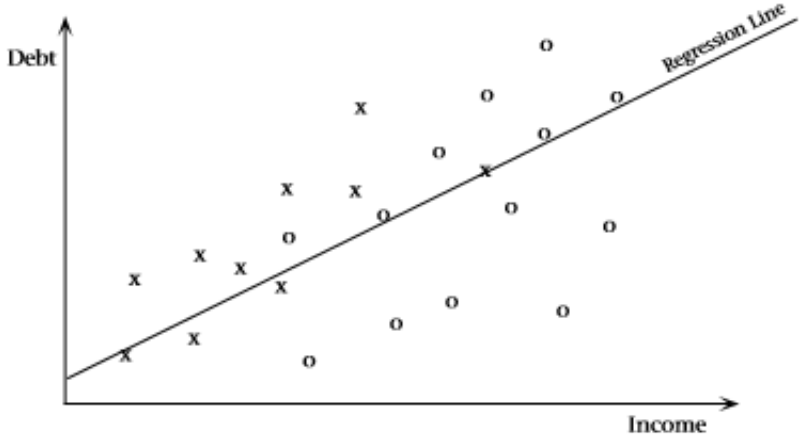

Figure 5. The Relationship of Income Level and Credit Debt Ratio

Source: Fayyad, Piatetsky-Shapiro, & Smyth, 1996

The figure above shows the result of simple linear regression in which total debt is analyzed as a linear income function: There is a weak correlation between variables according to that regression line.

5.5. Association

The data mining technique for the association or relating helps to identify data, correlations, and relationships between variables in a large volume dataset. Association rule analysis is the most widely used technique of unsupervised data mining methods. Since large amounts of data can be stored continuously in businesses and industries, there is an effort by businesses and researchers to identify undefined relationships between those data. Relationships between those data sets or variables contribute to business decision making processes. The most typical implementation of the association rule is "Market Basket

Analysis and Response Rate Analysis". In Market Basket Analysis, customer purchasing habits are analyzed through finding purchasing relationships between different products that customers place in shopping baskets. With the help of that analysis, businesses develop their marketing strategies by determining the frequency of purchases and purchasing associations of customers (Han and Kamber, 2000: 3).

There are parametric and nonparametric methods in the association rule. Parametric methods help define general models while non-parametric methods help define more detailed and local models (Kantardzic, 2020: 336).

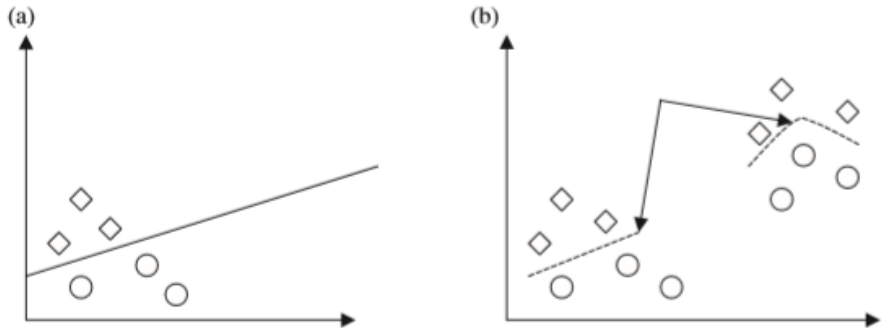

Figure 6. Parametric (a) and Non-Parametric (b) Methods

Source: Kantardzic, 2020: 336

5.6. Feature Selection

With the emergence of the concept of big data, businesses have not only had a significant amount of data and but also been faced with problems of reaching more meaningful and useful variables from that big data. For that reason, one of the important stages of data mining implementations is the reduction of that crowded and complex data size. Reducing the data size is important for businesses for reasons such as saving time in data storage and analysis processes. Also, today's businesses automatically record many relevant or irrelevant, useful or useless data in their systems. For that reason, it is necessary to extract irrelevant and unnecessary variables/data in the database for successful estimation and data mining. The methods used to reduce the data size are generally known as Feature Selection. Feature Selection is defined as the selection of the best subset(s) that can represent the original data set. This process aims to reduce the number of features in the dataset, that is, to reduce the data size by

selecting the most useful and most important features for the problem in hand (Budak, 2018: 21). It should not be forgotten that data storage has also difficulties in many aspects. Commonly used feature selection techniques are examined on three methods as filter methods, wrapper methods, and embedded methods. Some of these methods can be listed as follows:

- Filter Methods: Fisher Score, t-Score, Welch t-Statistics, Chi-Square test, Knowledge Gain Rate, Symmetric Uncertainty Coefficient, Correlation Based Feature Selection, Relief, and One-R
- Wrapper Methods: Sequential Forward Selection, Sequential Backward Selection, Plus l – Minus r, Sequential Forward Floating Selection, and Sequential Backward Floating Selection
- Embedded Methods: Decision Trees and Support Vector Machines-Recursive Feature Elimination.

5.7. Text Mining

Today, large amounts of data are found in the internal processes of organizations and documents on the internet. Text Database is growing due to available data from many online channels such as electronic forms, electronic publications, digital libraries, e-mails, social media accounts, and the internet. Special data mining techniques have been developed to discover new information from the data in the semi-structured form in the text database. Text mining can be used in all areas where there are large amounts of texts that need to be analyzed. Automatic processing of documents by using different techniques is often used to extract key points in the text and categorize documents although it does not allow the depth of analysis that a person can do. Automatic analysis of the text can be used for several different main purposes (Kantardzic, 2020: 375-377):

- Providing an overview of the content of a large document collection and organizing them in the most efficient way
- Identifying hidden structures between documents or groups of documents
- Providing a search process efficiency to find similar or related information
- Detecting duplicate information or documents in an archive

Approximately 80% of the information contained in the enterprises is included in texts. Text mining is a multidisciplinary field that uses techniques

such as information retrieval (IR), text analysis, information extraction, natural language processing, clustering, classification, visualization, and machine learning. Text mining can be successfully applied in areas such as market research, business intelligence applications, e-mail management, demand analysis, e-procurement, and automatic help desk. The process of applying text mining can be defined as follows (Kantardzic, 2020: 378);

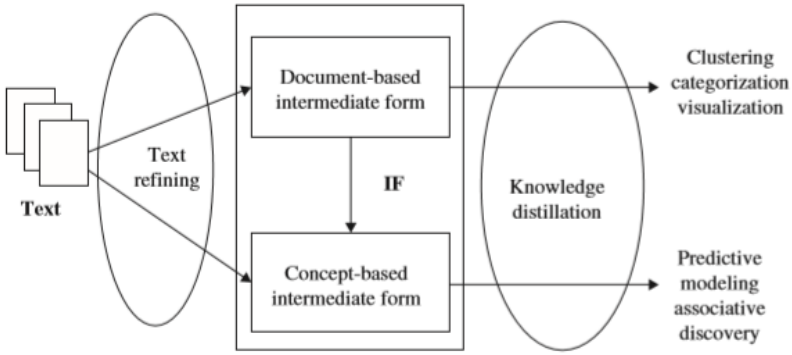

Figure 7. Conceptual Framework of Text Mining

5.8. Anomaly Detection

The main purpose of Anomaly Detection is to find outliers in the data set. Outliers are objects that do not conform to the general trend in the dataset and stand out compared to other data. Classification, clustering, regression, and other algorithms are used in identifying outliers. Outliers in the dataset can be caused by errors or variability in data. Determining the reason for the existence of outliers is important for determining which action and analysis method. It is often impossible to pinpoint the cause of the outlier. Some of the most common reasons for an outlier in the dataset are as follows (Kotu & Deshpande, 2015: 329-330):

- *Data Error*: It can be a part of the dataset due to measurement errors, human errors (data logging, etc.), or data collection errors.
- *Normal Variance in Data*: In a normal distribution, 99.7% of data points are within three standard deviations from the mean. But sometimes data can fall outside of those values. Although those values deviate some descriptive statistics, it should be remembered that they are a natural part of the data set.

- *Data from Other Distribution Classes*: Daily visits to a website have a certain average per person or IP, and that is a normal distribution. However, in some cases, quite high clicks can be obtained from the robot software called bot account outside of that mean. Here, there is a binary situation, although the values coming from bot IP are inconsistent, distributions of clicks from bot accounts may have a normal distribution. That is considered as the distribution of a different class.
- *Distributional Assumptions*: It may result from incorrect assumptions made on data or distribution. For example, if the distribution of visits to a library is examined during the exam periods, it is possible to encounter a quite high value than the normal distribution.

The methods used in outlier analysis can be analyzed in two groups as statistical methods (Gauss or normal distribution, Mahalanobis distance) and data mining algorithms (clustering, classification, and distance-based, density-based, distribution-based algorithms).

6. AREAS OF UTILIZATION OF DATA MINING METHODS IN BUSINESSES

Today, a significant majority of data mining implementations have focused on marketing in businesses. Data mining practices in marketing include activities such as customer segmentation and profiling, customer acquisition, customer confusion, and customer lifetime value management. Also, data mining is focused on activities such as risk analysis and fraud in banking, finance, and insurance. Besides, data mining practices and researches have spread to various sectors from production to technology, medical, pharmaceutical, government, and academy. Applications in those areas range from traditional sales forecasts to product suggestions and forecasting models of selection perception (Kotu & Deshpande, 2015: 1). Data mining practices can take place in quite different fields and different formats. For this reason, it may not be correct to limit the fields of data mining to only subfields such as finance, marketing, telecommunication and media, production, construction, electricity, and the following subfields. Also, a method used in one area can be used effectively in a different area. However, it may be useful to classify the areas of usage of data mining.

Accordingly, data mining usage areas can be listed as follows (Hofmann & Klinkenberg, 2014: 7):

a. Financial Services:
   i. Fraud Detection
   ii. Prevention of Customer Churn
   iii. Sensitivity Analysis
   iv. Trade Analytics
   v. Risk Management

b. Retail and Consumer Products
   i. Customer Segmentation, Channel Selection, and Next Best Transaction
   ii. Direct Marketing
   iii. Suggestions, Cross-sale, and Promotion
   iv. Customer Life Value

c. Telecommunications and Media
   i. Network Analysis
   ii. Customer Service Process Automation

d. Production, Construction, and Electronics
   i. Predictive Maintenance
   ii. Patent Text Analysis
   iii. Supply Chain Management
   iv. Productivity Optimization
   v. Quality Assurance

It is possible to generalize data mining usage areas as above. Within the scope of this study, the implementation areas under the heading “Retail and Consumer Products” which contain practices related to business processes will be briefly explained:

Customer Segmentation: Based on customer purchase history, customer segments can be created using classification or cluster analysis. Those segments are a more in-depth and more buying behavior-based approach than the classical A-B-C consumer classification. Segmentation of customers is used to assign customers for marketing channels or to identify potential customer groups. It can also help decide which marketing strategy is most appropriate for those customer segments.

Direct Marketing: It is the application area that includes data collection, testing, and analysis processes about current and potential consumers used to perform certain marketing actions more effectively. It can be determined that potential customer candidates will be interested in which product, service, or offer as a result of the analysis conducted the data collected in the business database through data mining (Thomas & Houden, 2002: 4; Karaboğa, 2020: 3). The whole point for businesses is to identify the sales that customers are most likely to respond to direct marketing campaigns. Thus, a high income can be obtained only by communicating with the most probable customer groups to minimize communication costs and compensate for campaign costs (Hofmann & Klinkenberg, 2014: 7). Methods such as RFM analysis, Cluster Analysis, Potential Customer Profile Analysis, Email Response Rate Analysis, and Purchase Tendency Analysis are frequently used to ensure effectiveness and identify potential customer groups in direct marketing campaigns (Karaboğa, 2020: 6).

Cross-sale, Suggestion, and Promotion: One of the important success areas of data mining applications is cross-sale and suggestion system. Those methods, which are frequently used in retail websites such as amazon.com, may not seem complicated at first glance. The problem is that there are customer populations who buy so many similar or different products. The important thing is to reveal similar consumption patterns. Association analysis can often be used to reveal those behavior patterns. That approach is called cross-sale and can complement or even replace traditional cross-sale approaches based on manual rules (Kantardzic, 2020: 9).

Customer Lifetime Value: Traditional business intelligence systems based on OLAP approaches are excellent for answering questions such as who the most purchasing customer has been ever or how much earned from the top 10 customers. Although those are undoubtedly important information, unfortunately only affect the past. Good customers can switch to another supplier or leave for other reasons before the processes are analyzed. That is why a good customer generating a lot of revenue so far does not mean that that will continue in the

future. In such cases, predictive algorithms can be used in addition to static information inquiries. Thus, typical customer value cycles are determined, and customer lifetime value groups can be created by assigning customers to these cycle groups.

CONCLUSION

As a result, data mining is an inevitable strategic tool in today's competitive environment for the processing of huge data generated by the information age and to produce information that will make the right decision for businesses. Data mining requires costly applications. However, there are dozens of software written in this area and there are companies that do this job. Therefore, data mining applications can be made through service procurement. This helps to eliminate small business, large business difference. It also allows small businesses to take advantage of data-driven decision-making, allowing them to gain competitive advantage alongside large-scale businesses (Alabay, 2014).

In this study, the relationship between big data and data mining is presented. At the same time, the most used methods in data mining are listed and explained. Finally, the fields of use of data mining in terms of business administration and management science are listed. From these areas; some of the applications used in the field of supply chain and consumer products are conceptually explained; customer lifetime value with customer segmentation, direct marketing, cross-selling and suggestion system.

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CHAPTER 3

REPORTING FINANCIAL INFORMATION WITH XBRL

Mine Aksoy

INTRODUCTION

Information has become an important source of power for companies in today's world. With effective information management, a company can have better decision-making and better planning. There are many definitions of information management. According to Choo (1995):

"Information management is a cycle of processes that support the organization's learning activities: identifying information needs, acquiring information, organizing and storing information, developing information products and services, distributing information, and using information."

XBRL is a language for the electronic distribution of financial data. From an information management perspective, XBRL provides benefits for data preparation, data analysis and data communication. These benefits offer cost savings, greater efficiency, and improved accuracy and reliability.

A financial information system can be described as a system that accumulates and analysis financial data to aid financial management decisions in the organization. The most important tangible assets of the financial information system are financial reports. Fast, reliable, and timely presentation of financial reports is very important for managers, shareholders, and stakeholders. The general structure of the financial information system actually reflects the accounting information system. Traditional accounting information systems appear as a classifying system that records information while the modern financial information system is used in internal control and decision-making.

Financial reporting is the transmission of data about financial events collected, recorded, classified, and summarized in the accounting information system to inform users in an understandable manner, at regular intervals, or if re-

quested. Financial reports provide business parties with information about the results of the business's financial affairs.

Shareholders and stakeholders use financial reports for different purposes.

- Investors use them to make investment decisions.
- Bankers use them to make loan decisions for lenders.
- Boards of directors use them to make business and management decisions.
- Employees use them to monitor the company's capacity to meet its obligations.
- Government use them to collect taxes; control compliance with laws and regulations.

Financial reports can be in standard and they also generally accepted formats, as well as in special formats and special times in accordance with the demands of users. There are many reasons for the differences in financial reporting between countries such as cultural differences, differences in the current legal system, differences in the qualifications of fund providers to businesses, and differences in tax and accounting practices. Besides, differences such as political and economic conditions, inflation, level of economic development, education level can also be shown among factors. While there are differences in the format of financial reporting, there is always a mandatory core of standard information, consisting of "accounts" or financial statement items.

1. USERS OF XBRL

Information management drives digital transformation and digital transformation requires better information management. Rapid developments in information technology (IT) and especially on the internet and related technologies affect financial reporting. The choice of technology to be used to report financial information is one of the decisions that companies face. The first alternative in this discussion may be reporting using Extensible Markup Language (XML), and the second alternative can be using Extensible Business Reporting Language (XBRL), a language enriched for business applications (Farewell, 2010, p. 3).

XML is a text-based markup language. It is hardware-software independent and similar to Hyper Text Markup Language (HTML). Different from HTML,

XML allows for undefined tagging by the author to define the document structure. XBRL is an application of XML using W3C1 standards. XBRL offers not only vocabulary for financial reporting but also a way to clearly represent the semantics or meaning of the reported information (Farewell,2010, p. 3).

According to its website https://www.xbrl.org/the-standard/what/an-introduction-to-xbrl/:

XBRL is the open international standard for digital business reporting, managed by a global, not for profit consortium, XBRL International. XBRL is used in more than 50 countries around the world. XBRL provides a language in which reporting terms can be authoritatively defined. Those terms can then be used to uniquely represent the contents of financial statements or other kinds of reports. As is shown in Figure 2, XBRL lets financial information to move between organizations rapidly, accurately, and digitally.

Figure 1 shows the traditional reporting between the institutions. The effect of XBRL on the current reporting process is shown in Figure 2.

XBRL has been initiated and developed by a diverse group of professionals. Large accounting companies, software companies, professional organizations, and the banking industry have all supported XBRL, since the beginning (Roohani et. all. 2010, p. 132). XBRL has the potential to guarantee a global standard to increase the accuracy, accessibility, availability, efficiency and reliability of electronic communication of financial data.

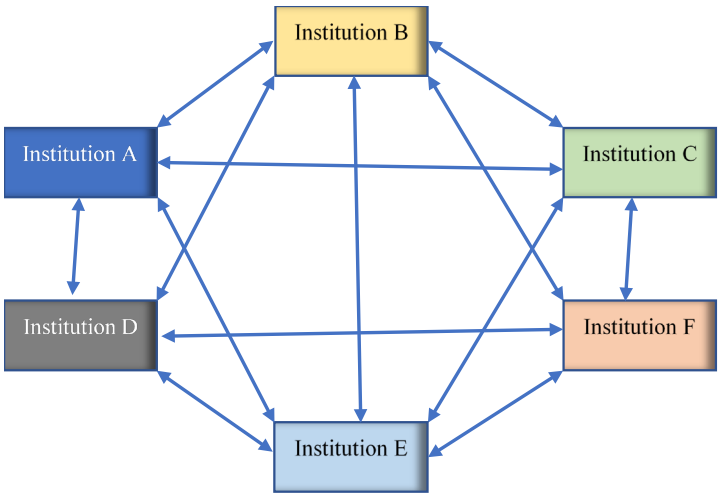

Figure 1. Financial reporting with traditional ways

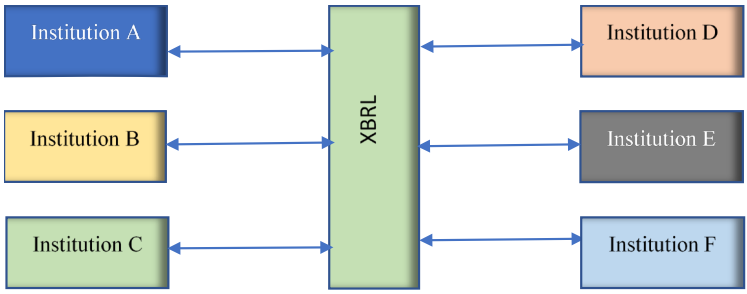

Figure 2. Financial reporting with XBRL

Note: Adapted and modified from Vasal & Srivastava (2002).

XBRL is used by different groups of users for many different purposes, including accountants, analysts and investors, companies, data providers, governments, and regulators. Although many benefits of XBRL use are predicted, it is possible to sort the most basic benefits for different user groups.

According to its website https://www.xbrl.org/the-standard/what/an-introduction-to-xbrl/ :

Regulatory agencies and other authorities

- They can automatically obtain information without trying to rewrite, format, or convert it.
- Costs are significantly reduced by automating routine jobs.
- Problems with filing are detected automatically and quickly.
- The information is analyzed and compared much faster, more reliably and effectively.
- Activities and information are controlled much more quickly, and the judgment is reached.
- Analysis and decision-making can be more concentrated instead of information manipulation
- Efficiency and cost savings are provided when filing.

Companies

- They can reduce costs by preparing information in one format and getting a large number of outputs from it. Companies get rid of the same information over and over again and other manual applications.

- They can consolidate results very quickly and reliably between units and subunits.
- They can increase the certainty and credibility of financial information.
- They can more focus on analysis, short and long-term financial planning, and decision-making rather than laborious issues such as the collection and preparation of information.
- They create a much more efficient internet use when communicating with investors.
- With more transparent and user-oriented information, they can develop investor relationships.
- They receive much faster responses from banks than regulatory agencies and similar businesses.
- They get rid of software that is difficult to use and cost-effective.

Analysts and Investors

- They ensure that company information is obtained transparently, understandably, and consistently.
- They gain the ability to compare and handle the company and deeper knowledge in a much wider field.
- They allow you to use much more advanced software for comparison and analysis.
- They gain activity in acquiring more concrete information from the company.
- They can choose information much more quickly to make comparisons.

Accountants

- They can get quick and reliable information about the company's financial performance and have the ability to record and report them simultaneously.
- They save labor and cost by being more effective at analyzing and interpreting information.
- They can automate them by simplifying transactions.
- They can concentrate on jobs and analysis that can create added value.

- Synchronicity is gained in sharing, reporting, and presenting information.

Banking, Credit and Credit Management and XBRL

- With automated reporting, they get fast and reliable information.
- They can reduce costs on information production.
- They can obtain financial information to both compare and analyze in a much more reliable, efficient, and complete way.
- They can track financial performance effectively and quickly.
- As a result, they are more effective and they also secure in the decision-making process and can return to their customers more quickly.

2. BASICS OF XBRL

Developers and users in general, need to understand a few of the basics of XBRL to not underestimate the size of the standard and all the features that are covered by it. According to its website https://www.xbrl.org/the-standard/how/getting-started-for-developers/:

"Concept is the definition of a term that needs to be, or might be, disclosed in a particular domain (e.g., Profit is a concept that is often disclosed in a business domain)."

"XBRL taxonomies are the metadata framework against which information can be reported. Major accounting and risk domains are modeled as XBRL taxonomies, including IFRS, US GAAP."

"Data is from an XBRL perspective, the values reported against this metadata are just that – a value, be it a numeric, monetary, boolean, text value – or occasionally even an encoded value like a picture or a chart. The value 1000 can be associated with the concept of Profit."

"Dimensions: Most XBRL environments allow organizations to report multiple values against the same concept, for various kinds of repeating values."

"Extensions: Taxonomies can be extended in order to modify the relationships between existing concepts, or to add new concepts to an existing taxonomy. Extension taxonomies are separate documents that import the base taxonomy and override certain aspects of the original."

3. THE PROGRESS OF XBRL

The history of XBRL is relatively short. In the year 2000, XBRL announced the launch of the first specification for United States companies: "XBRL for Financial Statements". Regulatory and supervisory agencies noticed that financial reporting has become extremely complex (SEC 2008; FRC 2009). As a result, the Securities and Exchange Commission (SEC) and the Financial Accounting Standards Board (FASB) undertook several initiatives to understand and simplify the financial reports (e.g., SEC 2008; FASB 2016). In 2009, the SEC passed Interactive Data to Improve Financial Reporting, which required companies to report financial statement information in XBRL format. The adoption of XBRL was initially voluntary. Mandated XBRL reporting for Form 10-K was phased in during 2009, 2010, and 2011 for large accelerated filers (Hoitash et. al, 2020, pg.8).

Since its inception and until today, XBRL has experienced continuous development worldwide (Enachi & Andone, 2015). While Europe focuses on XBRL for use in government and cross-border applications, the US focuses on XBRL for use in capital markets (Clos Segura, 2018). South America has focused its XBRL initiatives on both sectors, banking, and business reporting (Clos Segura, 2018, p.24). Finally, in Asia, XBRL has been used in capital markets. China is now the country that leads the integration, development, and adoption of XBRL reporting (Clos Segura, 2018, p.25).

XBRL compliance efforts also started in Turkey. Since 2003, the efforts still continue today and are coming up with new services every day. Turkey met with XBRL in 2003 and until today has found application area in the form of e-invoice, e-archive, e-ledger. Turkey's Central Securities Depository has officially launched its updated Public Disclosure Platform (KAP) for the filing of IFRS based financial statements by listed companies on Borsa Istanbul to the Capital Markets Board. The system is XBRL based. In addition to Borsa Istanbul companies and ETFs, investment firms, mutual funds, pension funds, foreign funds and portfolio management companies may submit using the KAP.

XBRL International is a global nonprofit organization that works for the public good. XBRL Turkey is a joint venture of key public and private organizations that will lead the implementation of XBRL for digital business reporting in Turkey. It has been granted Jurisdiction status in 2013 . XBRL Turkey currently comprises of key stakeholders from the regulatory, academic and business communities, including the Ministry of Finance, the Central Bank of Turkey, the Capital Markets Board, Borsa Istanbul A.S., the Banking Regulation

and Supervision Agency, the Scientific and Technological Research Council of Turkey and Turkish Statistical Institute. The Public Oversight Accounting and Auditing Standards Authority is working with the stakeholders to outline an XBRL roadmap for Standard Business Reporting In Turkey. Many Turkish Ministries have active XBRL projects and there is a planned transition to standard business reporting in the future.

CONCLUSION

A financial information system accumulates and analyzes financial data used for financial planning, control, forecast and outcomes. A well-managed financial information system is required for a company, as management needs the information gained to decide how to run the organization. Financial reports provide shareholders and stakeholders with information about the results of the company's financial affairs. Advances in information technologies changed the way that companies prepare their financial statements and deliver financial information to stakeholders.

XBRL is an open source, universally accepted information exchanging language. XBRL allows companies to transmit financial information electronically so that data can be easily extracted using computer code. XBRL improves the quality and speed of financial information transmitted. This technology provides tremendous benefits for information management.

Although there may be some potential problems that users of XBRL need to face; inexperienced users, initial costs are amongst related problems. Worldwide use of XBRL has become widespread and attracted great attention. It is obvious that XBRL filing will be mandatory in different parts of the world in the future. The goal of this chapter was to inform researchers on the potential of XBRL data and provide insights to stakeholders such as regulators and financial statement users and preparers about the benefits of XBRL. The advantages of using XBRL are seen in automation, cost savings, faster, more reliable and more accurate data processing, data analysis and better quality information and decision making (Clos Segura, 2018, p22.).

With the widespread use of XBRL, there will be an interest in the academic community within the context of XBRL-related studies. For Roohani et al (2010), the future of XBRL research may include a wide variety of areas that interest accounting and financial academics. Under these circumstances, there may be an increase in the number of articles related to XBRL published in academic journals in 2020 and later.

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CHAPTER 4

BLOCKCHAIN IN TAXATION

Derya Yayman

INTRODUCTION

Blockchain technology is a secure system that is accessible to everyone over the internet, thus allowing many transactions to be stored electronically. Thanks to this technology, many transactions no longer need to be kept as printed documents.

Satoshi Nakamoto used the word Blockchain indirectly for the first time in his article titled "Bitcoin: A Peer-to-Peer Electronic Cash System" published in 2008. Nakamoto has defined the technology component underlying crypto money as a series of cryptographically chained blocks of data. He discussed Bitcoin contracts on a page published in Crytography Mailing List. He led the development of Bitcoin by writing articles about Bitcoin until 2010.

With the introduction of the Bitcoin currency, blockchain technology has also emerged and has become the center of attention all over the world. Bitcoin and blockchain mean safe and fast money transfers that work on the principle of approval simultaneously by different sources (Taş & Kiani, 2018, 369).

Cryptocurrencies use cryptography to control transactions, increase supply and prevent counterfeiting. Transactions are confirmed, stored digitally and saved in the blockchain. Blockchain can be considered as an accounting system that includes all transactions (Karaoğlan, Arar & Bilgin, 2018: 1).

Blockchain technology has initally been applied in the financial sector, then its applications in health, food, customs, insurance, transportation, foreign trade and accounting have started to be seen.

Its use as a technology providing innovation in many sectors has become increasingly widespread due to its advantages.

Every country in the world needs tax revenues to be able to provide public services and serve their citizens better. No country can function properly and ensure the well-being of its citizens without tax. The more complex the tax systems are, the more taxes compliant citizens will have to pay. It is an important issue to implement blockchain technology efficiently in tax systems, leaving more available income for taxpayers.

It is being debated whether the use of blockchain technology will increase tax compliance of taxpayers. At the same time, issues that may play an important role both in accelerating tax collection and in preventing tax evasion have started to be brought to the agenda all over the world. Because blockchain technology is a transparent, reliable record-based system, this technology is a very important subject due to its possible benefits in taxation.

In this study, the use of blockchain technology in taxation, its effects and results worldwide and in Turkey will be analyzed. In the first part of the study, the definition, nature, development process of blockchain will be discussed. In the second part, the taxation process using blockchain worldwide and in Turkey will be examined in detail.

1. DEFINITION OF BLOCKCHAIN TECHNOLOGY, DEVELOPMENT PROCESS AND QUALIFICATIONS

In our age of information and informatics, the internet has become one of the indispensables of our daily lives and has led to the emergence of new global trends. Cryptocurrency transactions and blockchain technology are increasingly taking place among these trends.

1.1. Definition of Blockchain Technology

In substance, blockchain technology is not only limited to financial transactions, but is an intact digital ledger of economic and commercial transactions that can be programmed to find applications of almost any value (Jurowiec, 2018).

Blockchain is a secure data transmission technology. It is a constantly growing fragmented database in which records are linked with encrypted elements. Blockchain can be defined as a digital system that enables internet transactions to be recorded by adding them together like rings of a chain and doing

this over a digital network connected to millions of computers, which is why it is almost impossible to delete, hack, imitate or eliminate.

Blockchain is a system that provides encrypted transaction tracking, records all money exchanges, and has high security features and encryption methods. In this database, each information is stored in blocks, by connecting with advanced encryption algorithms, provides the opportunity to operate without connection to a center. Blockchain network is a system where every financial exchange is recorded. Blockchain technology can be used as a high security system in many fields besides banking (İzmir Chamber of Commerce, 2017).

The power of blockchain technology is based on the interaction between three elements: a distributed ledger, a consensus protocol and a new data structure. A distributed notebook is a simple book or computer file that records transactions. This is an innovation in accounting (Center for Global Development, 2017: 8).

1.2. Development Process

In November 2008, a strange white paper was published, which is said to be published by someone or a group of people using the nickname Satoshi Nakamoto. This document analyzed a digitalized currency system that was completely dependent on computer technology, which began connecting data blocks without the intervention or involvement of a third party. It was later introduced as Bitcoin.

Bitcoin is the first case to use blockchain technology. Today, technology is used much more widely and takes place in many business applications (Jurowiec, 2018).

The concept of bitcoin and blockchain started to be discussed on the forums in 2010 and began to be consolidated with Wikileaks' acceptance of donations with bitcoin in 2011. Later, the concept of blockchain started to get out of the shadow of bitcoin and attract the attention of all countries of the world. So much so that the Estonian government has begun work to include blockchain technology in its digital identity work.

Blockchain and bitcoin, which started to spread around the world and attracted attention, saw the level of 1000 USD in 2013. In the same year, the bitcoin ATM was opened and ethereum promotion report was published. Thanks to the advantages of blockchain technology, the star of crypto money

has also started to shine. Later that year, the Ethereum Foundation was established. World-renowned companies such as Dell and Microsoft have started accepting bitcoins in their payments.

In 2015, "The Economist" magazine crowned the bitcoin by carrying it to the cover page. 2015 was one of the productive years for ethereum. In the consortium it has established with 9 financial institutions, the ethereum network has reached nearly 40 members. The hyperledger project was announced in 2016. After these developments, which started to attract the attention of China, Blockchain Shenzen Consortium was declared with 31 members.

By 2017, after China's predisposition to the cryptocurrency market and blockchain technology was seen, countries did not want to lag behind this digital transformation and began to tighten their steps. In this context, the Crypto-Economics Research Institute has started operating in Austria.

In 2018, both international organizations and states increased their operational activities relating to blockchain. The European Union has announced blockchain projects and established a fund. Switzerland included bitcoin in tax payments. Countries such as United States, Singapore; companies such as Google, Facebook and Twitter also decided to take steps to become members of blockchain community.

2019 was a sensational year with Facebook's Libra project. Facebook has created mobility in the cryptocurrency market with the goal of making people who do not have much money and not use banks a part of the financial market with lower costs. After this effect, it is started to be said that approximately 400 million bitcoin transactions have been executed. It is observed that the star of blockchain shines even more with the effect of both China and Facebook and has become a subject of competition among countries.

In particular, China has made strides in stating that it wants to pioneer competition to make blockchain technology a part of its social life.

As of 2019, it is observed that steps have been taken and pilot programs have been created to monitor tons of commercial goods, drugs, forensic cases and personal data with blockchain technology. Based on all these developments, it seems possible to think that the development of blockchain technology will continue to increase in the coming years and that integrated systems can be established worldwide (URL 1).

1.3. The Qualifications of Blockchain Technology

The data that is blocked in the blockchain system is checked and directed to other networks in the system. Each computer in the blockchain system is called a “node”. These nodes control the security and compliance with mathematical operations in the system. If the block is approved by the majority of other computers within the system, the "hash" encryption phase follows. Each block encrypted in this way has a password for the previous block. Encrypted blocks are connected to the previous block and block chain rings are formed (Ciğerci & Eğmir, 2019: 206).

The key features of the blockchain mean that it has a significant potential in tax use:

- Transparency - blockchain makes sure of the source, traceability and transparency of each transaction.
- Control - access to networks is limited to defined, specific users,
- Security - digital notebook cannot be changed, altered or tampered with once data has been entered. Fraud is less likely to occur, and easier to detect,
- Real-time information - when the information is updated, it is updated simultaneously for everyone in the network.

Data and transparency

The key focus of the debate on the tax authorities of the world with the increasing demand for data was how the blockchain could help organizations at the required data scale. Tax authorities agree that the ongoing challenge in tax mechanisms is business’ access to a range of information that may be tax-related. Organizations are now capable of collecting and blending huge amounts of data, but tax mechanisms are barely involved in this process. As a result, tax mechanisms are applied rather late in situations that may have tax consequences. Blockchain technology can help solve this problem because it provides information in a way that it is captured from many perspectives - information that is reliable because it has been verified by everyone using it. Blockchain technology can help provide information in many ways. It provides more details, more visibility, more useful information and more precise results.

Verifying transfer pricing

Technology experts emphasize that blockchain technology is suitable for transfer operations. Considering this, tax experts have suggested that blockchain technology can be applied to transferred taxes, such as VAT, withholding tax, stamp taxes and insurance premium taxes. Whether the technology can help transfer pricing is also questioned. For instance, is it possible to code the results given when determining how profit is attributed to different parts of a business? It has been recognized that this can not be stopped from a technology perspective. A number of other experts have questioned whether blockchain technology can help in the fight against double taxation, and agreed it can provide great convenience.

Can blockchain technology convert tax completely?

In blockchain technology, documents such as big books and business books have become another software consisting of smart contracts. Tax administration is an indirect side of smart contracts and can collect taxes through the e-declaration system.

Blockchain technology has the potential to eliminate the informal economy in terms of the tax system and significantly reduce the need for tax control (Jurowiec, 2018).

The focus is on the current state of the tax system and whether application of the blockchain system is the catalyst required to fundamentally transform the system. Blockchain emerged at a time when it was questioned whether the current tax system designed for the trading, buying and selling of physical goods is still fit for this purpose in the modern, digital age. The increase in the sharing economy, digital businesses and new business models caused many people to think again about the tax system. Is it still reasonable for tax authorities to collect taxes as they have in the past? Should the tax system in a world based on digital transactions try to adapt to this? But where is the value that should be taxed created? These questions have no definitive answers, and according to some opinions, these issues apply to tax policy rather than technology. Blockchain is a possible enabler - not a solution by itself. However, it has exciting possibilities and it is recognized that tax can change the way it is charged. According to some experts, the responsibility for collecting income taxes can pass from tax authorities to participants and actual individuals in the sharing economy.

"Blockchain is a possible enabler - but not a solution by itself."

Blockchain, error and fraud

Although the blockchain is protected from tampering and modification, this does not mean that incorrect information cannot be entered at the initial stage. However, experts agree that no system can completely prevent fraudulent behavior: "If you put garbage in the system, you will take out garbage."

However, the blockchain system makes it much easier to detect fraud and errors, as it provides clear and transparent information about transactions and items on the network. Experts stressed that this could be particularly useful in keeping track of whether VAT was paid and where it would be paid, and in doing so would reduce VAT fraud.

Blockchain can also help guide behavioral change due to the risks and consequences of incompatibility as payers are more likely to be caught and excluded from the blockchain network forever. According to experts, although the vast majority of taxpayers are compatible, especially micro enterprises and individuals do not fully understand their tax obligations. Blockchain can facilitate compliance and at the same time provide visibility to micro transactions to tax authorities. In this way, it can help reduce the tax deficit (PWC, 2017).

The potential benefits of blockchain to businesses and enterprises are well documented. The Internet revolutionizes the exchange of information, while the blockchain changes the way we exchange value.

Third parties need to establish trust in order to exchange value, such as currency or deed, digitally. Blockchain rules out the need for a trusted third party by making a secure, distributed environment for transactions available on the network.

In essence, the linked transaction groups (blocks) associated with the previous transaction group database (chain) are copied and distributed to everyone involved in the network, so that all copies of the database are identical.

Blockchain records every transaction that takes place and no records are deleted.

Blockchain is a technology that can provide ease of application in almost every field in daily life. It provides great convenience in many areas of life, from the legal field to the real estate transactions, from financial records to employment contracts (URL 2). In the current system, we do these operations through "intermediaries". Intermediaries are sometimes a lawyer, sometimes a

real estate agent and sometimes banks. We pay money to the intermediaries to make sure that our transaction is correct. In return, intermediaries enable us to believe in the accuracy of our transactions and enable us to overcome the problem of trust created by asymmetric information in the system. On the other hand, the distributed registry blockchain allows people who do not know each other in the system to operate without requiring them to trust each other. For this reason, it is also called as "Trust Machine" (URL 3).

Blockchain has the potential to evolve or at least modernize accounting and tax payments. In this context, however, significant networking efforts are required before it can be implemented.

In the long run, blockchain can significantly increase tax compliance by warranting real-time, automatic tax payments from the taxpayer to the state budget on the date of a transaction. This is accomplished using Smart Contracts, code snippets that are programmed to execute themselves when the predefined set of conditions are met and fulfilled.

In addition to monitoring transactions and verifying information, blockchain can include business logic in value exchange with smart contracts (computer code that automates written contracts, such as "do this if this happens"). Examples of blockchain use are applications such as tracking diamonds from the supply chain, proving the time and presence of clinical trials.

Self-Enforcement allows unrelated parties to trade with each other in the absence of a trusted third party that verifies the validity of the transaction. For example, the salary tax can be automatically captured and paid to the treasury during the transfer of salary, thereby removing the employer's duty to act as a tax collector. Various benefits are available immediately: real-time compliance, a significant reduction in transaction costs, and elimination of the risk of tax evasion and fraud.

Transparency integrated into the blockchain also has the ability to offer solutions to property issues in the context of combating illegal tax flaws and preventing corruption.

Opaque is often used by money laundering experts in corporate tools to provide 'front' businesses where crime revenues are hidden and injected back into a financial flow. Opacity secured by the 'corporate veil' prevents legal authorities from easily accessing information on the ultimate utilization of these legal instruments and creates conditions where individuals can hide their assets from tax authorities, including crime revenues such as bribery and corruption.

The availability of verifiable information on the transparent blockchain-based distributed database to identify those responsible for law enforcement and tax authorities or those who may have information about a research, including the identification of the ultimate beneficiary might help.

Multinational companies that operate within themselves using blockchain and thus allow the creation of real-time local files for review of the audit may rely on blockchain-based applications to target a real problem of transfer pricing - the lack of information about comparable transactions between the non-related parties required determines the transfer price.

Depending on supply chain management, blockchain-based applications can be further expanded for customs and consumption use.

Authorities benefit from blockchain in two main ways: the ease of relying on the interests of the goods being transported and sharing customs-related documents among the various departments involved.

However, for the effective integration of blockchain-based solutions, a supportive system and full government support approach are required. This should contribute to the widespread use of blockchain technologies and setting the regulatory standards such as a legal identity that aims to recognize accounting and tax consequences at the time of booking (Institute for Austrian and International Tax Law, 2017).

Two interesting features of blockchain technology can be specified as:

1. Saving certain data and knowing when this data was saved (in a public or private blockchain)
2. The opportunity to make automatic payments through smart contracts, including VAT payment to tax authorities and entrepreneurs from tax authorities (Merkx, 2019).

Besides all these benefits, blockchain technology also has its drawbacks. These can be listed as follows;

- In blockchain systems where proof of work is used as a compromise protocol, the need for a lot of energy requires very expensive computer systems.
- Since adding blocks in the blockchain system takes more time than other systems, its performance remains low compared to traditional databases.

- The possibility of storing and accessing the data in the blockchain network can damage the privacy of users in the system.
- Once smart contracts are created, they remain open to everyone in the blockchain system, leaving them vulnerable to malicious attacks (Tanrıverdi, Uysalı and Üstündağ, 2019: 3).

2. BLOCKCHAIN IN TAXATION IN THE WORLD AND TURKEY

Legal regulations about digital currencies have been drafted all over the world for a long time. The largest economies of the world such as the USA and China are trying to include them to their systems by executing regulations regarding digital currencies.

China is the pioneer of this issue. In early 2020, the new encryption law (cryptography) came into force in China. A recently published report on China's cryptography law shows that China's efforts to become a global leader in this field have increased. The report in question states that the USA draws an image contrary to its regulatory sensitivity and crypto preparation.

China's cryptocurrency laws are intended to provide a firm grip on blockchain technology. The failure of Bitcoin and Ethereum blockchains to meet the prerequisites of China's latest encryption law predicts that China will focus on implementing its national standard, not on current blockchain conditions. The national standard will enable China's CBDC (China Central Bank Digital Currency) to operate in an environment free of competition such as Bitcoin and Ethereum, while maintaining more control over China's economy (URL 4).

The vast majority of the world countries regard the transactions made with blockchain positively. Although China and Russia have negative views on cryptocurrency transactions, they are countries that have entered into an intense legal regulation on blockchain and try to implement them in almost every field. Turkey, Singapore, Austria, Canada and the UK are countries with an unbiased eye to the crypto currency related transactions. However, these countries have also engaged in research on the use of blockchain technology and formed their authorized institutions in this regard (Topcu & Sarıgül, 2020: 37).

Germany is the best example among countries trying to use blockchain technology to combat tax fraud. A German business news center Woche reported in

2018 that the German Ministry of Economic Affairs and Energy (BMWi) plans to fight tax hijacking plans using blockchain.

BMWi has indicated that distributed ledger technology (DLT) can manage the tax system and be more effective in preventing fraudulence. This was an issue after the European Tax Fraud (CumEx-Files) plan, which was also used by stock market traders, banks and high level of lawyers to generate billions of dollars in dividend tax speculation. The German economy suffered the most in this fraud with 63 billion dollars.

According to the Parliamentary State Secretary Christian Hirte, blockchain technology can ensure that tax shares are always fully traceable. The German Federal Ministry of Finance stated that prior to 2012, more than $5 billion was laundered due to the gaps in tax regulation.

In Thailand, in November 2018, the Thai Revenue Department announced plans to use DLT (distributed ledger technology) and machine learning to track and especially verify the validity of tax payments, and increase the speed of the tax refund process.

It was previously reported by Cointelegraph that the tax software firm Vertex suggested that governments need to implement blockchain to improve their tax systems.

Many countries are already in the process of fully integrating blockchain with tax authorities for business transactions and tax processes. 38 member states of the European Economic Cooperation and Development Organization (OECD) started to apply the data sending process to tax operators in 2005. Some countries in Europe have already implemented the Standard Audit File for Tax (SAF-T) such as Portugal, France, Lithuania, Luxembourg, Norway, Poland and Austria.

There is a basic idea behind SAF-T, which is that companies can inform governments of the company's full public records, payment records, vendor data and software vendor invoices. This also serves to ensure that government tax authorities affect a taxation system based on blockchain technology. It aims to reduce the wave of tax fraud.

The integration of blockchain technology will increase the easy and simultaneous supervision of companies by tax inspectors. Once two taxable companies trade, they can be easily verified. Transparency automation of blockchain technology will reduce tax compliance costs and staff resources (Jurowiec, 2018).

Tax reforms are required to improve the current situation for taxpayers. In particular, applications in the digital age reduce record keeping and verification

times and make these operations more transparent. Records held in digital form are intended to store more tax-related data. There are also many digitalized transactions such as automatic payment and online payment via digital payment. In this way, the amount of tax to be paid by the taxpayer can also be calculated on time. Taxpayers will be given a digital tax account for the convenience of individuals and businesses. In fact, the digital tax account can replace the tax refund process.

The application area of blockchain technology in various tax types can be expanded. Wijaya, Liu, Suwarsono and Zhang (2017) developed a blockchain-based tax model for the Value Added Tax (VAT) system. They stated that this technology can be applied in the VAT system and in this way, corruption can be reduced. Accordingly, the VAT payer purchases a blockchain account in the new system and every transaction made during the taxation process is carried out through this account. The VAT system is based on the tax invoice system and ends the use of paper with electronic billing called "e-invoice" through the developed model. The system also prevents fraudulent billing. In addition, a blockchain-based tax system can be used to determine where and when transactions occur during the taxation process. In this way, qualified data can be provided to the authorities regarding the taxation process. In this model, the tax office has more control over the VAT process. Ainsworth and Viitasaari (2017) stated that payroll tax will be applied by blockchain technology by 2021. In another study, it is stated that the government will collect taxes using the blockchain system in the expected technological developments in 2025.

Blockchain, which includes a decentralized laptop system, offers many convenience compared to the central system. The central data storage system of a modern tax office includes tax activities covering a period of three years or more, such as declaration, payment and audit. With the blockchain system, central tax management will be replaced by decentralized blockchain technology.

At the World Economic Forum held in Davos between 20-23 January 2016, it was stated that governments could collect taxes with blockchain technology by 2023.

With blockchain-based automated tax regime, 100 percent success can be achieved in tax compliance. Because all wallets will be seen by the authority and money flow can be monitored. In addition, many people will be covered by the tax network and the tax network will be expanded. In this case, tax collection can be increased.

In parallel with the expansion of the tax network, as more people will face tax, the tax burden will be reduced for each taxpayer and each individual will pay less tax to reach the government's tax potential.

In this way, disposable personal income and savings will occur. The authority may receive a certain percentage, called transaction tax, from any transaction performed on the blockchain.

To promote the implementation of blockchain, in 2017 in the US state of Nevada, blockchain was recognized as an electronic form of registration, and the ban on the use or blocking of Blockchain was prohibited by the Uniform Electronic Transaction Act. It is also stated that the information and transactions obtained with the blockchain can be included in the jurisdiction.

Blockchain is intended to be implemented in the United Arab Emirates due to reducing tax errors and tax compliance. Since beginning of 2020, the UK Tax Office has been working on using this technolocy in the tax system. Italy, a member state of the European Union, introduced the e-invoice tax reporting regime as of January 1, 2017 to speed up reporting and reduce fraud. This way, the details of the invoices for the purchase and sale of VAT will be presented electronically.

The Republic of China announced in its 13th Five-Year Development Plan that it will implement blochchain technology in the tax system by 2023.

According to the European Commission, in 2014 there was a € 160 billion deficit in VAT. This can be attributed to tax evasion. The implementation of Blockchain will provide concrete plans for future tax revenue for tax authorities. This way, a guaranteed and error-free tax system can be created with smart contracts. Taxpayers will also be able to see for what purpose taxes are used (Kükrer & Eğmir, 2018: 642).

2.1. Chinese Application

China plays the lead in blockchain technologies. It is the country that invests most in blockchain technologies, gets the most patents and has the most users.

China takes blockchain technology to a very important position in terms of digital strategies and economic growth.

China aims to be the leader in 5G, artificial intelligence, internet of things, cloud and blockchain and other disruptive innovative digital technologies.

Since 2015, China has been describing blockchain as "national priority technology" in its "Five-Year Development Plan" documents and strives to introduce this technology in almost every area of daily life (Lantaugust, 2017). However, cryptocurrencies and blockchain are handled as two completely different topics.

As a result, access to crypto exchanges, making ICO (initial coin offering: initial crypto money idea) and collecting money from the public for ICO projects are banned in China with restrictions that started in 2013 and worsened after 2017.

The reasons for cryptocurrency restrictions can be stated as follows;

1. The interest of large masses without financial literacy as “high risk investment open to manipulation and speculation”,
2. Many projects are open to abuse and fraud,
3. China’s work on its own national digital currency.

In 2019, the Chinese Supreme Court announced that blockchain registrations will be regarded as binding legal evidence.

In 2018, China has issued new regulations to all blockchain companies that require their users to submit their personal data and activity pages to the authorities upon request.

Many people have said that such an arrangement is against the nature of this technology, and that China is trying to build a "blockchain wall". The censorship applied by China on the internet has been compared to the words of "Great Wall" and called “Great Fire Wall”. As a continuation of the same analogy, it is sometimes referred to as "Great Blockchain Wall".

Although it often comes to the agenda that bitcoin mining may be banned, the world's largest bitcoin mining companies are Chinese companies, and the biggest mining activity is in China.

Mainly state-sponsored technology firms and funds are the most important players in the Chinese blockchain market. Especially the Baidu-Alibaba-Tencent (BAT) trio is one of the companies that can benefit from the funds the most and make the most investments. In 2019, China announced that it will support 197 selected blockchain projects. Among these projects, banks and these companies also have projects.

Since collecting funds from the public for cryptocurrency projects is prohibited and only professional funds can invest in these projects, many projects related to blockchain in the country need the support of institutional investors at the initial thought stage.

This situation causes many blockchain projects that are financially problem-free but insufficient in terms of marketing. These projects, many of which are "international community oriented", cannot reach international markets due to their marketing deficiencies (a weak website, poorly prepared promotional documents and insufficiency etc.).

Trained manpower and lack of research are still ongoing problems in blockchain. China has started funding universities on this issue.

Although not very clearly, 20% to 30% of blockchain projects in the world are thought to be ongoing projects in China.

Three projects implemented by China are summarized below:

• *Payment and Invoicing with Shenzen Metro Blockchain used by 11 million people*

Shenzen tax administration has launched a blockchain project to meet billing requirements in transport systems, including metro, taxis, and airport shuttles.

The QR code payment system has been used in the Shenzhen subway since May 2018. More than 11 million people used this payment system between May and November 2018. With the project launched in March 2019, users paying with WeChat can receive their e-bills at the end of their journey with a blockchain infrastructure. Tax administration pays great attention to the project, especially since the multi-issue invoices issued for tax and discount purposes called “fapiao” are among the most forged documents in the country.

• *Digital money studies of the Chinese Central Bank and People’s Bank of China (PBoC)*

Studies on a legal digital currency in China have been ongoing for a long time. Testing blockchain technology, PBoC Digital Money Research Institute and the Central Bank decided to expand the scope of their work.

It is observed that digital currencies focus on a digital solution to the commercial financing needs of SMEs and projects.

• *A new type of blockchain-based philanthropy emerging in China*

For this purpose, PBoC partners with a number of regional banks and academic institutions, and supports blockchain and artificial intelligence-based fintech companies. According to the State Intellectual Property Office in China, PBoC filed 32 digital currency patents in 2017 and 14 patents in 2018.

There are more than 800,000 registered aid organizations in China. The amount of aid collected by these organizations is over 22 billion USD.

It is the first time that China has enacted an aid law in 2016. With this law, the opportunity to request tax deduction to donors has been provided.

In addition, the Ministry of Internal Affairs authorized 13 companies, including large firms such as Alibaba and Tencent, to act as intermediaries in collecting relief funds. These institutions can collect aid via mobile phones and the internet.

Blockchain technology mainly provides the following benefits within this structure in China:

• The philanthropists can see in a transparent way where the aid they have been spent or to whom they have been delivered.

• Small organizations can start independent relief campaigns. Blockchain platforms enable them to do these activities much faster.

• Community organizations and philanthropists provide an environment of trust where they can take a more active role in solving social problems such as poverty, education and health.

The number of firms called Trust-Tech that work on interpersonal trust and assistance is increasing. It is seen that blockchain technology also contributes significantly to the way these companies do business.

For the first time in 2016, Ant Financial-Alipay organized a blockchain-based aid campaign for 10 hearing-impaired children, and with this campaign, USD 29,560 was collected in a very short time.

Antlove users have more confidence in this system, as the records in the blockchain system are real-time and these records cannot be changed or deleted. As a result, 190 million Chinese donated over 50 million USD in the first 9 months of 2017 through the Antlove blockchain network (URL 5).

China established the world's first smart internet court in Hangzhou city in 2017. The court used technologies called AI and Blockchain to make decisions.

According to a report published by the Supreme Court, more than 1 million citizens are registered within the smart court system, together with 73200 lawyers. In September 2018, the Chinese Supreme Court ruled that the evidence confirmed by blockchain technology was binding in legal disputes (URL 6).

Despite its harsh attitude towards Bitcoin and other cryptocurrencies, the Chinese Government has decided to use Blockchain technology to fight corruption.

Before proceeding to the solution that China wants to bring to the billing system, it is necessary to understand the working principle of *fapiao*s (used instead of the official Chinese *invoice* word), which is a legal receipt for goods and services.

Fapiaos are issued by Chinese Tax Office for any goods or services purchased domestically. These documents, provided by the seller, are used by the Chinese government to monitor tax payments and prevent tax evasion. Individuals can receive tax repayments thanks to fapiao, while companies do their transactions on these documents.

The degeneration of the Fapiao system established in the 1980s such as the sale of fake versions of these documents publicly on the streets and the use of fapiaos that were not understood to be fake at first glance in order to evade tax directed China to blockchain technology. The technology underlying cryptocurrencies is considered one of the most effective weapons to combat this corruption. Blockchain, a constant, decentralized and encrypted accountant, can easily prevent irregularities that may occur during the invoice roaming process by providing a clear record of any transaction that occurs at any time of the day.

In May 2018, the Shenzhen National Taxation Bureau began working with Tencent, one of China's largest technology companies. As a result of this partnership, a “Smart Tax” innovation laboratory was established, which aims to encourage a technological approach in the tax field by researching cloud computing, artificial intelligence, Blockchain and Big Data.

At the beginning of August 2018, Tencent created a pilot blockchain ecosystem for invoices designed to be used by traders and tax authorities. With the blockchain supported e-billing system, the customer requires only one click on the WeChat application during the payment. After that, taxpayers have to wait for a refund in real time through the application. The fact that the process is shortened in this way and transferred to smart contracts prevents possible falsification and fraud on invoices (URL 7).

In late 2017, the main technology as blockchain was in the first place in China. Chinese investors have recently surprisingly increased their shares in blockchain-related businesses.

There are more than 32 thousand companies that use blockchain technology in China as of 2019, but only less than 10 percent of them really focus on technology. Chinese cryptocurrencies like NEO, Ontology (ONT), Quantum (QTUM), VeChain (VET) and more have earned more than 50%. Bytom (BTM) increased by 459%. It is predicted that China will take the first place once establishing the national cryptocurrency. It is observed that commercial banks have started to accelerate blockchain technology applications.

The Chinese government needs blockchain projects to enroll in Cyberspace Administration. Since March 2019, nearly 500 blockchain projects have been carried out by state-owned banks, courts and tax offices and commercial technology companies. China's most popular app, Xuexi Qiangguo, has launched state-run bitcoin and ethereum courses.

China also strives to create new initiatives such as "Blockchain+", a platform for "personal development" in areas such as education, employment and health. It adopted a new law designed to promote research and development in commercial cryptocurrency technologies. It also aims to establish standardized regulations for the industry in preparation for the challenges facing the newborn sector (URL 8).

China plans to invest approximately $2 billion by 2023 in the development of blockchain-based solutions. IDC is an international company focusing on market intelligence. The country's blockchain development expenditures are estimated to grow by 65.7% between 2018 and 2023. The country hopes the growth and expansion of blockchain technology. Due to the decentralized nature of its networks, it predicts that the technology can be used to create publicly accessible databases in various industries, including education and healthcare.

China is still not very clear towards Bitcoin. A few years ago, the government banned all crypto exchanges from operating in China. It has banned all crypto-related activities within its borders. However, it is observed that the country plans to create a national encryption currency. A state-owned media company shares content that educates millions of people about Bitcoin (URL 9).

2.2. United States Application

Although the U.S. Government still does not recognize cryptocurrencies legally, the Tax Office treats cryptocurrencies as "property" and therefore wants to tax them.

It is claimed that the US National Revenue Administration IRS can track all Bitcoin and crypto money accounts. Rules set by SEC and IRS lead cryptocurrencies to not be as anonymous as before. Not all crypto exchanges accept American citizens. Accepting exchanges collect personal data through KYC (Know Your Customer) or AML procedures.

Coinbase also reports users whose earnings exceeding $20,000 to the Tax Office. Authorities monitor those who trade 20 thousand dollars or more and request taxes from the accounts that accrue taxes. With the legal regulations, the laundering paradise perception for Bitcoin and crypto money is gradually disappearing (URL 10).

Bitpay company offers blockchain-based payment services and has also introduced the Bitcoin option for tax refund. In accordance with the agreement with the US taxation agency Refundo, citizens are allowed to receive all or part of their tax returns with the CoinRT product.

Citizens' ability to use the relevant service depends on performing the Know-Your-Customer procedure. In this way, the US Revenue Administration planned to prevent money laundering and illegal practices.

It is anticipated that the service offered by Bitpay company will speed up the return process and reduce the cost (URL 11).

2.3. Turkish Application

Blockchain technology slowly becomes the center of market-based value change. The rapid development in commerce and tax makes the use of blockchain technology beneficial for Turkey, where a blockchain working group was created by the Central Bank (TCMB). Applications such as e-invoice, e-ledger, e-waybill, e-archive, e-notification in taxation will speed up the transition to a blockchain-based technology.

Turkey does not have any legal arrangements made for the crypto currency assets as of today. In addition, according to the Banking Regulation and Supervision Agency (BDDK) and the Capital Markets Board (SPK), it is not consid-

ered within the scope of "electronic money". BTCTurk, Koinim, Paribu, are Bitcoin exchanges that Turkish Lira can be traded.

Identity of individuals trading in the stock registered in Turkey is usually certain as they create their accounts using identity information. However, because private key numbers of non-stock market traders cannot be determined, it is not possible to determine their identity on Blockchain (Ertaş, 2018).

2.4. The Reaction of Companies and Organizations to The Application of Blockchain Technology in Tax Regime

For many executives in the business world, it becomes an alarming situation how blockchain can cause change, especially with respect to indirect taxes. It becomes more evident how blockchain technology can transform indices that show how businesses and indirect tax administrations perform and interact fundamentally now and in the near future.

Lately, majority of the major players and companies in the taxation sector are investigating the problems, complexities and effects of blockchain applications in tax management. However, they are still at the beginning (pilot) levels of these missions. Nonetheless, it is evident that blockchain technology will increase the business benefits and reduce the tax problems, which is usually buried into the tax systems (Jurowiec, 2018).

2.5. Expected Effects on Corporate Taxpayers

A company's strength or weakness is measured annually in terms of all its financial statements and information for income tax purposes.

Supposed that all transactions of a company are revealed to the public through blockchain technology. This will mean that every single transaction that generate profit or result in loss can be easily accessed by government tax operators through government software. Consequently:

- On-time tax returns will become the order of the day, because governments will always cut tax payments simultaneously through all informed transaction details available to managers.
- Estimated taxes will be removed as all transaction information is "publicly available" via blockchain.

- Many workers in the corporate tax department may have to include small numbers of blockchain technology experts to install, regulate and maintain the required systems. This does not mean that the tax authorities will become completely unusable. This new approach to tax reporting will optimize its work and do it with fewer errors.
- Full automation of a new tax regime will help end pressure activities (Jurowiec, 2018).

2.6. Expected Effects on State Tax Management

- The government will have great advantage using a blockchain-backed tax administration. The extremely difficult task of blending, translating, processing, and documenting a company's periodic transactions will lead to more digital and secure, shareable documents that cannot be doctorated or changed.
- Periodic self-reporting of transactions of businesses such as revenues, expenditures, debts and other information will result in immediate deduction of taxes that must be paid by the tax processing time and the state tax authority.
- Indirect taxes can be changed and simplified by blockchain technology. The transparency and quickness of this technology can allow real-time verification and remittance of taxes in the economy business sector, especially VAT and other sales taxes. This is especially advantageous for both government and companies.
- Tax disputes can greatly reduce and save time for government and taxpayers. Blockchain's transparency can make verification, conflicts and controversy drop to almost zero.
- Today, in some parts of the world, especially in Asia, the Middle East and Africa, tax smuggling and other shady tax manipulation which has turned into a global industrial mystery, can be expected to be eliminated (Jurowiec, 2018).

More than 800 observers and technology managers have discussed when governments will start collecting taxes based on blockchain technology in 2016's Davos World Economic Forum. 73% of countries choose to mark the year 2025, the rest choose to mark the year 2023.

Many experts believe that IoT (the Internet of Things) is for areas suitable for applying blockchain to different areas - from refrigerators and kitchens to

cars and boats, and this technology tax scheme is also global with billions of smart devices. These devices will pass various conditions, including manufacturing cases, and some of these terms may be tax benefits.

Experts warn that blockchain is a potential facilitator, but it's not a complete solution. The expansion of the digital world and the shared economy will force technical assistance to seek new legislation, methods and technologies to possibly collect taxes. Blockchain will be a potential partner in these efforts. It is recognized that this technology can change the way taxes are collected: responsibility for collecting taxes on income or sales may likely shift from tax authorities to participants of the common economy (Seco, 2018).

2.7. Blockchain and VAT

VAT is a tax applied at the stage of production and distribution to increase domestic income. The difference between the estimated and collected actual VAT collection is a result of the VAT mismatch. The causes of the VAT deficit may be fraud, bankruptcies and finance (Alkhodre, Jan, Syed, & Khusro, 2019: 708).

For almost all states, VAT is the key income factor that makes the greatest contribution to government budgets. Billions of dollars are lost every year due to tax evasion, fraud, tax mismatch and insufficient tax collection. As the global tax environment gets more complicated, new interpretations are needed to increase transparency and end the tax deficit. Tax authorities have invested heavily in data integration and analysis systems in digitalization to increase tax collection and prevent tax fraud (Noor, 2020).

Invoice is the most crucial VAT instrument. A blockchain-based tax system will require each valid VAT invoice to show a digital fingerprint derived from the VAT blockchain consensus process. In this case, the fingerprint will determine that Block 3 is continually attached to Block 2. The entire past of the commercial chain (forward and backward from this cross-border transaction) can be tracked.

A hand-held scanner, similar to the browsers, attached to an authorized tax inspection program will be all it takes to reach the entire commercial chain instantly for a valid postpaid item.

In order to perform its function, each node must have instant access to all standard invoice level data (name, address, VAT ID, price of each item, related volumes) for both parties. In addition, all nodes can perform risk analysis based on independent artificial ground. The best AI (artificial intelligence) systems

allow these queries to occur naturally, and AI operators will be trained supervisors who know the relevant industry. Therefore, the use of blockchain at customs is recommended by experts.

Blockchain technology projects a chain of materials and items as it develops across boundaries. It can be used in DICE (Digital Invoice Customs Exchange) blockchain technology to create a safe business transaction train. However, because it is not clear how open the governments are to sharing their databases, there will remain an element that preserves the centralized ledger.

Countries may originate AI risk analysis with confidential data and may not allow the target judicial system to access this material while carrying out their own analysis. The consensus reached by these jurisdictions may mainly belong to their taxpayers and in some cases the threshold may need to be increased to achieve an acceptable level of confidence.

In November 2018, the European Parliament published a draft report including recommendations on combating cross-border VAT fraudulence. The report encourages member states to discover cross-border transaction data on a blockchain and discover a plan to use a secure digital currency that can only be used for VAT payments (Tenan, 2019).

Boston University Law School academics Richard T. Ainsworth and Musaad Alwohaibi proposed GCC (Gulf Cooperation Council: Saudi Arabia, Kuwait, the United Arab Emirates, Qatar, Bahrain and Oman) to use VATCoin in tax payments. VATCoin is modeled on Bitcoin. Both Bitcoin and VATCoin are distributor ledger applications built on blockchain technology. Bitcoin's notebook is open to everyone; VATCoin on the other hand is private. If accepted, VATCoin could become the world's first state-managed cryptocurrency currency. Unlike Bitcoin, VATCoin will not be a speculative currency. It is always fixed to the main currency that can be applied with VATCoin, DICE or material block.

VATCoins are a digital currency, not physical. They are only recognized for VAT payment. Transactions in VATCoin will be recorded in a chronologically distributed ledger. The validity of each transaction will be verified by the government (tax administration) nodes in each jurisdiction. The number of nodes contributed by a jurisdiction will be proportional to the GDP of that jurisdiction relative to the total GDP of all jurisdictions of the respective economic community. Every business involved in a VATCoin transaction can access the transaction records of all VATCoins it has.

In the GCC offer, the VATCoin blockchain will spread all over the 6 Member States (Saudi Arabia, Kuwait, the United Arab Emirates, Qatar, Bah-

rain and Oman). Valid transactions will be cryptographically sealed and added to the next block in the chain approximately every 10 minutes, collected in blocks. The verification and sealing mechanism is done with 75% of the active nodes in the network.

There are two separate legal provisions in the GCC proposal, each of which must be implemented in each Member State:

Currency rules:

- Throughout the GCC, VAT should only be paid (and received) on VATCoin. VATCoin payments will be made by smart contract embedded in billing documents.
- Throughout the GCC, VATCoins should be considered as unusable currency that can be converted into cash only by the government. Governments will be required to refund cash if the VAT refund has a verified negative VAT.
- Tax rules:
- Throughout the GCC, VATCoin input and outputs will be verified in real time and added to the blockchain.
- After the waiting period, a smart contract makes a daily refund when the VAT unpaid balance is negative in the taxpayer's account. Daily balancing of VATCoin accounts will be the norm, but the rules can be applied to delay significant reimbursement amounts until a more comprehensive risk analysis / audit (Ainsworth & Alwohaibi, 2017: 12-13).

CONCLUSION

Blockchain transparency will enable the world tax regime to witness a reform and transformation that will soon change the value of tax production through different tax platforms. In taxation areas, the blockchain will provide fresh air to the business world and offer permanent relief to tax values for reviewing, reporting and manipulating delayed tax transfer, tax disputes, fraudulent transactions.

Undoubtedly, the tax game will change with the implementation of blockchain technology. Although there are some initial problems in the planning, transmission and full implementation of blockchain technology, it is a fact that the world economy has great developmental advantages for companies, governments, medium and

small businesses. Blockchain technology will have a major impact on the world tax regime in one way or another.

Although blockchain is not a remedy for the tax system, it can be applied in many areas to reduce administrative burden, collect taxes at a lower cost, and help narrow the tax deficit. Blockchain can reduce costs and add value within a business, between businesses, between businesses and consumers, and between businesses and governments.

Monitoring where and when VAT is paid and reducing VAT fraud while doing so, helping multinational companies make consistent data available for multiple tax offices, to increase the trust of tax offices and other administrations to the data, verifying judgments and assumptions about determining the profit of global businesses in different jurisdictions and increasing visibility into micro transactions such as by individuals and participants as part of the sharing economy are the areas of use that are open to discussion and experiment (Pwc, 2017).

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2nd CATEGORY: INFORMATION

CHAPTER 5

NEW ERA: THE TRANSFORMATION FROM THE INFORMATION SOCIETY TO SUPER SMART SOCIETY (SOCIETY 5.0)

İbrahim Yıkılmaz

INTRODUCTION

We all witness the rapid change of technological advances in the social and economic domain of life. Technological advances leading to these changes cause different social stages in the historical process. Society 1.0 (hunting Society), which starts with the development of tools; Society 2.0 (agrarian society), which starts with the development of new agricultural techniques; Society 3.0 (Industrial Society), which started with the industrial revolution, and finally Society 4.0 (Information Society) where Information appears as a determining factor in every field of life, and refers to the current social stage. Information Society becomes a period in which information causes radical changes in every field of society and to be a valuable resource by the development of Information and Communication Technologies (ICT). Information and technological advances enabled the development of smarter factories and production methods such as Industry4.0 based on productivity and efficiency in production.

Productivity and technology-based developments in production have paved the way for some social problems and concerns at the same time. Increased hunger and poverty, inequality in educational opportunities, unemployment, climate crises experienced on a global scale, aging population, increasing social expenditure, and disruptions in the provision of public services have become problems that must have been overcome on a global scale. While all these are happening, the speech of the Prime Minister of Japan at the CEBIT fair as follows; The emphasis that technological advances are not an issue that will cause anxiety over the practice of social life; on the contrary, it can take an active role in solving problems, pioneering the development of a new and positive perspec-

tive in the environment of despair (Prime Minister Japan and his Cabinet, 2017). In this meeting, the Society5.0 vision was introduced to the world for the first time. Society 5.0 is a vision of a "super-smart society", with a human-centered, producing sustainable solutions to differentiated needs and social problems through technological advances (Government of Japan, 2016). This vision, which started in Japan, is a society that aims to offer a higher quality of life that embraces diversity; is more livable, full of wealth and welfare, environment friendly. In this context, in the study; The information society, namely, Industry4.0, has a great influence on Society 5.0's shaping,

Society 5.0 considered as the new social stage, and developments and preliminary studies in the way of Society5.0 will be examined in detail. Society5.0 vision requires effective cooperation, innovation, diversity-based perspective, and the construction of a new business model. In this social stage, where the social life practice will experience a paradigm shift in every field, it is considered that Society5.0 is of great importance for managers. It is important for managers to establish an innovative perspective in many areas such as the new organizational structure, flexible working order, way of business, product, and service provision. It is considered that the study will greatly contribute to raise awareness of the managerial process which will be most affected at the transition to the new social phaseincludes a radical paradigm shift.

1. THE EVOLUTIONARY JOURNEY TO SOCIETY 5. 0

Factors affecting changes in social periods generally develop around the transformation of energy resources, development in communication; it also teaches how historical processes are recorded and exchange of value **(**Haupt, 2018). In this context, different social periods have emerged till today. Society 1.0 (Hunting Society) refers to communities in a period when people are dealing with hunting and gathering in their daily life practice and setting a lifestyle intertwined with nature. It is a period with innovations continue in the form of tool development and a social structure consisting of family groups. Society2.0 (Agrarian Society) is the period of the communities that come together with agricultural cultivation, social structures, and nation-building that are generated according to their jobs and task sharing. Individuals belonging to this society experienced a transition from hunter-gatherer state to permanent settlement lifestyle. Society3.0 (Industrial Society) refers to the period that when the global

trade and supply chain started to develop along with the industrial revolution and mechanization and mass production increased. In this period, steam power-based mechanical systems replaced with human and animal-powered systems. It is the period when the transition from local production and small production facilities to larger and more complex central production facilities and factories. Society 4.0 (Information Society) is defined as the "information society" where the information gains an accessible and distributable identity and the added value is provided by "connecting intangible assets as information networks". It is a period of transition from mechanical production to more electronic, automation, and ICT technologies based production. Society 5.0 is defined as “super-smart society" beyond society4.0 and its previous achievements. It refers to a human-centered society structure that targets to ensure innovation and justice for all; serve the sustainable well-being of the members of the society (Harayama, 2017:10; Haupt, 2018). Figure1 summarizes the five societal eras:

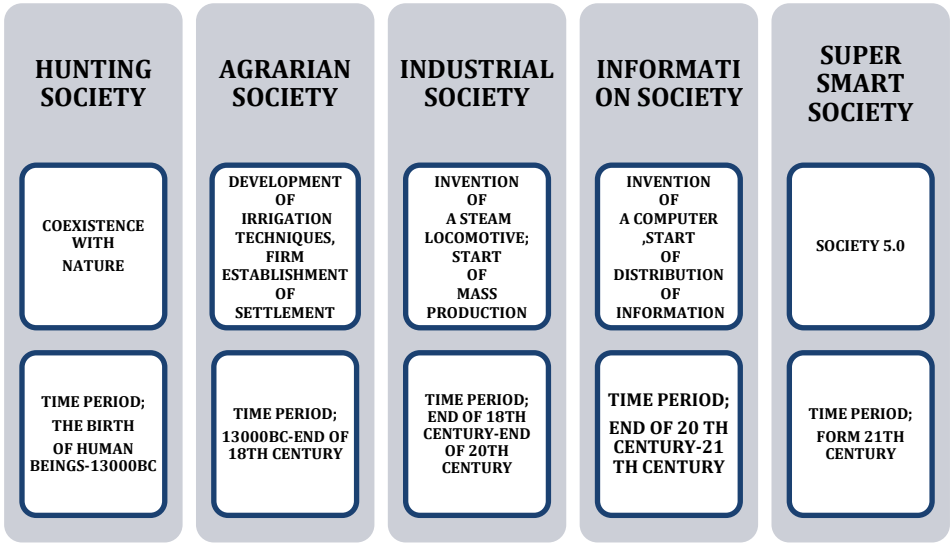

Figure1: The Five Societal Eras (prepared by the author)

Within the scope of this study, the concept of Society 5.0which started to be heard in various fields and developed for social problem solving; and also the developments during the transition period will be shared. It would be appropriate to give more detailed information about the "Information society" which has critical importance in the transition to the Society 5.0 vision.

2. INFORMATION SOCIETY

"This revolution (based on informantion) adds huge new capacities to human intelligence and constitutes a resource which changes the way we both work and live together.

The information society has the potential to improve the quality of life ....."

Bangemann (1994)

As social change has been felt in different areas, the society we are in is explained in different ways according to different perspectives. Those who think that social changes follow industrial society are explained by concepts such as "post-industrialism, postmodernism, flexible specialization and the informational mode of development". Again, those who think that it is an extension of previous theoretical developments are explained by concepts such as "neo-Marxism, Regulation Theory, flexible accumulation, reflexive modernization, the public sphere". (Webster, 2006:7). Albeit from different perspectives; it is clear that various writers and researchers are aware of the social changes. For Webster (2006), there are some firm changes compared with industrial society. The technological infrastructure of the society, information-based economic activities, information-based professions, cultural (such as the effect of media), and spatial (in terms of technological advances enable the accessibility in the context of time and space) changes are experienced by all domains of society. All of these information-based social changes point to a new social process that can be explained bythe inclusive umbrella term,"information society" (Webster, 2006: 8).

The first determinations about "the information society" belong to Fritz Machlup, one of the most distinguished professors of America. He pointed out the impact of information on the change in the economy and the way of business doing of industry (Duff, 2015). For him, contrary to expectations, the center of the economy will be replaced by intangible goods and services of the mind which is calledKnowledge-Economy, instead of agriculture, automotive, or oil (Machlup, 1962). According to Bell (1976); Information society is defined as a society that organizes social and managerial processes under the umbrella of knowledge. Bell (1976) discusses the differences expressed in the social-historical phase and tries to define the information society with the proba-

ble changes in the economy, strategic resources, technology, methods, time, planing, and the principles. He emphasized that there will be tendency to a model of processing production style and service sector focused economy in this information society. The main source will be "information, computer, and data transmission rather than natural resources. The most strategic resource will be" knowledge" (Karvalics, 2009:13).

Literally, the information society was brought up with the concept of "joho shakai" used by the Japanese (Duff, 2015:85; Karvalics, 2009:8). Masuda (1981:51) states that computer telecommunication technology, developing on the basis of the information, would cause a dramatic and inclusive change in the industrial society. He summarizes the differences between the industrial society and the information society where human intellectual and creative processes will develop and progress with the possession of information rather than material things or resources. These are shown inTable1:

Table1: A holistic view of the differences between the Industrial and Information society (Masuda, 1980:30)

		INDUSTRIAL SOCIETY	INFORMATION SOCIETY
Innovational Technology	Core	Steam engine (power)	Computer (memory, computation, control)
	Basic Function	Replacement, amplification of physical labour	Replacement, amplification of mental labour
	Productive Power	Material productive power (increase in per capita production)	Information productive power (increase optimal action selection capabilities
Socio-economic structure	Products	Useful goods and services	Information, technology
	Production centre	Modern factory (machinery, equipment)	Information utility (information networks, data banks)
	Market	New world, colonies, consumer purchasing power	Increase in knowledge frontiers, information space
	Leading industries	Manufacturing industries (machinery industry, chemical industry)	Intellectual industries,(information industry, knowledge industry)
	Industrial structure	Primary, secondary, tertiary industries	Matrix industrial structure (primary, secondary, tertiary, quaternary/systems industries)
	Economic structure	Commodity economy (division of labour, separation of production and consumption)	Synergetic economy (joint production and shared utilization
	Socioeconomic principle	Law of price (equilibrium of supply and demand)	Law of goals (principle of synergetic feed forward)
	Socioeconomic subject	Enterprise (private enterprise, public enterprise, third sector)	Voluntary communities (local and informational communities)
	Socioeconomic system	Private ownership of capital, free competition, profit maximization	Infrastructure principle of synergy, precedence of social benefit
	From of society	Class society (centralized power, classes, control)	Functional society (multicentre, function, autonomy)
	National goal	GNW (gross national welfare)	GNS (gross national satisfaction)
	Form of government	Parliamentary democracy	Participatory democracy
	Force of social change	Labour movements, strikes	Citizens' movements, litigation
	Social problems	Unemployment, war, fascism	Future shock, terror, invasion of privacy
	Most advanced stage	High mass consumption	High mass knowledge creation
Values	Value standards	Material values (satisfaction of physiological needs)	Time-value (satisfaction of goal achievement needs)
	Ethical standards	Fundamental human rights,humanity	Self-discipline, social contribution
	Spirit of the times	Renaissance (human liberation)	Globalise (symbiosis of man and nature)

It can be stated when all these titles are examined in detail that the Information society has various characteristics from the previous societies both in terms of thought and application.

In short, information society has been defined as the main actor of many developments and changes in the economic, cultural, political, and social domains all over the world. The characteristic of this society is experiencing the effect of the transformation of information and its development in every field of life. Within information society; "information" is the central topic of industry and the critical economic tool. "Information" is the central topic of industry and the critical economic tool within information society. Individuals of Information Society have increased the volume and the use of information in every domain of life. Due to the positive opportunities, it has become a vital part of the daily routine of people. The progress in information sector in the economy has established an information society.

2.1. The Importance of Industry4.0, Ict And Cps In The Information Society

The basic social periods are a combination of environmental and technological features, and the technology and resource used in basic economic activities determine the characteristics and names of that society (Lenski; 2005:84). Technology is crucial to determine the limits of possibilities and the development of other elements for a society (Nolan & Lenski; 2008:57). The development of work design from manuel to industry 4.0 has been through a series of technological advances in the historical process. Each stage has certain characteristic features and technology. Figure 2 summarizes our industrial story:

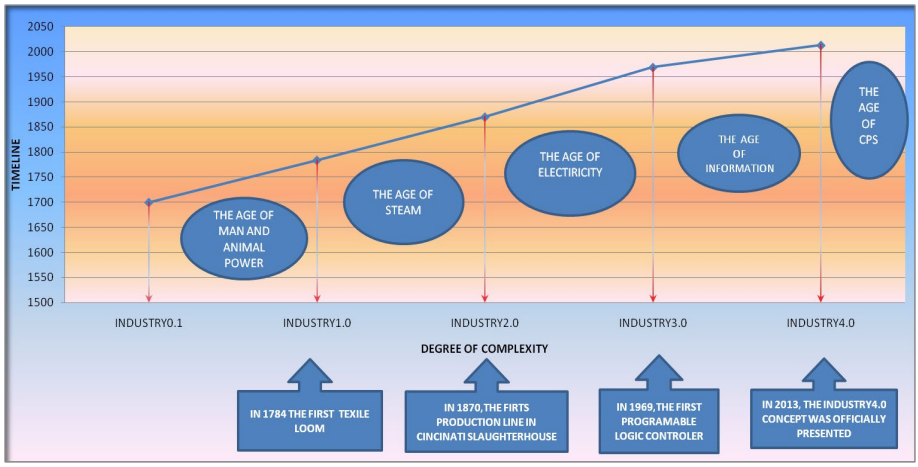

Figure 2. Our Industrial Story And Series Of Technological Advances.

Source: It is adapted From Zhou (2015).

Industry 1.0 started in the 1800s with the use of more mechanized systems rather than labor-based production systems in the textile industry. The productuvity increase and The second industrial revolution (Industry 2.0) was started By the help of electrification that allowed mass manufacturing and industrialization. Digitalization with the advent of microelectronics and robotics characterizes the Industry 3.0. This promotes modular development in the manufacturing industry, where a range of goods is developed on modular production lines with programmable machines. Nevertheless, these manufacturing structures often do not have flexibility with respect to the volume of output (Harayama, 2017:10). Industry 4.0 was first introduced at the 2011 Hannover Fair (Germany), which is organized among the most competitive countries in the world in manufacturing. Industry 4.0 was developed by ICT and it also points to a new production period "smart manufacturing", contrary to previous industrial revolutions, Industry 4.0 still continues to transform the information society and beyond it (Peraković, Periša, & Zorić, 2020). Industry 4.0 continues to develop with the advancement of CPS, digital mapping, Internet and IoT, virtualization of the physical (real) world, and smart factory. It has reduced the expenses in many subjects, especially in production, logistics, and management expenses, and provided an environment for "just in time" and" lean production" due to the opportunities of itself. With a smart factory design, it has enabled the products to reach the market on time and at the desired quality, high customer responsiveness, and flexible and environment-friendly production (Rojko, 2017).

The basic technology leading to the formation and progress of Industry 4.0 and Information Society is ICT (Audenhove et.al; 2003: 4; Northrop, 2000; Castells, 1996: 21; Duff, 2015). Although ICT has different definitions; it consists of the components (sensors, detectors, control, and display system, etc.) which are all interconnected with computers and information-based structures that enable the creation of a sophisticated network of communication functioning interdependently. In today's world, ICT starts the new paradigm of network age on the industrial process with the aspects that develop and transform other technologies and domains; enables new process innovations; contributes to the development of the innovative economy; takes on a critical role in the production process and serves the change of the economic structure (Dutta, 2007: 242). By the help of the latest advances in Information and Communication Technology (ICT); Industry 4.0 proposes the technology framework used to integrate and extend the level of intra- and inter-organizational production processes (Xu et al., 2018).

Industry 4.0, which is called "smart manufacturing" gives the sector a whole different perspective that will operate with new emerging technology (cyber-physical (CPS), cloud computing (CC), and Internet of Things (IoT)) in order to reach optimum efficiency in production. Especially; the positive and progressive development in CPS hasspecial importance in achieving the goals of Industry 4.0 (Wan,Yan, Suo & Li, 2011). CPS was first introduced by Dr. James Truchard in 2006 with the idea that the physical and virtual world could be merged (Zhou, 2015). As one of the basic concepts of Information Society and Society5.0, Cyber-Physical Systems (CPS) are a kind of system that creates a link between "Physical and Virtual Reality" with computing and communication infrastructures and enable possible to produce smart products (Zhou, 2015: 2148). Actually, we experience the benefits of embedded systems such as heating systems, tea or coffee machines, some censored system like the bulb. CPS enablesus to connect all these separate items and communicate with each other and serve for the intended purpose. Driving assistance and medical systems, which have recently entered our lives, can be given as examples. The collected data reaches the central system in the CPS and the probable pattern has occurred. The data is reached in two ways to the central system, some kind of communication interface or cloud, internet. At this point, if the data exchange is established via the internet, this concept is defined as IoT. The transformation from embedded systems to IoT systems is explained in the Figure 3:

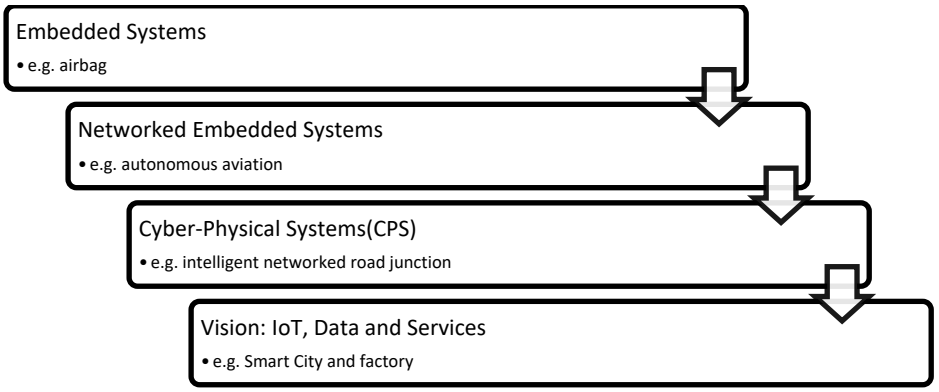

Figure 3: The transformation of IoT systems

Source: It is adapted from (National Academy of Science and Engineering(ACATECH (2011)) and (German Research Center for Artificial Intelligence(DFKI) (2014)

Advances in ICT, CPS, IoT, AI, Cloud, etc., technologies serve the development of both the information society and the next stage, Society5.0 in order to enable creating effective, efficient solutions.

3. SOCIETY 5.0

Government of Japan (2016) defines Society 5.0 as a new economic and social system that follows the previous four social stages "*hunting, agrarian, industrial and information societies"*. The "super smart society" is capable of providing precisely differentiated personalized services that address varied customer needs and offers resources to promote human initiatives aimed at achieving better life quality, struggling to overcome discrimination in the age of culture, ethnicity, and language. It plans to realize this by combining physical space (real world) and cyberspace with leveraging ICT (Fujii, Guo, & Kamoshida, 2018).

While the technological and industrial advances continue at full speed, the following question is asked in the introduction of The 5th Science and Technology Basic Plan (2016), which addresses concerns in various areas of society:

"Whether science, technology, and innovation (STI) can contribute to sustainable and inclusive development here and abroad."

The first step to defining the process of Society 5.0, which was accepted as the last stage of social progress was taken in The 5th Science and Technology

Basic Plan (2016) created within the framework of the answer to this question. The main problems that serve the birth of the concept are the issues at the national level that Japan had to solve. These are "decreasing labor force, increasing social security expenditures, and increase on old infrastructure" (Fukuyama, 2018). In fact, it is clear that these problems are experienced in most countries in the globalizing world. A more effective initiative for the solution has been taken by Japan and it is defined as:

"a society that is capable of providing the necessary goods and services to the people who need them at the required time and in just the right amount; a society that is able to respond precisely to a wide variety of social needs; a society in which all kinds of people can readily obtain high-quality services, overcome differences of age, gender, region, and language, and live vigorous and comfortable lives (Government of Japan, 2016)"

As stated in the definition, the purpose of Society 5.0 is to produce sustainable solutions to many problems, especially environmental and social issues, in today's conditions. In the solution of problems, the virtual, real-world cooperation and effective use of IoT is the focus (Harayama, 2017).

Another solution initiative for the Information society social problems caused by rapid change and industrial advancesis "*The 2030 Sustainable Development Agenda Of The United Nations"*. In this context, 17 sustainable goals were determined with the participation of 193 member countries. These are considered as the universal agreement against poverty and global attempt to create "an equal, just and secure world – for people, planet, and prosperity." These 17 goals are based on 5p (planet, people, prosperity, peace, and partnership). It was planned to achieve these goals with an absolute partnership that pioneered man and the planet and established abundance and peace. 17 goals include the following main issues: ending hunger and poverty, equal education and employment opportunities, effective and sustainable resource use, durable construction, reducing any social-economic difference between countries, and environmentally sensitive life (https://sustainabledevelopment.un.org). Within the scope of the definition of Society5.0, it proposes creative solutions to these problems with the help of digital transformation and technological advances (Keidenaren, 2018:16). In line with the 17 goals of SDG, Figure 4 shows the title of the Society5.0 solution proposal and the targeted SDG item.

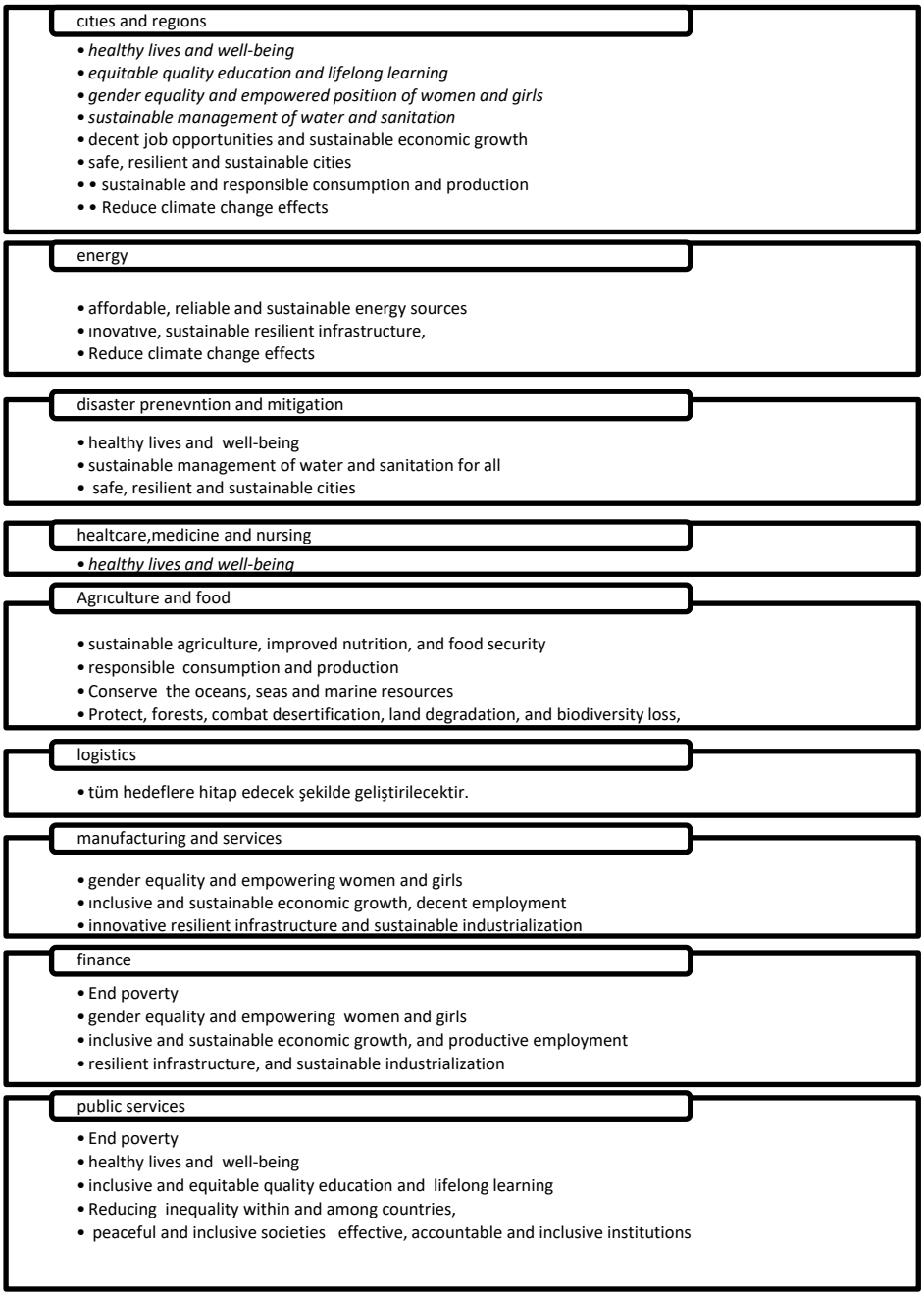

Figure 4: The Title Of The Society5.0 Solution Proposal And The Targeted SDG Items

Source: It is adapted from "Society 5.0: Co-creating the future"(Keidenaren, 2018).

Society5.0 aims to solve problems with smart solutions in the city and regions. With the further expansion of autonomous driving systems, it is planned to design various transportation facilities at a low cost. Thus, while building a more environment-friendly transportation system, it is aimed to support individuals and related institutions financially with high-efficiency systems and low cost. It also aims to disperse the population proportionally in rural areas with accessible medical facilities and eliminate conditions that adversely affect heavy urban life and human quality of life.

Regarding energy efficiency and diversity; with decentralized advanced autonomous power systems that require minimum dependence on the power supply and power grid, it is aimed to make energy accessible and affordable in both industry and daily life. It also aims to support a diverse lifestyle in different locations and environments through advanced autonomous power systems. Disaster information collaborations system based on CPS, ICT, and IoT technology will be developed for global warming, increasing natural disasters and earthquakes. Thus, necessary precautions will be taken both before and during the crisis. With the more advanced systems, the infrastructure in the settlements will be analyzed in detail. Thus, structures on energy efficiency will also be analyzed while providing support for the detection and solution of the problems (such as water, fire, natural gas leakage).

The health system, medicine and nursing currently used in the information society will be redesigned with new technological opportunities. Detailed information will be collected through systems that allow instant data flow on individuals or in their living spaces, thereby providing service to everyone in need. Uniform treatment methods and patient admissions in the information society will be transformed into a more tailored and diverse form through new approaches, thereby building a long healthy, and energetic society. Easy use and accessible health services will be created with systems based on AI, IoT and telemedicine. The Know-how based on the technological advancements will be shared in order to serve the benefit of societies on a global scale.

Unlike the information society, the food industry and agriculture will be redesigned based on creativity and sustainability. AI and IoT based systems used and all processes conducted by the autonomous drones and agricultural robots, so efficiency and biodiversity in energy and resource use will be preserved. Production and food history will be shared with everyone at every stage with detailed data accumulation and an effective food value chain will be created.

The role of logistics in the Society 5.0 is vision of improving quality of life with the help of complex systems. The logistic system will be designed with cutting edge technology. The logistic supply chain will be rearranged with real-time logistic tracking and AI-based systems. With the new advances in CPS and AI technologies, the production process and service sector will further develop. Thus, SMEs and entrepreneurs will participate in the process with high value-added products and meet different demands and expectations. It will be ensured that the production technology will spread to each manufacturer by not staying within the realm of certain large enterprises. Unlike fears for less workforce and job loss, a production process will be created that enables more jobs and initiatives. For example, decentralized labor force can be created by making 3d or 4d printers more accessible. Through digital transformation, a more service-oriented business model and production approach will be developed instead of hardware.

The accessible lifestyle provided with the help of technological developments in production and economic areas will allow individuals to live wherever they want, without the need for cash. A more sustainable and creative economy will be built financially by developing a system that provides funds to emerging sectors. With the blockchain technologies that are becoming more and more known nowadays, the economy will have a diversity, innovation, and production identity by getting rid of the molded chains in the current information society.

In the public sector, with the digitalization-based management approach, faster data and service sharing will be provided between both institutions and citizens. Thanks to the convenience and accessibility offered by technological advances, a more transparent and accountable management approach will be adopted. With the transfer of cities to the digital platforms, service demand will be met instantly and service quality will increase with more efficient distribution of resources.

Starting at the initiative of a country with the diversification of projects and investments under these nine headings, Society5.0 is considered to spread rapidly with effective collaborations all over the world and this synergy will spread even more as concrete examples of practices are formed.

3.1. The differences between Society 4.0 (Information Society) and Society 5.0

Society5.0 differs from previous social levels in every field with its people-centered perspective. Society 3.0 (Industrial Society) and 4.0 (Information Society) are trying to produce services with mass production and consumption with a basic perspective that pioneers "scale and efficiency" in socio-economic development. There are more standard business plans and procedures in this process. Efficiency and productivity concerns make this necessary. However, Society5.0 aims to produce more tailored and creative products at this point. With a number of positive developments that will be offered by digital advances, it focuses on meeting the need and value production instead of efficiency with specially shaped service and products produced according to almost every individual's needs. In previous societies, a "uniform" lifestyle and service procurement were accepted, while society 5.0 pioneers the "diverse" life and service procurement of individuals. Instead of fitting in certain patterns, individuals will have the desired work and living conditions free from time and space dependency with the opportunities offered by digital developments. The differences will become even more important and a distinction will be eliminated for individuals' gender, races, and nations. Unlike the information society, in society 5.0, the power of knowledge, and the wealth will spread to every layer of society. Problems such as construction, insufficiency of public facilities, security, and terrorism, which are among the main social problems, will disappear with the help of digital developments in Society5.0.

The previous social stages have caused permanent damages to the environment. In Society5.0, these damages will be removed with changing paradigms and technological advances in production and service provision. The sustainable energy resources and decentralization offered by technological advances, unlike information society, will prevent excessive consumption of resources. Thus, a sustainable environment and society in harmony with nature will be established (Keidanren, 2018). The differences between the fourth and fifth societal stages are summarized at figure5:

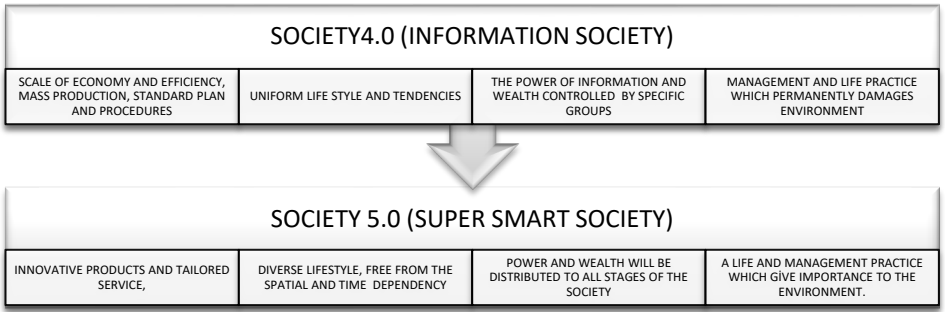

Figure 5: The differences between the Information Society and Society 5.0

Source: It is adapted from Society 5.0: Co-creating the future(Keidenaren, 2018).

3.2. Industry 4.0 and Technological Advances (ICT, CPS, IoT, AI, Cloud) are getting more and more important

The Industry4.0 aims to create digital factories that offer "smart networking, flexibility, integration of customers, mobility, and new innovative business models" (Jazdi, 2014). The purpose of Society 5.0 is to carry these developments from the focus of the production sector to sustainable prosperity by offering a solution for the social issues. In this context, ICT and CPS technology which shaped Industry 4.0 and the determinant of Information society's socio-economic transformation also assume an important role for the success of "digital society" vision of Society5.0 (Harayama, 2017:10; Gladden, 2019).

ICT consists of three elements, which are "computing power, network, and software solutions". Such components allow for functions in real-time, flexible and remote. Effective use of them is important in producing value-added contributions for society5.0. The real-time function is important to collect data and analyze them in order to generate alternative solutions. The remote feature is essential to give equal value, beyond spatial constraints (eg e-government).

CPS is considered as 'the next generation embedded, integrated, interdependent, interactive, and autonomous intelligent ICT systems. CPS enables computation and coordination, monitoring/control of physical components/processes. CPS systems enable interconnect and operate together to deliver a broad variety of creative technologies and services for people and companies (Germany Trade and Invest (GTIA) Report, 2014).

CPS, AI, IoT, and Cloud, the value creations of advanced ICT; are important for Society5.0 vision to create value-added solutions for social problems. The sustainability of this vision and the future of the possibilities rely on how well we plan the scope of AI and associated technology for optimization (Endo; 2018).

Much as society5.0 stands before us as a great vision, there are major problems ahead of the development of industry 4.0 and related technology. Major problems have several forms of challenges including "scientific, technical, economic, societal concerns and political issues" (Zhou, 2015). The integration and cooperation of different systems are complicated and still needs to be improved. The production cost of new and improved smart devices is very high. The increase in data, computing power, and connection volume create an urgent need to have a qualified workforce and complex management systems. Wide range usage of the analytics and business-intelligence capabilities requires businesses and organizations to invest more in these areas. New modes of human-machine interaction systems (augmented-reality systems etc.) are important for the future of the industry, but the advanced versions need to be invented in higher efficiency (Zhou, 2015; McKency, 2015). Solving various such infrastructure and technology problems is important for the great vision to achieve the desired results.

3.3. Promising Studies and Developments in The Way of Society 5.0

Preliminary research on the transformation from the intelligent society to the super-smart society (Society5.0) has begun. Some of the studies such as Society 5.0 at higher education (Sarif, 2017) and parent-child relationships in Society 5.0 (Romli et al., 2018) are on a theoretical level and aim to expand awareness. Some studies are tried to be implemented in practice. These examples are as follow;

- **Sardinia 5.0 Project**

Through the advancement of ESRI technologies, which allow WebGIS to be incorporated with AI, IoT and Big Data Aerospace, "the Science of Where" identifies different ways to plan and experience the environment and the city. The experimentation is scheduled in a project called Sardinia 5.0. All the infrastructures, technology, and data required for experts were provided within the current research; thus,the chief goal is to carry out an evaluation of the social

effects of current programs and to develop scenarios for a potential future that is able to serve the vision of Society5.0 (Ratti, 2018).

- **Aizuwakamatsu City Project**

Aizuwakamatsu City residents in Fukushima Prefecture are observed and their personal vital data have been collected. The experts analyze these data and use them to increase the quality of living. The average age of residents living in Aizuwakamatsu is high. Because of that entrepreneurial attempts are made to develop their life quality. IT companies invest much in here. Especially new medical and regenerated energy fields are tested (Niinami; 2019). Within the scope of the project, it is evaluated that the obtained social and technological results will contribute to the development of the Society5.0 vision.

- **MaaS (Mobility as a Service)**

To be used in the tourism industry; it is a platform that provides detailed information about transportation, accommodation, events, and products to be sold for being used in tourism industry. It is a platform with tourist-friendly applications such as reservation and cashless payment, tailored production suggestions. Within the scope of this project, it is aimed to strengthen local players and develop tourism as a key industry within the scope of the Society5.0 concept (Tomita; 2019).

- **The Construction Career Up System (CCUS)**

It is a public-private sector joint project, which is developed by the Japan Ministry of Land, Infrastructure, Transport, and Tourism. This system collects detailed data about skilled workers and evaluates their performance. The data collecting according to their qualifications and performance enable develop standards for the sector. "CCUS" considers talented workers as valuable managerial tools and create a database. With the help of this database; CCUS aims to serve the development of society5.0-visioned construction. Also in the process of increasing productivity with public and private sector media initiatives, i-Construction, which is "an effort to incorporate emerging technology such as the Internet of Things (IoT), AI and robotics into production processes in building" and business process re-engineering (BPR) has been developing. CCUS will support the decision-making system with big data and implementing the training process of skilled workers for the futuristic vision of Society5.0. Also, CCUS supports quality and safety besides productivity, and enable the usage of the maximum capacity of individuals (Yamauchi; 2018)

- **Cyberdyne- HAL (Hybrid Assistive Limb)**

Cyberdyne Inc. uses the new inventions of The "Cybernetics" which is a current interdisciplinary field search technologies focused on the convergence of person, the computer, and information systems that improve and sustain the physical and cognitive functions of human beings. Cyberdyne develops a HAL (Hybrid Assistive Limb). HAL is the world‘s first cyborg-type robot that is wearable and it also enables improving, supporting, and enhancing the bodily functions of the users. HAL helps the physically challenged person to move and also accelerates the learning of cerebral nerves. It will be useful for the Society5.0 vision of a decrease in the aging society's problems and increase life quality (https://www.cyberdyne.jp).

- **Cyberdyne -AcousticX**

Acoustic X helps to collect data through absorption of light and ultrasound at the same moment. The gathered information can be viewed on any monitor. By integrating these two methodologies, Acoustic X presents detail that was considered to be hard to view, such as capillary vessels. Acoustic X is to be designed for enabling real-time photoacoustic imaging in order to diagnose difficult cases. It uses the High-speed light pulse LED to take the image. Unlike conventional photoacoustic devices that are expensive and consuming a lot of energy, it is more efficient and effective. It has a technology that enables real-time and 3D imaging (www.cyberdyne.jp). The increases in technological developments in this field contribute to the society5.0 healthy vision.

- **E-Skin (Ultraflexible organic photonic skin)**

Researchers at the University of Tokyo have created an extremelythin; flexible, high-performance wireless wearable interactive displays and illustrated its usage by developing an air-stable, organic light-emitting diode display (OLED). It is a kind of electronic skin (e-skin) displays technology. This technology will enable us to get real-time data such as blood oxygen level, heart rate, and several other issues. Also some recent studies of Professor Takao Someya advance this technology and create more complex "skin electronics" enable to display the moving of electrocardiogram waveform that is recorded by a breathable electrode sensor on the skin. This integrated biomedical sensor network-called "skin electronics" can send biometric data to the cloud with the help of a wireless communication module. These technological improvements will be helpful in realizing the Society5.0 healthy and prosperous life vision (Yokota et al., 2016; Someya, 2018, http://www.ntech.t.utokyo.ac.jp).

- **Biometric Information Sensor**

Researchers created a sticky gel and managed to create a thin sensor that can evaluate biometric details easily attached to the body like a seal. In line with significant advances in information technologies such as big data, the technical significance of measuring biometric knowledge is growing. To improve the accuracy of measurements, it is ideal to put the sensor in direct contact with what is to be measured. And this device enables more comfortable and easy usage to be applied to a living body. The wearable and bio measurement devices will monitor the wellbeing of the user, and then transmit the data to other devices wirelessly. In the aging world, user-friendly wearable sensors and bio-measuring tools are required for patient monitoring to reduce the stress of nursing and improve the tailored health care vision of Society5.0 (https://www.jst.go.jp).

- **Smart Cyber Operating Theater(SCOT)**

In the treatment room, networking technology is not used much and almost all devices operate separately. SCOT offers a treatment room where these devices are connected to each other via a network. “Smart Cyber Operating Theater (SCOT)” is implemented through the Orin (Open Resource interface for the Network) which is originally designed for industry. Orin is easy to use and offers flexible installation. Also, some new advancement utilizing ORiN technology enables proper decision-making on the treatment device (Okamoto, et. al, 2018).

- **Smart City 2.0**

Mainly most of the examples and discussions of smart cities concentrated on the idea that is managing urban assets (roads, public transportation, and wastewater system, etc.) using big data and information technology. This “connected infrastructure” vision defined as Smart City 1.0 mainly focuses on physical assets. The advanced sensor and networked technology enable getting data and helping the problem solving and decision-making process. But beyond that, new developments have emerged... New vision Smart City 2.0. This new vision offers a platform far beyond the use of data provided by different sensors in the implementation of decisions made by City officials or in the solution of a problem. The different “lens" enables an effective solution that is decided by all actors of the city(City officials, businesses, nonprofits, schools, and individuals) on the city issues with the help of the combination of digital technology, data, and design thinking(Deloitte:Building the smart city, 2018,https://www2.deloitte.com). The-

se technological improvements will be helpful in realizing the comfortable, safe, and high life quality vision of Super Smart Society (Society5.0).

- **Vehicle-to-Everything (V2X)**

Vehicle-to-everything (V2X) is a system that allows cars to interact with moving parts of the traffic system around them. There are some different versions of it. Vehicle to Vehicle (V2V), which allows vehicles to interact with each other. Another aspect is "infrastructure to vehicle (V2I)" that allows vehicles to connect with external structures such as streetlights, houses, and also cyclists and pedestrians. When this system gets more advanced in the future, it can extend what it is capable of. V2X also provides other benefits such as enabling toll fees to be charged automatically and help to park.

The 5G Automotive Association (5GAA) is founded in 2016 with the participation of telecom and vehicle manufacturers in order to created advanced real-life examples of Vehicle-to-Everything and make it available to all users. The new technology solutions are important for the society 5.0 vision aiming safety life (Segal, 2020,https://www.investopedia.com).

4. KNOWLEDGE MANAGEMENT IN THE INFORMATION AGE AND ITS IMPORTANCE IN SOCIETY 5.0

It is generally accepted that information is the most important source in the information age and it has a transformative effect in every domain of life (Toffler,1990). Effective management of this important resource, whose importance and quantity is increasing day by day, increases the importance of knowledge management (Kalseth & Cummings, 2001:164). Knowledge management is important in terms of directing all business and activities, creating new values and products, the quality of the bond established between the producer and the consumer, and the effective rearranging process of the social domain. Knowledge management has a multidisciplined, social-behavioral, and technological aspects. It consists of "creation, storage and retrieval, transfer, and application" processes (Kane & Alavi, 2007; Alavi & Leidner, 2001; Alameh & Zare, 2011). The process from obtaining information to new production or service is important in achieving the innovation capacity and strategic competitive advantage organizations need. As Aktan and Vural (2016:5) stated; Knowledge

management consists of "people, process and technology". With the Knowledge obtained within the framework of these three elements(people, process and technology), common mind and value production emerges. It ensures the continuity, profitability, development of skills and capacities of the organization, increasing the efficiency of the decision-making process, and focusing the organization's main and critical works (Uit & Roelof,1999:97). Knowledge management is important in terms of organizations' adaptation to changing terms and conditions and their development to become learning organizations. Knowledge management is important for a learning organization that adopts a critical approach adopts new ideas, supports innovation and different ideas, and emphasizes the welfare and development of individuals. In this context, knowledge management, which is important in the information society, is also important in the next social stage, Society 5.0. Because the need for learning organizations is increasing in a society that cares about the welfare of the society, puts people at the center, and emphasizes difference and innovation in the solution of social problems. Knowledge management is becoming an even more important issue from today to the future. Particularly we observe the increasing importance of knowledge management in concrete examples. When the applications and projects regarding the Society 5.0 in the previous section are examined; creation, storage, and retrieval stages in knowledge management is important for achieving the Sardinia 5.0 Project, Aizuwakamatsu City Project, The Construction Career Up System (CCUS), Smart City 2.0 projects. Also, it is seen that transfer, and application stages of knowledge management is important for achieving projects such as MaaS (Mobility as a Service, Cyberdyne-HAL (Hybrid AssistiveLimb), Cyberdyne-AcousticX, E-Skin (Ultraflexible-organicphotonic skin), Biometric Information Sensor, Smart Cyber Operating Theater (SCOT), Vehicle-to-Everything (V2X).

It is obvious how important it is to collect, store, process information about social life in projects and to use this information effectively in solving problems and in the production of innovative solutions. For this reason, Knowledge Management has special importance in the vision of Society 5.0, which is human-centered and aims to use technology and information effectively in the solution of social problems. It is considered that the development of the issues focusing on knowledge management in the existing strategies of the organizations is of vital importance in the new social phase, Society 5.0.

CONCLUSION

Socio-economic advancements and Technologies are vital factors that affect the transformation of today and the future of society (Nolan & Lenski; 2008: 57; Lenski; 2005: 84). From Industry 1.0 to Industry 4.0; many developments in social, economic, political, and environmental areas, as well as problems, have been raised. Technological and economical advances such as industrial manufacturing style, IoT, AI, CPS, ICT should focus on social benefits, offer new opportunities and solutions to the society. Otherwise, economic and social degradation is inevitable (Bryndin, 2018). At this point, Society 5.0 focuses on the "Super Smart Society" where social problems are sustainably overcome and the quality of life is at the top level unlike "the smart factory and manufacturing" in the stages of industry4.0 and earlier (Skobelev & Borovik, 2017:1; Hozdi'c, 2015; Ferreira & Serpa, 2018; Iwano et al. 2017:1; Harayama, 2017).

With Society 5.0, the Information Society is experiencing a radical paradigm shift including technological, economic, political, and mindset. Society5.0 aims to build a society where social problems on a global scale will be resolved, the quality of life of enhanced, the diverse lifestyle is admitted and everyone has a healthy, comfortable and safe lifestyle (Bryndin, 2018; Ferreira & Serpa, 2018; Keidanren (Japan Business Federation), 2016). In the realization of this purpose; It is important to build a solution-oriented synergy that all stakeholders participate effectively and respect differences. The "Innovation Policy" to be created by governments, "Entrepreneurial spirit" that will be motivated by the society to analyze the needs and take action, and "Entrepreneurial Skills", which are important to be exhibited by the civil society and institutions, are the determining factors of the realization of this process (Yousefikhah, 2017:38). Industry, academia, and government should have initiatives for the development of open innovation on various platforms, which offer solutions to the problems of all humanity, share the data, and know-how (Komoda; 2019). Also, the implementation of strategies for the development of knowledge management, which has become more important in this social phase, is important for the realization of the vision of society 5.0.

Information Society is moving towards the Society5.0, where the dream of a country will become the reality of the whole world, social problems are left behind, and the quality of life increases; in order to realize a dream of human-centered, safe, environmentally sensitive and Super Smart Society.

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CHAPTER 6

STRATEGIC MANAGEMENT IN THE INFORMATION AGE

Duygu Hıdıroğlu

INTRODUCTION

Dramatic changes are taking place in the global market day by day. In today's business world the speed of the change is so fast and reaching information is so vital for firms. The companies' ability to keep up with the change maintains a competitive advantage to them. The future business practices have not been the same as the past. We are now in the information age; people have been exposed to increase their knowledge in order to cope with fluxional market conditions. The decision makers of companies serve the market in the light of everchanging information. Companies adapt their organizational structure to constantly developing and floating environment. The dominance of information management has a key role for firms. It is inevitable that information is the most important part of strategic management issues in businesses now.

Recently, the concept of strategy has taken a significant part of business management discipline. The information has changed continuously so that the strategic planning issues and strategic management of business plans have changed simultaneously as well. The globalization boosts competition among firms in a variety of sectors. The globalization raises the flow and the use of the internet, easier access to information over the internet and enhances information sharing. Companies even now could carry out their commercial activities over e-commerce and these developments have revealed the importance of strategic management based on information management in today's businesses. Besides; as a result of inventions in the light of innovative information flows in businesses, a dramatic change in organizational structures and operations of businesses has been emerged since 1980. Thenceforth, local markets and firms have been launched to adapt their business processes to globalized market conditions rapidly.

In this section, we will examine the main trends and strengths through the informational flow that challenge the company's strategy and which allow the organizations to set new strategic plans by replacing planned strategies up in years. We will examine the influence of information on businesses' strategic management in eight key parts:

1) The Importance of Information
2) The New Giant Information Age
3) What is Strategy?
4) Strategic Planning
5) The Strategic Planning Process in Information Age
6) The Effects of the Information Age on Strategic Management Tools
7) Strategic Management in Rapidly Growing International Markets
8) Strategically Managing Ethics and Social Responsibility Firms' Information Sharing Policy.

1. THE IMPORTANCE OF INFORMATION

In this age, many processes in the social and economic context have been reshaped due to the rapidly changing technological environment. Developing strategies that adapt businesses to the pace of change and managing these revised processes successfully have vital importance for businesses strategic management issues. When developing successful strategies that ensure compliance, businesses and managers need more information than before. In other words, businesses have become more relied on information to ensure their sustainability today.

The provision of information from the right source and ensuring the correct flow of information from the top level to the lower levels in the organizational structure requires a serious responsibility and stress on the business decision makers. Because of the significance of knowledge for businesses today, information management has been recently emerged as one of new business management discipline which is taken the first place in academic management literature.

Information would be described as the facts or news about a particular situation or situations transmitted or obtained (Borko, 1968). Information is also defined as the real data gained by means (Miller, 1953). The correct use of in-

formation is so crucial for the economies of a variety of countries as well as the information is misused; since it could set blocks of the economic welfare (Andersen, 2001). Information is also part of every stage in business studies such as organizational communication, research and development activities etc..

Today, the profitability and success of businesses are measured by their ability to access information rather than use of financial data such as cash flow. Moreover, to what extent these businesses can adapt new information to their business processes is a main criteria determining the success of businesses (Magness, 2006).

Knowledge is substantial, but knowledge expertise is even more major than the information itself. Now, the more useful information businesses have, the stronger the businesses are (Li, Scora, Shaw & Tan, 2006). Access to information and communication success (success in social networks) are the basic skills that provide competitive advantage to businesses (Egbert, 2009).

In the developed economies and western societies today, it is observed that the professions specialized in information gathering, sharing and using (Yang, 2004) are more preferable than other professions. Companies seeking new employment is in information-oriented professions more and more. Computer purchases are increasing day by day, and fiber, mile and magnetic signals connect people, their computers and a wide range of computing devices over a very long distance (Davis, Smolyaninov & Milner, 2003). Societies have become more knowledge oriented and people inhabit and are adaptable more on the information age.

In this information age, there are many difficulties, both socially and economically. These difficulties have been generally raised from the complexity access to information. Information is defined as the fact reached at the end of the intellectual design as a result of an input mostly used in intellectual activities, while the dissemination and utilization capacity of information is increased (Steward, 2010). Thus, knowledge constitutes the intellectual capital in which people maintain their quality of life as well as the values that businesses generate.

2. THE NEW GIANT INFORMATION AGE

With the latest advances in technology and technologic explosion, a new digital age called “Information Age” has begun. Sudden growth in computer using, telecommunications, information sharing, transportation and other technologies has also had a major impact on companies' value-added strategies (Bakos & Treacy, 1986).

In the information age, people are more connected than ever before, and they are more connected to every person in the near and far distance on earth where they establish social networks. While it used to take weeks or months to travel to cities in a country, nowadays people can reach cities in just a few hours; we can travel the world in a very short time. It takes just couple of seconds to follow the developments in the whole world and access to global news simultaneously. Live satellite broadcasts and internet distances make people so close. In the past, it had been used to take months or even years to communicate with distant places, but now it takes only a few minutes to be able to connect with people with or without a simultaneous view.

To identify the customer portfolio with the developing technology, by monitoring and analyzing the consumer behavior after the sale are so effortless and businesses have gathered consumer behavior data straightforwardly (Johnson & Selnes, 2004). In the light of consumer behavior data, businesses could revise easily their production processes and company could simply arrange their strategies according to customer needs and expectations. According to customer feedback information, it has become easier to plan procurement, logistics and distribution strategies effectively and efficiently in businesses. Technology also helps companies to distribute products in a most effective manner. Furthermore, technology helps them communicate with customers in large groups or if desired face to face / one by one.

Through video conferencing, marketing researchers at a company's headquarters in London can follow focus groups in China or Africa without having flight lots of hours (Gates, 1999). With just a few clicks of a mouse button, the direct marketer can refer to online data services to find out every single information about consumer focus group such as the information about which car consumers drive, what consumers read, what ice cream flavor consumers prefer and so on. In this way, in the field of marketing, service providers can reach more accurate sales predictions and can decide more practical marketing strategies with the access to customer databases. So that successfully converting customer database information to companies' offers increases the customers' satisfaction with ease.

The technology has also brought a new wave of communication and advertising tools, from mobile phones, external hard drives and interactive TV to video kiosks at airports and shopping malls (Khang, Ki, & Ye, 2012). Marketers can use these tools to reset customers selected with carefully targeted messages. Through e-commerce, customers can learn, design, order and pay for products

and services without leaving home. Then they can receive their purchases in less than 24 hours by express delivery wonder. From the virtual reality screens that test new products, to online virtual stores that test new products, to online virtual stores that sell them, the boom of technology affects every aspect of marketing and strategic management.

3. WHAT IS STRATEGY?

The strategy is to harmonize the resources and core capabilities of the business with the environment in which the business is located in order to achieve its goals (Porter, 1996). Strategies are long-term and high-cost plans. Tactics, on the other hand, are short-term plans where businesses find temporary solutions to the problems they face (Cable & Judge, 2003). It is a holistic approach to perceive the strategy as plans that are designed against competitors. Although some of the strategies developed by businesses are to provide competitive advantage against competitors, there are strategies developed to cooperate with other businesses (Dyer, Kale & Singh, 2001).

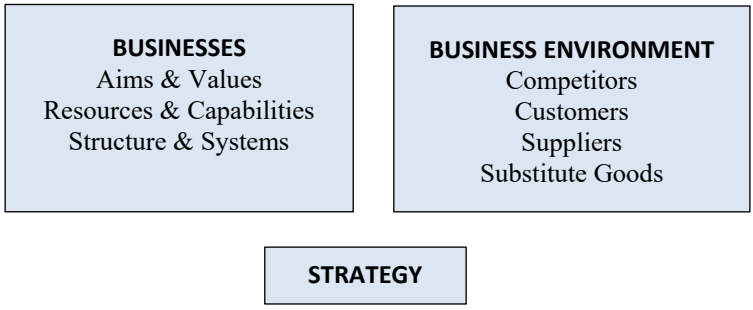

Figure 1: The Function of Strategy of Businesses

Source: Robert M. Grant, (2002)

Figure 1 summarizes the function of the strategy for businesses. As it can be seen on the table, strategy acts as a bridge between the businesses and the businesses' environment.

4. STRATEGIC PLANNING

In order for companies to prepare strategic plans, analyzing internal organizational activities and capabilities and the dynamics of the companies' envi-

ronment in detail will directly affect the success of the strategic plan the companies have prepared. There are various analysis tools of researchers who make important contributions to the literature that make it easier for businesses to analyze these internal and external dynamics (Rothaermel, 2016). The most well-known of these analysis tools are SWOT Analysis and Porter's 5 Force Analysis. With SWOT Analysis, while determining the internal dynamics of the firm, namely its strengths and weaknesses, the opportunities that the company could benefit from and the threats that may adversely influence its activities could be determined (Dyson, 2004). With Porter's 5 Force Analysis, as can be understood from its name, has 5 prominent factors including 1) Potential Competitors, 2) Existing Competitors, 3) Substitutes, 4) Suppliers and 5) Customers (Dobbs, 2014).

Strategic planning is defined as the process of developing and maintaining a strategic harmony between the goals and capabilities of the organization and changing marketing opportunities (Steiner, 2010). Another definition of strategic planning is long-term plans planned by senior management in order for an enterprise to reach the specified goals (Heracleous, 1998).

5. THE STRATEGIC PLANNING PROCESS IN INFORMATION AGE

5.1. Defining The Company Mission

To set the company mission a decision maker should answer such questions: "What is our business?", "Who is the customer?", "What is the value of consumers?", "What should our business be?" (Kirk, 2000).

The company mission should also be neither too narrow nor too broad. The company's mission should be tailored to the market where the company is located and should emphasize its distinctive competencies from other companies owned by the company. Finally, the company's mission should be motivating both internal employees and external stakeholders (David, 1989).

5.2. Designing The Business Portfolio

The business portfolio is the sum of the businesses and products that organize the companies' processes (Hedley, 1977). Designing the business portfolio is an important step in the strategic planning process.

The first step of the portfolio design process begins with analyzing the current business portfolio. The second step of the process is to shape the future business portfolio. The next step is to identify strategic collaborations. To do this, the priority is to evaluate strategic collaborations.

The fact that the prepared strategic plan provides competitive advantage for the company compared to the sustainable competitors depends on the internal and external stakeholders of the firm to be fully adopted, not imitative. The internal dynamics and organizational structure of the firm would comply with the prepared strategic plan (Allison & Kaye, 2011).

Since the planned strategy is easily imitated by new entrants or existing competitors (MacMillan, McCaffery & Van Wijk, 1985), it could ncrease the competition in the market and decrease prices and decrease profitability. Thus, it is quite important that the planned strategies cannot be imitated. In the long term, the performances of the companies that implement imitative strategic plans decrease. Therefore, if companies want to gain competitive advantage by adding value to their companies with the planned strategies, those strategies should be unique and almost impossible to imitate.

In this age, the strategic method that companies most prefer to use for their strategic management issues; is to learn the practices of other companies by imitation or to get some training consultancy services and to revise their own internal processes related to the operations and basic capabilities of companies in the same or similar sector. For example, implementations such as Total Quality Management (TQM), Authorization, Six Sigma, Just In Time (JIT), Reengineering and Benchmarking (Reed, Lemak & Mero, 2000) have been imitated from the company which has firstly developed these new unique and implements these strategies to sustain its own organizational facilities. After imitating by other companies these strategies become common management and process applications used by many businesses today.

6. THE EFFECTS OF THE INFORMATION AGE ON STRATEGIC MANAGEMENT TOOLS

With the changing world dynamics, the need for companies to change their strategic plans and the idea of specializing companies' strategic management in terms of these dynamics is approved by a large group. The competitive advantage of businesses depends on their ability to collect data and set strategic plans to effectively use of this data in their internal activities.

The first of the strategic management factors developed to ensure compliance with information is developing strategies which aim to change organizational structures as information based structure. The purpose of the strategies that are expected to increase the efficiency of the employees shaping the organizational structure is to facilitate the access of internal information limited to certain security and confidentiality obligations (Higgins, 1999) and external information outside the organization that influence the businesses (Rowe & Gallaher, 2006). In this way, the obstacles to the learning of the employees will be removed, while innovation, diligence and working motivations and the employees' sense of belonging is will be improved by businesses' strategies.

In the organizational structure in which the flow of information could be smooth, the most correct way of doing business could be easily determined after getting feedback about what businesses were done and which way of doing business was most effective. After defining the most appropriate way, the human resources department could utilize the correct strategic performance analysis in terms of information gathered from employees. Developing a strategy in terms of organizational feedback data human resources department can set achievable targets for the development of both the employees and superior company performance (Noe, Hollenbeck, Gerhart & Wright, 2015).

Moreover, finished work results could be easily controlled in organizations where easy access to information would be ensured. In organizations that all processes are almost operate well, the audit mechanism could be functioned in a more realistic way regarding the issues who performs what, how effectively and efficiently employees could finish their responsibilities. The answer of the question "How employees could be encouraged to perform better" could also been responded by gathering data about employees current performance results. Employees who did good job would be supported with reward and incentive strategies in order to provide sustainability to perform well. When evaluated from a holistic point of view, improvement in the individual performance of the employees will allow businesses to achieve improvement on the companies' overall performance results. While information sharing is well done within an organization, performance indicators are not only factors that are influenced positively but human resources indicators such as motivation, dependency are also related to the that concern.

Additionally, when information sharing could be made clearly on the flow of production processes; it would be easier to strategically intervene when a

possible glitch and critical problem arises on production processes. It is very important that information sharing about production processes can be clear and easy, both as it increases the efficiency of strategic production processes, minimizes the costs arising from disruptions and shortens the time spent in problem solving.

Another benefit that information provides to business strategies is quality management. The issue of quality is an important issue that businesses should pay attention to compete with their rivals. Quality, which is one of the strategic management tools, allows a firm to stand out from other companies and be preferred by consumers (Schonberger, 1992). In this regard, businesses need to renew certain processes by introducing certain quality standards and to develop strategies that will bring their organizations to the optimum level in terms of quality in line with information from the external environment.

Today, information becomes constantly out of date and an up to date information is being replaced old information quickly. It is essential to develop strategies at the same pace of information update. In this regard, business strategies should be adapted to new quality approaches simultaneously. For this reason, it will be inevitable that most strategies have developed for maintaining quality would be tend to short-term. Quality management strategies, established with access to up-to-date and accurate information, satisfy customer needs and increase consumer loyalty which provide profitability to businesses in the long term (Oakland, 2014).

With the correct strategic management of the information, the efficiency of the employees is increased, and the customers and suppliers' data in the market is quickly reachable. Business could get right feedback from their customers in order to meet the customer demand (Hamilton & Nickerson, 2003). Again, by enabling the completion of much work in a short time, the information share internally increases the efficiency of all employees in an organization and costs could be reduced. The information enables the employees in different departments to cooperate within the organization (Davis, 1982). In summary, nowadays information is essential for splendid strategic management. Successfully administrating business strategies could be only possible with managing internal and external information correctly and making optimum use of information technologies in business facilities.

7. STRATEGIC MANAGEMENT IN RAPIDLY GROWING INTERNATIONAL MARKETS

All basic strategic processes of businesses require some informational features. The success of the strategic management of companies depends directly on these key features. These features are based on the separability of information and the authenticity of information (Bettis, 1998).

Information provides an opportunity to change the organizational structure of international companies. Information ensures international market actors to gain strengths in global competition in new virtual organization structures based on promoting innovation (Mowshowitz, 1994). In order to better share the knowledge and basic information of the companies, some companies make consensus such as joint ventures or strategic alignments (Vanhaverbeke & Peeters, 2005). Both two part of companies could benefit from the advantages such as business to business network sharing, supplier management system competencies sharing, customer information databases sharing of this consensus (Cabrera & Cabrera, 2002). These strategic alliances also provide the linkage among divergent value chain activities (Kale, Singh & Perlmutter, 2000).

In the information age, the competitive advantage for companies trading internationally is reaching accurate analysis of industry density, correct positioning of businesses, correct diversification of business products according to the relevant market, and establishing innovative processes and following up innovations (Utterback, 1994). In an internationally competitive environment, understanding the environmental and industrial conditions surrounding firms correctly is almost impossible, but with the ability to gather right information it is. The existence of correct and feasible company strategies depends on how much information companies use in strategic planning process. (Sampler, 1998).

In addition, with the globalization, there is a kind of invisible borders between countries. This situation has facilitated the employment of individuals with knowledge and skills besides the easy spread of information worldwide. For example, by regulating information as a strategic management tool, it is possible to employ individuals with high level of technical knowledge and skills from different nations. So that IT companies producing high technology continue their research and development activities without any break.

Diversifying the human resources of companies enriches the organizational culture and gives different perspectives to the business activities (Reed & Reed, 1989). On the other hand, the development of new strategies for employees employed from different nations with different knowledge and experience also requires extra responsibility from managers. Further, if employees with high level of knowledge leave their jobs after a while, there is a loss of information within the organization. To prevent such a risky situation, there are some functional organizational structures that decision makers can apply their organizations proposed in the literature.

Companies that compete in international markets and have multinational employees or have established a strategic partnership with a multinational company are recommended to apply the learning organizational structure to their organizations. In such an organizational structure, information migration does not occur when employees suddenly quit their job in an unexpected situation or when the partnership has to be terminated due to unexpected reasons with the company having strategic partnership established (Pawlowski & Robey, 2004). Because in these organizational structures, the most important thing is internal learning and the information flow between different departments is quite fast in this type of organizational structure. If so, the learning activity can be carried out within the company from one to another, in any condition and at any time from superiors, subordinates, suppliers, customers (Ghorpade, 2000). In short, there is always something to learn from all internal and external stakeholders with whom the business is in contact, and information sharing is unlimited in this type organizational structure.

8. STRATEGICALLY MANAGING ETHICS AND SOCIAL RESPONSIBILITY FIRM'S INFORMATION SHARING POLICY

Direct organizational information flow could reduce bureaucratic cumbersome and bureaucratic costs associated with managing relationships (Jacoby, 2004) between both the headquarters and departments and departments and external strategic partners. Organizational level information has enabled more internally and internal processes would be more effective and efficient by improving communication among departments.

Companies have the capability of ease of access to information facilitate more innovative activities than any others. It is extremely prominent to keep

this new innovation approaches secret when a new invention is developed or an innovative approach is discovered in companies. Companies give such importance to innovative activities where information sharing is intensive and active (Müller, Buliga & Voigt, 2018). The responsibility of employees in companies focus on innovative activities such as research and development activities is higher than the firms that do not value innovative activities. Such companies do not plan innovative strategies, since they are aware of the threat of employees' sharing organizational innovative information and the probability being imitated by other competing companies. In the case of imitation from other companies, the innovative approaches and inventions would not be advantageous. These such companies must ensure that their inventions and the innovative business strategies have been kept confidential (Schot & Geels, 2008). This imposes certain ethical and social responsibilities on both companies' managers and employees. The fulfillment of these responsibilities can only be achieved through properly planned strategies.

Although there are lots of positive results of internal information sharing, the security and confidentiality issues that need to be protected carefully while sharing information has the critical importance for the firms (Dhillon & Torkzadeh, 2006). As mentioned, preventing some undesirable outcomes in terms of lack of security and privacy conditions; it is possible to one employee share information with outside organizations especially with representatives of other competing companies from the same sector. At this point, information sharing is more harmful to the company than being advantageous as expected (Herath & Rao, 2009). Therefore, it is very important for the company to protect its rights by taking advantage of legal advice while managing organizational knowhow and distinctive knowledge without missing a single point to be abused regarding security and privacy policies.

CONCLUSION

In information age, the processes of collecting, distributing and using information have become quite easy and for this reason the age is called the Information Age. With the help of information processing activities, technological developments and the disappearance of invisible borders between countries, companies have been able to carry out their activities comfortably on a global scale. With this ease provided by information; the first thing that businesses require in order to be successful especially in the global market is the accomplished strategic management that enables managers to make their strategic planning correctly in an effective manner.

The most important purpose of a business is profitability as it is known. There were two main ways to increase profitability before. These were reducing costs and increasing revenues. Although the strategy is on the agenda when it comes to providing the most competitive advantage in local and global markets, many of the strategic management's internal activities (production management, quality management, human resources management, legal management, supplier management, customer relationship management, information management etc.) and the process of organizing the process and shaping the organizational structure are also highly effective. Keeping these processes in optimal level would be only possible by correct use of information on businesses by developing correct orientation strategies and correct strategic planning.

After information has gained an importance in business activities, the strategic management issues have been planned accordingly. If a business aims to provide significant strategic advantages over its competitors and increases its competitiveness, it should use the power of knowledge in its organizational processes and trading facilities. Although it varies depending on the organizational structures and business environment, if one firm aims to be successful and sustainable in its business environment, the firm requires more than cost and revenue calculations (Cornett & Saunders, 2003). The only significant factor a business has to have to differentiate and make inimitable itself among its competitors is the ability to gather and use of information. Right use of information provides a unique strategic advantage to businesses.

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CHAPTER 7

COMPETITION STRATEGIES IN INFORMATION MANAGEMENT

Gözde Mert

INTRODUCTION

Today, knowledge has become the main source and the most important power of economic and social life as well as competition. In dynamic markets, because of the competition in the market, businesses are trying to produce, process and store more information than before. With the rapid change of information and information technologies and pressures in the markets; companies that focus on information technologies (IT) who want to grow globally, achieve organizational change and adapt to the environment. In the fierce competitive environment, the difference between success and failure depends on how well businesses use information in the market. However, it is seen that information is used effectively in new business models and management processes, and businesses are shaped on the basis of information.

Davenport & Prusak (2001), who are important researchers in the field of information management, argue that information can create the most competitive advantage for a business in the global economy. The ability of businesses to achieve this competitive advantage depends on adequate and appropriate information. Existence of too much information in a business does not mean that the decisions to be made are so rational, objective and accurate. Not only lack of information, but also existence of excessive information is a very important problem for an enterprise. In order for the business to make impactful decisions; decision makers should be provided with the information at the right time, in the right format and in the right place.

Information is one of the critical success component in formulating the strategy. Therefore, firms have to establish business strategy and information connections, in order to successfully determine the business strategy, to identify

the necessary information and create a competitive advantage. According to Porter (1985: 35), companies, not countries, create competitive advantages. For that reason, it is quite vital for businesses to manage information, adopt and implement competitive strategies, in order to enter and hold international markets. Drucker (1995: 355) states that economies that demand competitive advantage use information very wisely. It is sufficient for the information to be specific to the business that the information is of a strategic nature and it can create competitive advantage (Aadne, Krogh & Roos. 1996).

In this study, first of all, the concepts of competition and competitive advantage are explained, then information about competition strategies, corporate eigenvalues and creating competitive advantage are shared. Following that, the technological and human elements of information are mentioned and the links between information management and the competitive strategies of the enterprises are explained.

1. COMPETITION AND COMPETITIVE ADVANTAGE

In the classical sense, competition is based on overcoming the other (in terms of price or quality) (De Bono, 1996: 102). Competition is about the ability of businesses to achieve sustainable success against their competitors. Competition, as a system of relations based on universal rules, is an effort to meet a limited demand economically and maintain its existence by using scarce resources (Rugman & D'Cruz, 1993).

While defining the concept of competition, there are basic elements that need to be emphasized. These are; The number of participants is multiple, the aim of winning, the existence of rules and restrictions, freedom of entry and exit to the competitive environment, performance of getting shares from scarce resources, guaranteeing human rights and fundamental freedoms, and no discrimination among the participants in the race (Türkkan, 2001).

Adam Smith, the founder of liberal economics, defines the term of competition as being similar to the attitudes and behavior of the parties in a race. He stated that the competition stems from the limited product quantity. He also proclaimed that the competition has the ability to adapt to the change in the market. Smith (1973: 57) also defines competition as strengthening the activities of competitors in order to make profit. Competition takes place in an envi-

ronment where the actors in the market have full knowledge, there is a free market, and there are many buyers and sellers in the market (Mert, 2019: 130).

Competitive advantage, which is one of the most important research areas in strategic management (Teece et al., 1997: 510; Papatya, 2003: 5-22), has been defined in different ways. Ma (1999: 259) stated competitive advantage as asymmetries and differences in the characteristics of high-performance businesses, which enable an enterprise to serve its customers better than its competitors, thereby creating customer value. Kay (1993: 17-37), on the other hand, put forwards that the competitive advantage is a relative concept and proclaimed that the concept will become an advantage only when compared to the competitor or competitors.

2. COMPETITION STRATEGIES

According to Porter, the competition strategy has been defined as "taking aggressive and defensive actions in order to achieve a defensible position in an industry, to successfully cope with five competitive powers and thus the company to achieve a great return on investment". For this purpose, companies have discovered many different approaches. The best strategy for a particular firm is a completely unique structure that reflects its specific conditions (Porter, 2003: 43).

Enterprises are faced with the following features regarding competition (Kavrakoğlu, Gedik & Balkır, 2002: 70):

- International borders have disappeared,
- The growth rate of many industries has decreased,
- Product differences decreased,
- Customers are hard to like,
- Competition areas of businesses have started to change,
- Creativity started to come to the fore,
- It has become more important to be close to the customer,
- The need to create synergies emerged to achieve competitive advantage.

Competitive powers of businesses determine the profitability of the sector (Porter, 2008: 3). Firms offering similar products and services in the sector need competition strategies to survive in the face of competition. Competition strategies are necessary for the search for a suitable competitive position in the sector where the business is located.

Competitive strategies can be deliberately defined as the selection and application of different ways of thinking and behavior from competitors to create a unique mix of change. Competitive strategies are based on external environmental factors (opportunities and threats) and competitive factors grouped as business resources. The characteristics of the economic sectors and the market are defined, external environmental factors; Competitiveness with respect to resources is defined internal factors; that is, it is defined as business functions. Opportunities and threats are identified by the analysis of external environmental factors. Internal environmental factors become tangible with their business functions (Doğan, 2000: 6).

According to Porter, the business has three generic competitive strategies, so that it achieves higher performance against other companies and to gain competitive advantage (Porter, 1998). These:

- Cost Leadership Strategy
- Differentiation Strategy
- Focus Strategy

2.1. Cost Leadership Strategy

Cost leadership is about proposing lower costs and prices. This strategy requires the joint efforts of business functions (production, distribution, sales, marketing, etc.). An important feature in cost leadership strategy is to provide the most efficiency with the least input against its competitors. This should be done without compromising the operating principles (price, product, quality, service etc.). This is due to the solid structure of the business. Even if counterfeit goods are produced in competitors, even if there is an increase in input costs, it does not affect the firm with solid construction (Taştan, 2005: 51).

Especially in developing countries, companies that follow the cost leadership strategy try to offer products to customers at the most competitive prices. The biggest reason for adopting this strategy is that companies are more likely to create superior performance due to low labor and production costs (Aulakh, Kotabe & Teegen, 2000). Therefore, it would be more beneficial to expect cost leaders to be competitor-oriented rather than customer-oriented.

If the firm wants to invest in the cost leadership strategy as a way to increase its market share, it is necessary to examine the impermanent condition of

the costs to ensure the permanence of the cost reduction. If price is not a decisive factor for competition in the market, the existing investment may not be as important as an alternative investment (Amit, 1986).

2.2. Differentiation Strategy

The differentiation strategy is to differentiate the product or service offered by the business and create something that will be considered special and unique from the competitors in the market. The basis of the differentiation strategy is that the enterprises produce new products and services in accordance with the wishes and needs of the customers in cases where the classical products and services produced do not meet the needs and wishes of the customers. It is the basis of differentiation strategy, to do different applications than everyone else, to produce goods and services according to customer preferences (Ülgen & Mirze, 2014: 264).

The differentiation strategy is based on the fact that the product or service created is considered as "unique" throughout the industry. Important elements at this point are brand image, licensed technology, special features, a strong distribution channel and other features that can make a difference in the current industry. The uniqueness will transform the firm's profit margin above the industry average (Özkan, 2007: 61).

2.3. Focus Strategy

Although the focus strategy does not achieve low cost or differentiation, it achieves one or all of these elements against the narrow market target (Porter, 2000: 493). The focus strategy is the generic strategy that businesses apply to narrow target customers rather than implementing broad-based strategies, thereby providing sustainable competitive advantage. The focus strategy is put into practice in two ways (Peker, Özdemir, Kerse & Arsu, 2016: 15):

- To achieve cost advantage in the business target segment by focusing on costs,
- The enterprise wants to achieve a competitive advantage in its target segment by focusing on differentiation.

Businesses that adopt the focus strategy are in a position to both define the target market components and meet and evaluate the customers' wishes and desires better than their competitors (Bordean, Borza, Nistor & Mitra, 2010: 174). Focus strategies enable businesses to create their own markets and cus-

tomers. For this reason, focusing strategies are one of the most frequently applied strategies, the examples of which are very common (Ülgen & Mirze, 2014: 268).

3. CREATING A COMPETITIVE ADVANTAGE WITH THE CORE VALUES OF BUSINESSES

The competitive advantage includes capabilities, resources, relationships, and decisions that enable the business to focus on opportunities and avoid threats in the industry. Porter signifies that the management of human resources reduces costs, differentiates products and services, increases resources and contributes to competitive advantage. These activities should be managed from a strategic perspective in order to increase the competitive advantage through the core values of the business (Lengnick-Hall & Lengnick-Hall, 1988: 454).

The firm derives its material and moral values from its own competitive power. Therefore, businesses being aware of themselves better, know, protect and improve their values may be superior to other businesses (Grant, 1991: 123). Continuous improvement is the basis of increasing competitiveness. An enterprise that can successfully manage the continuous development process will increase its performance in both the short term and the long term. With its highly competitive power, the company will increase its revenue, increasing its market share. In this way, the enterprise that creates new investment opportunities will increase its competitiveness even more, with increased capacity and additional advantages provided by production (decrease in unit costs) (Kavrakoğlu, 1998: 15). Accordingly, businesses that can determine their own values and skills and invest continuously to protect and develop them can achieve both cost leadership and product differentiation at the same time (Okumuş, 2002: 361).

Having many resources and abilities is not enough for the success of the enterprises. Competitive advantage arises from the privileged abilities or resources controlled and owned by the enterprise. Therefore, traditional sources of competitive advantage such as natural resources, technology and economies of scale create value for the business. Resource Based Approach factors can be easily imitated compared to complex social structures such as the personnel system. Based on this point, the well-developed human resources system can be an nonignorable source of competitive advantage (Saa-Perez & Garcia-Falcon, 2002: 124).

4. INFORMATION AS AN ORGANIZATIONAL GAIN

An enterprise acts as an open system that takes information, materials and energy from the outside environment and transforms them. It then provides resources to information, processes and structures that produce goods or services consumed in the environment. The relationship between business and the environment is therefore both circular and critical. Businesses depend on the environment to gain resources and sustain their assets. Since the environment develops in complexity and uncertainty, continuing to be applicable requires businesses to obtain sufficient information about the current and possible future conditions of the environment and to use this information to change their behavior in a timely manner (Akyazıcı, 2019: 5).

The return on investment for businesses was measured by physical products and hardware, previously. Today, the intellectual value created has become crucial for businesses and the main source of this value is accepted as knowledge. However, the level of information mentioned here can become an important gain for the business if the information is effectively used and raised by the workers. To do this, managers need to consciously organize, encourage and oversee the development of information workers. Managers' efforts in this direction may offer new solutions that can eliminate the complexity that may arise in businesses' existing relationships with their customers (Carniero, 2000: 88).

The basis of information management consists of two elements in businesses. One of them is technology and the other is human element. In other words, information management in companies requires solutions of people and technology together (Davenport, 2002: 3; Gümüş, Duran & Hamarat, 2003: 154).

4.1. Technology Aspect of Information Management

Technology is one of the critical elements of the structural dimension required to mobilize social capital in the creation of new knowledge (Özgener, 2003: 5). The most important role of technology in information management is that it spreads the possibilities of accessing information to a wider audience and enables the transfer of information faster (Davenport & Prusak, 2001: 43).

Information technologies provide many advantages to businesses in business processes (Malhotra, 2000: 10):

- Information management technologies ensure that the right information reaches the right person at the right time.
- Information management technologies can spread human intelligence.
- Information management technologies ensure the protection of human experience and intelligence.

Information systems have an important place in the production and decision processes of businesses, and in marketing and competition processes. Today, rapid developments in information and communication technologies lead to globalization in the market, thus forcing businesses to set a business strategy worldwide (Anckar & Walden, 2001: 242).

4.2. Human Element of Information Management

The factor that turns them into information by adding value to data and information is human (Davenport & Prusak, 2001: 25). Employees in an organization are a primary and important resource for improving success and fulfilling organizational goals (Yılmaz & Özer, 2019: 199). The success of the enterprises is achieved through collective work of the employees in line with the business goals and objectives. Social and personal success is made possible by employees sharing their working skills and knowledge with other employees (Duvall, 1999: 2).

Large and small businesses operating in different sectors turn into information-based organizations, and more and more information managers and information workers are needed. In businesses that strive to grow and compete, much more information-intensive jobs are emerging. Therefore, the skills and knowledge levels, training, attitudes and experiences of the employees are a matter that should be constantly improved (Barutçugil, 2002: 46).

Every employee in the business is an active participant in information management. However, due to the strategic importance of information and its critical role in achieving competitive advantage, information management is the responsibility of the manager (Bailey and Clarke, 2001: 62). Information manager is the person who has the responsibility of maximizing the value obtained through information (Barutçugil, 2002: 147). The duties of the information manager are as follows (Barutçugil, 2002: 146-147; Davenport & Prusak, 2001: 161-162):

- Achieving project goals

- Identifying and managing customer expectations
- Building and managing teams
- Monitoring the completion of the works in the project on time within the budget
- Identifying the problems that arise in the project and finding solutions
- Evaluating organizational information in terms of strategy
- Building information networks and infrastructure
- Creating a corporate culture that values and shares information

Information is found in the internal and external environment of businesses. It is crucial for the business to manage information both inside and outside. The important point here is that it is the encouragement of people who need to find, capture, create, organize, share and transfer information, to receive and use it. The incentive systems of an enterprise should be designed in a way that facilitates the sharing of information with people outside their department and functions by determining which channels and how the employees will access the information (Özgener, 2003: 5).

5. INFORMATION MANAGEMENT AND COMPETITIVE STRATEGIES OF BUSINESSES

Today, the rapid developments especially in information technologies have brought businesses to a market structure where competition is experienced at all times. Within this structure, "information" emerges as a rising value and directly affects the competitiveness of businesses, so that information, like other sources, must be managed within business policies (İlhan, 2000: 5). Because accounting and financial data is not a cause, but a result for organizations. In fact, these records show a small part of the result. The quality of use and processing of information are the main factors that determine the organization's profit, loss, efficiency and effectiveness. Therefore, in the post-industrial age, the success of a company depends on its intellectual and system capacity rather than its physical presence. The capacity to manage human intelligence and transform this intelligence into useful products and services is swiftly becoming a vital management skill of our age (Quinn & Anderson, 1999).

Information gives the business a sustainable competitive advantage. Unlike the tangible assets that decrease as they are used, knowledge increases as they

are used and contributes to the emergence of new thoughts as well as the existing ones. While those who share the information do not suffer from loss, those who provide it obtain significant competitive advantages (Odabaş, 2008). Good use of information resources also enables unlimited potential growth to be activated. In this sense, information is invisible. The concept of knowledge is defined by abstract value, strategic asset, basic advantage and basic ability or other similar concepts. The concept of knowledge is seen as an organizational resource, a value or an element of learning processes in management theory (Numbers, 2004).

Tiwana (2002) has suggested that a clear link should be established between knowledge management and business strategy. Tiwana stated that in the second step of the ten-step information management roadmap, it is necessary to balance the information management with the business strategy for the success of the information management application. Accordingly, once the link between information management and business strategy is clearly established, the information management system will provide businesses with a long and lasting competitive advantage.

One of the most important features of information that will make businesses competitive is that it should be of a strategic nature. Clear, expressive, coded, packaged and therefore easily transferable information cannot be a strategic information. Such information can be easily navigated and easily obtained between businesses and their environment. Therefore, this kind of information cannot be expected to create a competitive advantage in the long run among businesses. In order for the information to be of a strategic nature and to create a competitive advantage in the long term, it must be enterprise-specific and it should not be very easy to transfer, migrate, obtain and disseminate. Perhaps the only way to reveal and transfer strategic information is to establish and develop a close and more interactive relationship with those who have this information (Barca, 2002: 519).

When companies see information as an important organizational resource, they determine the information management together with the business strategy. Therefore, a business or a business unit must first select information activities that will provide and support aspects of the overall business strategy (Davenport, 1999). From this point of view, competition strategy and information strategies of businesses combine in information management at strategic level (Bukowitz & Williams, 2000).

Information management provide managers with the opportunity to better anticipate and take action against them. By utilizing information management, managers can better evaluate the environment and offer alternatives for global purposes. At this point, managers want to reach the most appropriate solution by achieving global goals by choosing the best alternative. This means that they become more concerned with the concept of competition. The primary purpose of this orientation in modern business organizations is to provide contributions to more efficient work in achieving organizational goals. Managers should perform competition and information management optimization and ensure the effectiveness of information management (Carniero, 2000: 92).

The purpose of establishing the link between information management and business strategy is to determine how effective use of information will support a well-defined business strategy. For example, if an organization is directed to deliver new products and services to existing and new markets, information management should focus on product and business development (Furlong, 2001). If a business strategy is to sell low-cost products, information management goals should be determined accordingly (Tiwana, 2002). From this point of view, the questions about when information will support the business strategy can be asked as follows (Furlong, 2001):

- How does knowledge affect our business and our competitors' business?
- What information do we need to achieve our business goals?
- What are our critical business processes?
- What information maintains our business processes?
- Where does information transform into action that creates value?
- Where are the information gaps in our value chain?

Kotler (2001) says ‘You do not win today because your product is better, you win because your information is better’. In fact, it suits better to say that ‘you gain because you manage the information better’. For example, information-oriented companies, such as banks, insurance companies, credit card companies, basically manage information. Such companies do not manufacture anything, they only manage information (Kotler, 2001).

CONCLUSION

In today's information society, information has become the most important strategic resource for businesses. Most of the work done now is knowledge-based. Organizations compete on the basis of information. Information makes products and services more valuable. Information-intensive products and services are growing rapidly. All kinds of information created since humanity first exist have been a source of technological development and have become a critical organizational resource that provides competitive advantage in the market. On the other hand, the only way for businesses to survive and achieve competitive advantage in today's challenging competition environment is to benefit from technological development. Information management has become very important for businesses and it has power and guidance over businesses. Information should be managed effectively and systematically in order to use this power in accordance with the purposes and effectively for businesses. An effective information management will determine the aspects of the business strategy and help realize this strategy.

Adopting universal values, placing business activities on the basis of knowledge and having the knowledge to use information creatively is the basic condition for being information-oriented. The main features of the information businesses that incorporate this structure are; intention to learn intensively, devote itself to transferring and producing new information, being open to the environment and constantly searching and learning what is going on in the outside world, to have a vision and a system idea that is shared by everyone in the organization.

The reason for businesses to manage information has paved the way for them to establish information management processes and the development of information management discipline. In modern businesses, information provides competitive advantage. Information management is a business process in which businesses create their own corporate and collective information. Due to the nature of information, today's most advanced information may lose its significance tomorrow. Therefore, information management is not only a static and limited process, but also a strategically critical issue for businesses.

In order for information to become competitive in organizations, an institutional culture is required, which is rational, innovative, creative and emphasizes information sharing. This can be done with managers who are aware that the investment in knowledge and people is the most profitable investment. The way to provide competitive advantage by determining information management

strategies is to manage information strategically. Therefore, information management will be the main factor that differentiates an organization from others in organizational creativity and innovation, motivation, communication and organizational culture.

With a general evaluation, information management is one of the indispensable management areas of today for organizations that resist competition and want to gain efficiency from their work. The effective use of information in organizational processes ensures the development of organizations and provides an important competitive advantage in a globalized business environment.

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CHAPTER 8

MARKETING AND DIGITAL MARKETING STRATEGIES IN THE INFORMATION AGE

Sibel Aydoğan

INTRODUCTION

The industrial revolution left its place in the late 20th century to a new era called the "Information Age". Information age; It is defined as the new economic and social order of the world after the agricultural and industrial revolutions. One of the countless names given to the age we live in is the "Information Age". One of the most important features of this age is that knowledge is accepted as one of the production factors.

Marketing in the sense of technological developments; After the marketing 1.0 approach that emerged as a result of developments in production technologies and industrial revolution, information technology and marketing 2.0 approach that emerged by significant changes based on the internet, and marketing 3.0 processes emerging with new wave technologies, a new process called digital marketing, which is also defined as digital marketing 4.0 (Taş & Şeker, 2017:12).

The word marketing comes from the verb "market" of Anglo-Saxon origin and represents the idea of selling and buying a particular product (Fucui & Dumitrescu, 2018:43). Marketing, which is defined as the process of determining which products will be preferred by customers through communication, sales and some steps in business, gradually increases its importance with the development of technology (Taş & Şeker, 2017:12). Marketing is a constantly changing and developing discipline over time. Marketing is marked by numerous innovations and contributions in its basic concepts, structures and nature (Erragcha & Romdhane, 2014:137). Marketing is changing, and it is no longer focusing on the traditional view of meeting traditional needs and desires (Wojciech, 2017:194).

E. Jerome McCarthy, a famous marketer in 1960, defines his marketing activities as 4P of the marketing he calls 'marketing mix' as product, price, distribution and promotion. The marketing mix summarizes actions and practices related to product management. In the 90s, Robert F. Lauterborn argued that the period of 4P was over and that the new model was the 4C of marketing, which consist of Consumer wants and needs, Cost, Convenience, and Communication. (Leino, 2016:3). It is stated that the concept of “Product” should be left aside to focus on "customer" concept; It is also stated that segmentation, targeting and positioning should precede 4P. Thus, marketing is not seen as a tactical component to join the strategic union that paves the way for modern marketing (Erragcha & Romdhane, 2014:137). Just 15-20 years ago, companies had completely different tools for marketing such as print media, street advertising, television, radio, different events, fax machines, and direct mail. In the middle of 2010, the number of marketing channels increased significantly due to digitalization in technology and current developments.

The rapid growth of the digital age and internet with other technologies has fundamentally changed the way people live. Communication, information sharing and shopping habits have all changed, and companies have had to develop new ways to add value to their customers. The Internet and digitalization have developed an electronic marketplace that is growing beyond borders, to an online world where over a billion customers already live. The new marketplace offers marketers new value while creating value for their customers (Leino, 2016:3). Online retailers use ways to communicate with the customer through multiple channels, what customers buy, what they look for, how they can watch, navigate the site, how they are affected by promotions and page layouts, and how they measure similarities between individuals and groups (Jiménez-Zarco et al., 2017). Therefore, the marketing activities of the digital age gained a more interactive, innovative and personalized perspective and provide a more efficient function to businesses (Başyazıcıoğlu & Karamustafa, 2018:633).

1. THE INFORMATION AGE AND THE CHANGING ROLE OF MARKETING

In history, the social stages of humanity can be listed as primitive society, agricultural society, industrial society and information society (Garda & Temizel, 2016:1-2). The "Industrial Revolution" that marked the change in the late 19th century left its place to a brand new era called the "Information Age"

in the late 20th century. Today, the entire economic system focuses on a knowledge base (Toffler, 1995:47). In this period, which is called the information age, humanity is facing a very rapid change thanks to information technologies and new information systems. This situation confronts humanity with considerable social chaos and the most creative restructuring in world history (Toffler 1980:10-12).

Having and managing information in the process of transforming it from input to output has been the key to success in regards of obtaining, processing, reproducing, and sharing information. Indeed, thanks to the opportunity to access information on different topics stored in any part of the world and, above all, to combine and analyze a large amount of data, it is now possible to produce information with added value that others may not have (Ekin, 1997:16). The rapid access of information to the smallest unit in the society has also changed the strict structure of the industrial society and hence the meaning and content of the competition. As the information started to flow from social organizations towards the individuals of the society, social and individual awareness increased, consumer goods and services demands changed, as a result of the change in demand, the production diversified and began to change accordingly the type of economic activities (Kargı, 2006:108). Therefore, a process similar to the radical change and transformation brought by the industrial revolution and the industrial society to humanity is being experienced today, the competitive environment of the industrial age is replaced by the competitive environment of the information age (Erkan, 1994:14). Rapid developments in production and communication technologies, customer focus, new management approaches, social, political and cultural changes emerge as features that shape the competitive environment and gives orientation to it in the information age (Kaygusuz, 2005:83).

Developments in information technologies have eliminated economic boundaries and broaden the extent and scope of competition between nations and organizations. Managers need to understand and adapt to quickly changing markets, new competition, increasing customer expectations. The information revolution affects businesses and their marketing understanding as well. For example, while most of the enterprises today make all or a large part of their production to countries in development, many businesses see their future to provide services that meet the individual needs of customers.

Marketing is a concept with a deep-rooted history, and with every definition, it gets richer and becomes a discipline that can adapt to more comprehen-

sive and changing conditions rather than being synonymous with sales or advertising. Globalization, technological developments and changing consumer profiles add new dimensions to the definition of marketing, enrich it and enable the development of solution-oriented approaches, leading to the emergence of new marketing definitions. While examining the science of marketing, distinctions such as production, sales, marketing, modern marketing, social marketing periods emerge (Mucuk, 2009:7). White (2010) summarizes the evolution of marketing in 7 terms. He states that the 1990s and beyond started with long-term, mutually beneficial relational marketing and addressed the social / mobile marketing era of today and beyond. Thus, it shows that the digital process has started a new era for marketing science.

In the face of informational and technological developments, marketing discipline constantly renews itself and adapts itself to the digitalization process by using the internet and digital devices to reach the consumer. It can be said that this process caused the birth of a new marketing branch / type called "Digital Marketing".

2. TRANSITION FROM TRADITIONAL MARKETING TO DIGITAL MARKETING AND EVOLUTION OF MARKETING

When the digital revolution took place, companies were not paying attention to the effects of technology on marketing. When the world was transformed into a technological environment as a result of the developments, while evolving from the steel machines in the industrial era to the concepts of the knowledge economy, the demands and needs of customers, the communication with the customer, sustainability and the increasing importance of customer loyalty were revealed (Wind & Mahajan, 2002:53).

Marketing understanding has evolved from product-oriented understanding to customer-oriented, value-oriented and ultimately virtual reality-oriented understanding. The aim of marketing has evolved from selling products in the beginning, to satisfying and retaining the customer, and eventually creating the future from today. While the market was initially seen by companies as the target audience with physical needs, it began to be seen as fully conscious customer communities who create common products. While companies put marketing rules only on product features at the beginning, today they have started to build on vision, values and expectations. Today, marketing has entered the era of

marketing 4.0, where human emotions are involved, storytelling plays a key role in success, and where consumers are defined as creatures with emotions, spirit and heart (Çağlıyan et al., 2018:187). As the world changes, the concepts of marketing and industry change in parallel with the evolution of the information technologies and the Internet. With these developments, as a result of the increasing integration of the industrial value chain, the concept of marketing 4.0 has emerged. Today, there are important changes in the balance of power between organization-society, company-customer. Marketing is developing in parallel with technology and as a result, research focusing on digital marketing and e-marketing is increasing (Ertuğrul, 2018:158).

Digital marketing and technology are transforming the way we do business. These technological developments reduce both product costs by enabling both automation and miniaturization, and this enables companies to serve new emerging markets (Kotler, 2017:27-30).

2.1. Marketing 1.0: Mass Production, More Competition

At this stage of marketing, there is a product-oriented approach. Concepts such as consumers, producers, intermediaries etc. that were not so important in this period gained importance over time in the following periods. As the number of consumers increased and manufacturers wanted to sell larger quantities, they focused on mass production to meet the needs of people, and the so-called industrial age process began in this period (Jones & Shaw, 2002:41-48).

The "Industrial Revolution Period" led to mass production. Competition has increased steadily as the high production capacity has reduced costs, resulting in cheaper product prices. Thus, Enterprises had to develop new business strategies by switching from simple marketing (product-cost) to 4P marketing (Mc Carthy, 1960). The marketing mix 4P plays the role of design and synthesis with factors such as product, price, place, promotion to produce and supply products that meet the needs of the market.

4P Marketing pursues the interests of the seller in order to gain competitive advantage by creating new products with higher quality than other products in the market. The strategy of 4P Marketing is to create quality and innovative products, to develop a more affordable pricing policy than competitors, to distribute the products to the big cities to increase the scope of the product and to gain the competitive advantages by delivering the product to the consumers quickly. In order to attract the attention of customers, "Push Strategy" such as advertisement campaigns and public relations (PR) in television, newspapers,

billboards, media, etc. was applied. In short, marketing 1.0 has positioned the brand image of the product in the minds of the customer, provided a competitive advantage and applied information from the seller to the customer with the concept of 4P in marketing by applying market research methods to increase sales. In this period, marketing was transaction oriented and focused on how to sell. Briefly Marketing 1.0 approach involves a product, production and sales (Erragcha & Romdhane, 2014:138).

2.2. Marketing 2.0: Emphasizes the Link Between Information Flow and Information

In the 80s, the wave of internet and information technology expanded the communication process globally. The Internet has rapidly changed the social structure and has become a part of the daily lives of businesses as well as consumers. Information technology, also known as the information revolution, has changed the way consumers approach and perceive information. The fact that consumers can easily access a lot of information in this period has helped people become more knowledgeable every day. In the Marketing 2.0 period, production has been made in accordance with the desires and needs of the consumers. In addition, internet and information technology made it easier for consumers to connect with each other, and thus consumer decisions are included in the marketing process (Fuciu & Dumitrescu, 2018:45). When the business direction and marketing strategy depends on the power of consumers, businesses launched the 4C strategy in addition to the Marketing 1.0 (4P focused) Marketing 2.0 (consumer oriented) strategy (Luater, 1990). 4C strategy includes transitions such as:

- From Product to Customer;
- From Price to Cost;
- From Place to Convenience;
- From Promotion to Communication.

In addition to the 4C strategy, companies need to examine consumer behavior to understand the psychology, reasons for purchasing, and the factors that affect the consumer's decision. Based on this information, businesses can implement the 4C strategy even with low budgets and the targeted sales volume can be achieved in this way (Isarabhakdee, 2017:41-45). In this period, a new sales mechanism e-commerce emerged. It provides advantages such as expanding the market size of e-commerce in terms of business, decreasing costs by selling products in online or virtual stores, and purchasing products cheaply and saving time for consumers (Wen et al., 2012:1106-7).

2.3. Marketing 3.0: The Power of Social Networks (online)

In an information society, in addition to market research and 4C marketing strategies, businesses are involved in politics, poverty, economy, environment, education, etc. They need to include new elements such as research topics. Businesses should have in-depth knowledge of every area of society, update market content, and focus on interactive and fast-themed issues to keep up with trends. Today, it is becoming more and more difficult for consumers to make decisions, and the opinions and comments of friends, relatives and online communities on a topic have gained more importance, and customers with potential for purchasing care about these opinions. On the other hand, businesses have to keep up with social networks in order to persuade the customer and gain the trust of the customer (Kotler, 2010:4-6). In addition to the advantages of social networks, there are a number of problems that businesses cannot anticipate, so businesses need to take a cautious, strategic and tactical approach. Businesses can solve some unpredictable problems using social networks. Because the network community's power is enormous and the increasing digital community transformation is moving towards a new era (Isarabhakdee, 2017:55-57).

2.4. Marketing 4.0: Digital Society

Today, technology aims to connect consumers around the world by meeting basic human needs with automation, robotics, energy technology, gene and medical technology, and communication technology. These information technology and data forecasts will become stronger in the future and will have a major impact on consumers' lives and the structure of the world economy (McKinsey, 2014). According to a study by the International Telecommunications Union (ITU) and the United Nations Population Division, the world population exceeded 7 billion 300 million in May 2015, but only a third of this population can connect to the Internet. By 2020, the number of internet users will reach 4 billion, which means approximately half of the world's population. This study also revealed that consumers spend at least 7.5 hours with activities such as accessing social media on the internet, searching for information, surfing the internet, reading news, listening to music, playing online games. While people do their daily activities such as eating, listening to music, and working, they never break their ties in the virtual environment. This is called parallel multitasking between the virtual world and the real world (ITU, 2015:28).

When consumers take control and build their own values, the world turns into a digital society. Businesses should focus on the marketing 4.0 strategy to

get the support of the digital society, turn them into market value and create value (Isarabhakdee, 2017:145-146).

The table below shows the periodic difference of the marketing stages from each other:

Table 1. The Periodic Evolution Process of Marketing (Ertuğrul, 2018:161; Kotler, 2010:2).

	Marketing 1.0 (Product oriented)	Marketing 2.0 (Customer oriented)	Marketing 3.0 (Value oriented)	Marketing 4.0 (Virtual marketing oriented)
Purpose	Selling products	Satisfying the customer	Making the world a better place	Creating the future from today
Possible Power	Industrial revolution	Information technology	New wave technology	Cybernetic revolution and Web 4.0
Key Marketing Concept	Product development	Differentiation	Values	Production according to customer and production on time
Value Propositions	Functional	Functional and emotional	Functional, emotional and spiritual	Functional, emotional, spiritual and self-creativity
Interaction with Customers	Multiple transactions	One-to-One relationship	Multiple cooperation	Multiple cooperation and co-creation

Source: Ertuğrul.İ. (2018). Kotler,P. (2010).

Marketing 4.0 has emerged as a result of turbulent markets, aggressive global competition, demanding customers, rapid emergence of new technologies and complex changes caused by disruptive innovations (Rahayu et al., 2018:83). Marketing 4.0 is about "a marketing approach that combines online and offline interaction between companies and consumers". While blending machine or artificial intelligence to other technologies to increase productivity, it also strengthens the person to person connection to improve the customer interaction process (Fucui and Dumitrescu, 2018:45). This process should be balanced with the person to person connection that will increase customer participation (Rahayu et al., 2018: 83). In addition, it is expressed as a marketing approach that

completes the connection from machine to machine with a touch from person to person in order to increase customer participation by blending essence and style in brand development (Özata, 2017:85). That is, the brand not only offers a good brand, but is also supported in terms of good content and up-to-date packaging (Rahayu et al., 2018:83). Today, with the introduction of concepts such as big data, social media, corporate social responsibility and e-commerce into our lives, the transition to marketing 4.0 is accelerating (Taş & Şeker, 2017:12). The fact that the internet has an important place in human life has directed businesses to determine their marketing strategies using technology. Economic activities have changed due to transformations in global technologies (Toksarı, 2018:327). Marketing 4.0 is a new generation that replaces economic activities with digital transformation. Marketing terms 4.0 can be used to design not only a marketing evolution of marketing 3.0, which focuses on the internet and social media, but also to design marketing strategies that develop brand-consumer relationships.

Marketing 4.0 also allows for interactions with products. This new generation marketing continues to focus on demands and needs starting from the first two generations and continues to satisfy the values, desires, creativity and concerns in marketing 3.0 (Çetin, 2018:179). Consumers can view the features of the product or purchase radio frequency identification (RFID) and near field communication (NFC) tags by scanning themselves, offering direct interaction with products with advanced technology. These situations enable consumers to be more conscious. As the interaction between machine and man increases, marketing strategies have turned to digitalization. Traditional commerce has turned into e-commerce first, then m-commerce, and the continuous development of technology has seriously affected both social life and business life (Başyazıcıoğlu & Karamustafa, 2018:633). Marketing 4.0 is the marketing of big data. Digitalization transforms the purchasing decision making process, it includes the way customers seek information, consider and evaluate products and services, and interact with the organization and make purchases. The 5A (awareness, attraction, asking, action and defense) is the point where traditional marketing and digital marketing meet each other. For example, someone may be aware of a product through traditional advertising on television, then ask online on social media, then buy it and recommend the product to other people, both on social media and in the offline community (Rahayu et al., 2018:83).

3. DEVELOPMENT, DEFINITION AND COMPONENTS OF DIGITAL MARKETING

3.1. The Evolution of Digital Marketing

Digitalization, which entered our lives in parallel with the information age and is defined as a digital revolution, enables the use of brand new platforms as a marketing tool by adding the internet to traditional marketing activities using visual and written media organs such as television, newspaper, radio. The increasing number of internet users causes the qualifications of consumers to change. "The digital revolution has fundamentally changed the concepts of space, time and mass," said Kotler. In today's world, a company does not have to physically exist; it can be virtual and it can be anywhere. Messages can be transmitted and received simultaneously. Objects such as books, music and movies can be sent as "bits" rather than physically. "(Kotler, 2000:286).

Digital marketing provides the “firm-customer connection” to be carried out quickly in all processes of marketing by using digital tools intensively in marketing. Internet Marketing, Permission Marketing, Database Marketing, Email Marketing, Technology Marketing and Mobile Marketing are considered as types of digital marketing (Kaya, 2015:105). Digital marketing, which involves the sale of goods and services through one or more channels on the electronic platform, is a real-time activity. The fact that the global market is not restricted in terms of the number of customers and profile is an important advantage, but the flexibility to respond more actively to expectations, complaints and suggestions is one of the most important advantages (Graphicmail, 2016). Digital marketing is a direction which enables increasing the sales by offering a rich product portfolio more frequently to many people and finding more ways to make more money through digital media (Ertan, 2012).

3.2. Definition of Digital Marketing

Digital marketing is defined as the promotion efforts of products or brands with the help of electronic platforms (SAS, 2015). Today, technology and the internet have become an integral part of social and economic life. Digital products, presented as an important innovation in the market, bring consumers and businesses together in digital environment. Digital product refers to the transmission of digital signals that include different, infinitely expandable, non-competitive, non-spatial and combination of different qualities, economic value sound, image or both (Quah, 2003:6; Revenuewi, 2015). In order for digital

products to be successful, they should be constantly improved and consumers' expectations and preferences should be well understood.

Marketing aims to develop different strategies to create a brand and gain competitiveness by adapting to the conditions of the day according to consumer expectations and wishes. At this point, digital marketing emerges as a type of marketing that facilitates the delivery of products to relevant and potential customers, and to make performance measurements faster and more efficient, and provide time-oriented solutions. The concept of digital marketing, which was first used in the 1990s, has become one of the most effective methods to establish deeper relationships with customers in the 2000s. Digital marketing can be defined as the promotion efforts of products or brands with the help of electronic platforms (SAS, 2015). Changes in consumer behavior require businesses to keep their marketing strategies up to date in digital terms. Digital marketing, where communication plays a key role, enables to receive feedback from customers interactively, to create a more intimate environment in customer relations, to increase the level of knowledge, to improve the connections with the internal and external environment, to support the decision-making process, and to increase efficiency (Tiego et al., 2014:703-705).

3.2.1. The Concept and Scope of Digital Marketing

Digital marketing is the promotion and sale of products and services using online marketing tactics such as social media marketing, search marketing, and email marketing. In other words, digital marketing is virtual marketing. As we know, the first rule of marketing is to present the right offer to the customers at the right time and place. However, today customers can be online 24/7 thanks to opportunities such as updating on social media, news sites and blogs and searching whenever they need. Today, businesses are in the same channels as their customers in digital marketing, so that customers can ask questions to learn more about businesses, products and services (Digital Marketer, 2018:3).

Digital marketing is the use of signal-based digital tools such as internet, television, radio and mobile phones in the promotion of brands and products to consumers. Digital marketing can present more traditional marketing platforms such as direct marketing by communicating with an audience in the same way by a digital method (PediaPress, 2012:281). Basically, digital marketing refers to any online marketing effort or presence. Email marketing, pay-per-click advertising, social media marketing, and even blogging are great examples of digital marketing. These are the channels that help people to promote companies permanently and to convince the users to purchase. Digital marketing is actually

about understanding people, not technology. It is about how they use this technology and what they need to do to use it more effectively (Damian & Calvin, 2009:13-19).

The scope of developing digital marketing strategies has a great potential for organizations and brands that have great value in the 4.0 era of marketing. Some of these strategies are as follows:

- **Branding**: Platforms and technologies are a great opportunity to create a brand image on the web due to their scope, availability and constant updates.

- **Complements**: Opportunities to spread information through links offer consumers a chance to approach the organization more easily.

- **Usability-Functionality:** Digital media and the Internet offer simple and user-friendly platforms for everyone to improve user experience and online activities.

- Interaction: The Internet offers the opportunity to create a positive experience with the brand at the end of the product evaluation or to have an all-inclusive experience.

- **Visual Communication**: Digital marketing provides customers with image and video-based facilities. This is the easiest way to reach engaging audiences.

- **Related Advertising**: Segmenting and customization of ads on the Internet maximizes positive results. Also, regardless of other media limitations, this environment allows creating more advantageous ads.

- **Community Connections**: The Internet is a unique opportunity to bring institutions and audiences together with their users. This connectivity experience of the customers is a great chance for them to develop relationships with products, brands and organizations.

- Viral Marketing: Enables exponential expansion of any possible content as the Internet's network of interconnected nodes. Viral communication, which deals with the mouth-to-mouth marketing (wom) communication model, is a very advantageous method thanks to connecting to online platforms that enable the spread of content and instant sharing.

- **Measurement Output**: Online platforms offer opportunities such as the availability of tracking options and the ability to evaluate results (Teresa & Xabier, 2016:38-39).

Digital marketing processes are listed as follows (Altındal, 2012:1).

- Acquire: It covers the activities offered to the digital sales platform to intensify the customer's attention. Pay-Per-Click (PPC), Search Engine Optimization (SEO), Social Media Marketing, Viral Marketing, E-mail Marketing, Content Marketing (producing/sharing), Affiliate Marketing, Advertising Partnership, Interactive Comparison are in this category.

- Convert: After the customer's attention is drawn to the digital platform, these are the activities carried out to reach the business objectives. Sales are not always the main goal. Topics such as how many people have read, liked, shared or started following the blog post for a blog are among the examples to be given in this concept.

- Measure and Optimize: This stage gains importance in terms of understanding what is done wrong and what is done correctly, measuring, evaluating the situation in the best way and comparing the company with competitors. Success is expected to be measurable.

- Retain and Grow: It is the process of establishing long-term relationships with existing customers and creating customer loyalty. Developing a good customer service and membership systems and community building programs, personalization, and offering affordable pricing strategies are important steps.

Digital marketing has led to changes for businesses and consumers. 4P, which is one of the milestones of marketing, has started to evolve in this digital process. Created by American Professor Jerome McCarty and developed by Philip Kotler, this concept consists of the terms product, price, place and distribution. Along with the developments in the business and marketing world, the number of P's increased and even the C's evolved. With the development of the internet in recent years, 4P can no longer adequately demonstrate the functionality of businesses in their relationship with customers. In an article published in Harvard Business Review and examining the work done in more than 5 years with more than 500 managers and consumers in different countries, it has been underlined that 4P is inadequate in the world of digital businesses and it needs to be revised (Ettensonet al., 2013).

For this reason, it is possible to say that the marketing mix started with the business-oriented 4P, continued with the customer-oriented 4C and now came to the level of the digital-centered S.A.V.E. It can be said that SAVE is a digital marketing mix created to fill the gap of P's and C's in meeting the needs of the

digital age. Modeled by Eduardo Conrado of Motorola Solutions, who is one of the authors of the related article, explains S.A.V.E as follows;

- S-Solution: Focusing on producing solutions to the customer's problems rather than product features and functions,

- A-Access: Being accessible whenever the customer wants, regardless of location,

- V-Value: Providing value before the price with knowing the importance of the price for the customer,

- E-Education: Consists of words that emphasize the ability of the parties to learn and be informed about each other (Webit, 2014).

Figure 1. Conversion of the Marketing Mix (4P)

Source: https://josephineuba.com/what-you-should-know-before-crafting-your-marketingstrategy/

3.2.2. Features of Digital Marketing

Although digital marketing is based on the basics of traditional marketing, it is also a marketing branch that acts faster in fulfilling the requirements of the age by using technology. Unlike traditional marketing tools, it is a marketing branch that declares its existence in digital media. The features that distinguish digital marketing from traditional marketing can be listed as follows (Wind & Mahajan 2001:3; Meloche, 2014).

- **Providing Integrated Cross-Functional Solutions**: Enables integration of customers, business, marketing and customer service by enabling customization.

- **Developing A Global Perspective**: By accessing the global market thanks to the Internet, it provides the opportunity to see customer needs, expectations, behavior styles, local competition from a global perspective.

- **Time Saving**: Short development cycle, fast changing marketing dynamics, provides effective solutions for converting time, which plays a key role in fast decision making, into cash.

- **Multiple Communication**: With the ability to address, listen and respond to more than one person at the same time, it offers full participation to the target audience without time and space limitation.

- **Providing Planning Flexibility**: While making long-term planning, it provides flexibility to make changes in the scope and applications of the strategies applied according to current and possible situations.

3.3. Components of Digital Marketing

The components of digital marketing can be gathered under three headings. These are;

3.3.1. Digital Enviroment

Digital enviroment, which expresses an electronic environment, has a system that allows the personalization of mass media, and the convenience of reaching the consumer from devices such as desktop, laptop computers, personal digital assistant, mobile phones or even music players. In order to use the power of communication to the full extent, it is a requirement of the digital age to offer individuals the opportunity to communicate with each other, to share their ideas freely by uploading audio, video or by creating groups, to read books, magazines, newspapers, blogs, online education, games or use applications.The birth of digital media allows us to enter our lives on social platforms, to communicate in large masses and enter the flow of information. The most current usage area of digital platforms is social media. Digital enviroment, which was used only for communication purposes, now operates as a sales promotion tool (Kahara et al., 2012:564).

It is possible to say that today's generation is a generation that uses the internet a lot in creating content. This platform, which uses not only text, but also audio and visual tools, photographs, videos and sound recordings actively in terms of creativity, innovation and difference, causes changes in life styles, dialogues with social media, sharing. It takes only seconds to get the dialogues, shares, the transfer of opinions and the feedbacks via social media.

3.3.2. Digital Product

The word digital is defined as “displaying data electronically on a screen” (TDK, 2015). The digital product includes goods and services created, offered, used and stored in electronic media. It is possible to download digital products, which can also be called electronic products or e-products, to the consumer, to download from the internet or to be used via the internet. Goods and services offered in digital media such as music, books, pictures, videos, games, and mobile applications that contain digitally visual and audio elements are included in the digital product portfolio (Webopedia, 2016). Digital products refer to products of economic value are consisting of 0 and 1 bit sequences. It is possible to talk about the characteristic features that distinguish digital products from others. Digital products are products that are different, infinitely extensible, non-competitive, non-spatial and composed of a combination of different qualities (Quah, 2003:6). Digital product refers to any product that is electronically transferred to the buyer. It contains versions of digital files that can be transferred to electronic media, in which different forms are produced over time. The digital product consists of the transmission of digital signals that contain sound, image or both (Revenue.wi, 2015).

The differences of digital products from physical products are listed below (Jinxiangvd., 2013:2-5);

- Creation, storage and transfer of digital products takes place in digital media.
- Digital products are difficult to produce, but easy to copy. Because the cost of copying is almost zero.
- Digital products can be consumed by more than one consumer at the same time.
- During the transfer of digital products, the presence of intermediaries between the producer and the consumer is minimized or even zero.
- The pricing of digital products is based on the version. The bundling strategy method, which is based on the introduction of a bundle of cheap and expensive products, is also one of the used effective tactics.
- Digital products can be accessed wherever there is internet, regardless of time and location. They offer unlimited marketing power. The products can be purchased without paying an additional fee even if they are provided outside the country's borders. Since there are no

transportation storage costs, they are priced less than the physical product of the same product. Download can be made as soon as payment is made (Selfgrowth, 2016).

Videos, e-books, e-magazines and e-newspapers, digital games and mobile applications are among the digital products.

3.3.3. Digital Consumer

Digital consumers, as actors of the digital world, are not different from other consumers, but they represent a group of consumers who can communicate with each other faster and simultaneously with the contribution of technology. Digital consumers who personalize their digital experiences with niche content or video use the power of technology to organize or filter content in the information-intensive world (Ryan & Jones, 2009:25-26). The concept of digital consumer, which is at the heart of digital transformation, defines the consumers who, at the point of communication tools used, from computer to mobile devices, from sound to video on communication, from printed publications to content, to mobile application, to make money rather than socializing in terms of social media, that can change the usage areas of digital platforms instantly (Duncan et al., 2013). By enabling the change of consumer behavior, digitalization has revealed the consumers who want to see the same if they have received a better service from not only their competitors in their sector, but the insurance company, supermarket or holiday site. Increased communication between new generation consumers, who have less tolerance (complain more quickly) and are hardly satisfied and have more information about the products, has become effective enough to lead to strengthening or weakening of businesses (Hughes, 2016).

Digital consumers are grouped differently according to their speed of keeping up with the digitization process, their ability to use digital devices, their ability to be in digital environments and prefer digital products. These groupings help create a clearer digital consumer profile. There are those who are born in the heart of the digital age, take advantage of all the blessings of the internet and technology, live with an e-life, have been involved in digital culture with digital natives, and are the architects of the culture prepared for digital natives. On the other side there are also those who try to avoid being involved in technology. All of them appear as digital consumer groups (Bilgiç et al., 2011:2).

3.3.3.1. Digital Natives: The concept of "Digital Natives", named after the studies carried out by Plensky (2001), identifies individuals who put their eyes

on life in technology, put new technologies and online platforms at the center of their lives, and do many daily activities through technology (Prensky, 2001:2). “Millennials, The Gamer Generation, Net Generation, N-generation, Next Generation, Grasshopper Mind, Homo Zappiens, Cyber Kids ”are also used to describe this generation (Pedró, 2006:). The digital language of the computers, the internet and video games they use as their mother tongue accelerates the digital natives in accessing information (Bilgiç et al., 2011:4).

It can be said that digital natives, are particularly skilled in mobile phones, social media technology and digital literacy, and have adapted all the blessings of the internet into their own lives by living an e-life and forming the basic elements of their culture (Ng, 2012:1065-1066). Also, this generation, which is at the forefront of creativity, is in search of new and different ways to convey its messages. By using their knowledge of software programs, they have great mastery in producing animations similar to video and computer game design called “machimina” and they can publish them on various digital platforms such as Youtube, Daily motion (Palfrey & Gasser, 2008:6). In the sense of this information, an important aim is to obtain important clues in terms of reaching digital natives in terms of brands. It is necessary to determine the characteristic features of the generation and to offer a suitable user experience. (Combes, 2006:402).

3.3.3.2. Digital Immigrants: Unlike digital natives, digital immigrants are people who were not born in the digital world but later embarked on digital journey (Palfrey & Gasser, 2008:296). The distinction between digital native and digital immigrant made by Prensky also expresses the distinction between continuity and fluency in the use of digital technologies (Prensky, 2001:2).

According to the Turkey Statistical Institute which conducted a research between 2004-2016, shows that digitalization has a rapid increase in the country. By analyzing internet usage, it is determined that information technology usage (Internet and computer) is 60%, and that regular internet users are at around 96%. It is seen that the young population predominates in the total usage rate and 85% of this population is concentrated in the age range of 16-24 and 78% in the 25-34 age group (TÜİK, 2017). According to these data, it can be concluded that especially the young population uses digital media, digital tools and digital products.

4. FOUR BASIC STRATEGY OF DIGITAL MARKETING

The following strategies are basically the transition from traditional marketing to digital marketing;

4.1. Approval of the Customer Community in Segmentation and Targeting

As a strategy, marketing always starts with segmentation. Segmentation includes practices of dividing the market into similar groups according to the geographical, demographic, psychographic and behavioral characteristics of the customers. Targeting is done after this stage. Targeting is an important stage in the marketing process where businesses research and implement groups or individuals selected in one or more segments based on their suitability and brand availability. However, segmentation and targeting also includes the vertical relationship between a brand and its customers (Cateora et al, 2015:249-250). In the digital economy, customers are socially connected to horizontal community networks because community networks are developing every day and creating new segments (Kotler, 2017:77-79). But in this relationship, customer rights are often violated and customers are disturbed by irrelevant messages targeting them. Trademarks must ask permission to connect with a community of customers and must be sincere like a friend who sincerely wants to help them (Isarabhakdee, 2017:200).

4.2. Brand Positioning, Brand Differentiation and Brand Personality

Brand positioning can be described as a promise by marketing professionals to win customers' minds and hearts. A brand must make a clear and consistent positioning to create strong brand value, and must also differ according to its positioning goals. Brand positioning provides information on why consumers should buy and use that brand in cross-brand competition. In short, positioning refers to the position of the brand among its competitors (Keller, 2013:51). Due to the rapidly developing technologies, short product life and rapidly changing trends, brands need to be flexible, strong and dynamic enough to adapt and change these situations. What needs to be consistent are brands'

personalities and rules because brand personality is the reason for the brand's existence and distinguishes it from other competitors. The brand can only achieve permanence as long as it is flexible (Kotler, 2017:79-80).

4.3. From Selling 4P to Commercializing 4C

In the old marketing model, there was an understanding of I can sell whatever I produce. In the new model, firms are focused on producing according to the wishes and needs of the customer. Traditional Marketing Mix 4P; The product consists of 4 concepts: Product, Price, Place Promotion. In a networked world, the concept of marketing mix should change to provide more customer loyalty. Therefore, the 4P marketing mix should be redefined as 4C. 4C: It consists of components such as co-creative, currency, communal activation and conversation (Myers, 2014:8-9).

In the digital economy, the new strategy for product development is co-creation. Co-creation offers customers the ability to tailor and customize products and services, thereby enabling higher value proposals (Pamastillero, 2017). Dynamic pricing is the determination of flexible prices based on market demand and capacity utilization. In particular, the digital economic price includes pricing based on the exchange rate, which fluctuates depending on market demand. While companies are pricing, they do not respond to customer requests and needs and should not ignore the cost factor. If companies rely on prices to compete, they may be disadvantageous in the long run if they compete. For this reason, companies should be flexible in pricing valuation. In summary, dynamic pricing is the process of setting flexible prices based on market demand and capacity utilization. The digital economic price can be thought of as the exchange rate fluctuating depending on market demand.The Place element in the 4P model focuses on the traditional process of "the product reaches the buyer". Rather, 4C focuses on the quality of the buying experience. This is extremely important for the modern buyer. Especially in the sharing economy, the strongest distribution concept is interpersonal distribution, which means that customers want to reach products and services instantly (Smalley, 2017). For example, services such as Airbnb, Uber, hotels and taxis are intermediaries that provide convenience to customers through products owned by other customers. Such developments in the market caused great changes in traditional perception (Samuel, 2019).

Communication is always the keyword of marketing. Without communication, the concept of 4C would lose its effect. Communication is often compared to the 4P concept, but these two concepts are very different from each other. It is not enough to send one-way messages to the promotion of a product or to attract customers' attention to ensure that they purchase a product from the company; In order to achieve success, interaction between the buyer and seller is required in communication with the customer. This marketing strategy can be implemented much more easily with the use of social media. Social media increases customers' loyalty to the brand by enabling them to interact with the brand on a personal level (Warren, 2016).

4.4. Integrating Traditional Marketing with Digital Marketing

Digital marketing cannot completely replace traditional marketing. Instead, they act together on the common goal with the customers. At the first stage between companies and customers, digital marketing plays an important role in creating brand awareness and attracting attention. The most important role of digital marketing; is promoting action and support. Digital marketing has a more reliable structure than traditional marketing and generally acts result-oriented. But the focus of traditional marketing is to interact with customers. Unlike traditional marketing, it combines online and offline interaction between companies and customers, and exhibits a market approach that completes the machine-to-machine, person-to-person contact connection. In summary, in marketing 4.0, digital marketing and traditional marketing should coexist and the ultimate goal should be to gain the advocacy of customers (Kotler, 2017:84-5).

5. NEW RULES OF DIGITAL MARKETING IN DIGITAL TRANSFORMATION

5.1. Customer-Centered Marketing

Current trends encourage consumers and customers to conduct a purchasing research. In this process, customers evaluate the recommendations and search their websites and their personal links before deciding to buy. Organizations must constantly update product information and stay connected with online communities to stay ahead of the competition. Organizations can use

digital marketing tools to personalize their brands to increase customer loyalty, as customers and businesses can be identified increasingly active and online. Marketers must build the human side of brands, be physically attractive, intellectually impressive, socially binding and emotionally attractive, and at the same time show strong affinity and morality (Kotler, 2017:164).

5.2. Omni-Channel Marketing - Any Time, Any Place

The same is true in the development of the digital age, and new marketing methods have emerged, such as digital marketing or social marketing, to help customers have better access to their brands. Omni-channel is a marketing strategy focused on combining traditional media and digital technologies to increase brand coverage, competitiveness and sales.

Omni-channel marketing (i.e. all channels-Multi-channel retail) is a fully integrated approach that gives shoppers a unified experience on online and offline channels. In fact, "multi-channel" shopping ranges from real store locations to television, radio, direct mail, catalog, call center, mobile browsing, e-commerce markets, on-site marketing and social media. In other words, multi-channel retailing refers to the use of various channels in order to interact with customers. Omni-channel supply chain can both meet customer needs and achieve cost targets by using the complementary powers that its online and offline channels bring to the supply chain. The growth of multi-channel retailing is likely to have a significant impact on retail networks and future logistics networks. Consequently, considering the supply chain network design of the companies, the shape of the stocks, the mode of transportation used and the role played by the information, this marketing form is strategically important (Chopra, 2018:5).

5.3. Multiple Content - Not The Best But The Most Impressive Method

Content marketing is a very broad digital marketing term. Content marketing is a digital marketing concept that uses content items (blog posts, infographics, ebooks, videos, etc.) to build brand awareness or increase sales clicks.

Content marketing is an indispensable component of digital marketing. For this reason, a marketing strategy with digital content can achieve success by marketing quality content in multi-channel and multi-vehicles such as video

content (video ads, product promotions, etc.), images (Infographics, product shots, company photos, etc.). Written content includes blog posts, e-books, product descriptions, references, etc. In this context, it requires extensive research on the target in order to create content that will interest the companies. The main role played by content marketing is to inform and educate viewers to develop a privileged relationship and ensure brand loyalty. To create a strong brand perception on the mass, it is necessary to gain their trust and admiration. By creating valuable content, interests that turn into permanent relationships can be created and success can be achieved in this way (Vuelo, 2015).

CONCLUSION

The 21. century, where knowledge is at the center of all social, political and economic processes, is the symbol of the transition from industry to the service sector and simultaneously to the information age. In this period, information that can be evaluated as an economic added value factor is at the center of all changes. In the age of information and communication, where information drives all social processes, information is a "value" for businesses. In parallel with the developing technology, businesses have to adapt themselves to this process. The information age, the period we are in, is increasingly different from the previous ages. Globalization, which has led the world to become a smaller place, has brought along political, technological, cultural and economic changes. During this process, some changes occurred in marketing methods, practices and strategies. Especially the concepts of industry 4.0 and marketing 4.0 are two important concepts mentioned together with the information age.

The increasing importance of information in production factors not only changed the economic and social structure, but also began to radically change the production structure and marketing strategies. The information age is a period when businesses that see information as a strategic value continue their activities. Information gained importance through the use of information, which is an open system, from internal and external environments, on the basis of competition, innovation, creativity, efficiency and marketing in their processes. The reason why information has become a strategic value and production factor for organizations is that innovation, creativity and strategies gain importance in the competitive structure. The way to meet customers' expectations and deal with competitors is to apply information in the processes and strategies of business by transforming information into strategy. In a global competitive environment, businesses need a variety of strategies to succeed. These strategies can some-

times emerge in a variety of ways, such as a different structure in the market, sometimes activities aimed at pacifying competitors, and sometimes collaboration with other businesses. At the core of these and similar strategies is knowledge, a common strategic resource. Organizations that have information today and turn it into a strategic resource with timely and effective use become more advantageous in achieving their goals.

The information society stage, which is shaped by the rapid development of information and information technologies and affects the economic, social, political and cultural areas in a short time, leads to a rapid increase in production and productivity beyond the agricultural society and industrial society in the process of socio-economic development. Developments in the information age bring about structural changes rapidly in economic, social, political and cultural areas due to their effects on the efficiency of the human factor. With these developments and changes that have entered our lives in the information age, it is ensured that the productivity of people increases, the level of economic development increases, the strategies of businesses differ, and new developments in science and technology appear.

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CHAPTER 9

MANAGEMENT INFORMATION SYSTEMS AND STRATEGIC DECISION-MAKING

Mustafa Aslan

INTRODUCTION

States, businesses, associations, unions, organizations in the broadest sense, try to make the environment suitable for living by changing or influencing the environment like all living creatures do. If they cannot change the environment, they try to keep up with the change, in other words, to adapt to change in order to survive, not to be subject to natural selection. Organizations that cannot change their environment or keep up with the changes in the environment in the way to sustain their existence are also doomed to share the same fate with other living beings: extinction. This end is not related to size, technology, or market share of the organization, but to how they manage to change the environment or to adapt changes occurred in the environment.

Whether it is a one-person running shop or governmental organization that millions of people working for, or from a single cell to the most complex organism, all organizations and organisms want to have the resources they need, keep them under control, or at least secure them from all threats. Management's main duty is to make sure the availability and security of these resources to attain organizational goals. Management, hence, as defined by many scientists and practitioners, is a set of activities performed to utilize resources efficiently and effectively in the pursuit of one or more goals.

These activities are setting goals for the organizations, making plans to achieve those goals, organizing staff and resources to implement those plans, executing the plan, and leading the organization, and at certain times, checking the compliance of their activities to the planning. The most crucial part of all these activities is choosing the best alternative. Therefore the most important duty of management is decision-making. Making a decision requires intact, complete, on time, and satisfying information.

Therefore, in the field of management, information is one of the most critical elements of the decision-making process. Information, in business life, is delivered in the form of reports to the top management levels, and as orders to subordinates. It connects and helps to coordinate the functional parts of both internal and external organizational activities (Aslan, 2020). Information plays a strategic and vital role in making effective strategic decisions, solving problems, and especially helping the business get rid of the problematic situations with the least damage by eliminating uncertainties and ambiguities (Yıldırım et al., 2010).

1. MANAGEMENT INFORMATION SYSTEMS (MIS)

Organizations are social entities that try to adapt to changes in the internal and external environment and establish a dynamic balance. The only way to accomplish this, the top management has to have a full understanding of those changes to find effective ways to react on time. Only then the organization may adapt to changes or obtain a competitive advantage to survive.

In order to obtain this competitive advantage and maintain an advantageous position, the organization has to reach and sustain a dynamic development process that relies on the data collected from the context. Only then the top management may adapt to and manage the changes. Therefore, the survival of Organizations depends on storing, processing the data obtained from the internal and external environment it into information, and transforming it into information then into knowledge that managers can use in decision-making processes.

The integrated systems that collect, store, process, report and distribute data obtained from various internal and external sources, transform them into the information required by management for decision making are called Management Information Systems (MIS) (Güleş, 2000; Kumkale, 2014; Canbaz, 2016; Çoruh, 2018; Williams, 1997; Yıldırım et al., 2010; Tekin, 2000). Management Information Systems (MIS), hence, combines business and informatics to enable the creation of more effective and productive decision-making processes.

Informatics and information technologies that form the infrastructure of Management Information Systems (MIS) process data obtained from Data Processing Systems (DPS) of different units of the organization and turn them into information for strategic, routine, and tactical decision making. This infor-

mation is sent to the relevant units as reports in different formats. Some of them are human resources, stock level, resource usage, market position, sales, production, and financial reports. These reports may also include recent or distant past data or projections of possible actions or trends or plans (Tutar, 2010; Çoruh, 2018). MIS focuses on internal activities rather than external and developed to support planning, control, and decision-making activities, and provide accurate, timely, and meaningful information mentioned above to decision-making bodies and all management levels (Tekin, 2000; Ülgen, 2010; Laudon, 2011; Yozgat, 1998).

MIS uses an integrated Data Storage and Processing System and supports functional areas such as accounting, production, marketing. It enables managers are making decisions at the operation, tactical or strategic level, hassle-free, and timely access to data, information. MIS is used more frequently by people who make intensive tactical or strategic decisions since it works well in non-routine but programmable decisions (Coruh, 2018). MIS for top-level management hosts a flexible reporting structure in order to support scenario-based strategic and tactical decisions (Tutar, 2010; Anameriç, 2005; Aslan, 2020).

Medium Level Management's use of MIS, as MIS reports and summarizes the main tasks of the business regularly and in real-time (Laudon & Laudon, 2014), is mostly limited to monitoring-controlling, daily decision-making, and other management activities. It answers the question, "are things being done as planned?" As a science, MIS is an interdisciplinary academic field that combines management (public or private) and informatics with human, technology, system theory, and Information Management (IM) fields (Aslan, 2020).

Although the concepts of data, information, and knowledge are very confused and often used interchangeably in many languages, there are differences between these concepts and the systems formed based on them. Management Information Systems and the components of this system can not be revealed and fully understood without explaining each component, and revealing the relationships between them and context.

In order to better understand the scope and purpose of the Management Information Systems, we need to examine the terms related to it:

1.1. Definitions

1.1.1. Management

Management is the sum of the processes for making decisions and implementing these decisions as necessary by utilizing all the resources of the organization in order to achieve the predefined targets (Eren, 2011). All these activities can be categorized into four different functions known as *planning*, *organizing*, *leading*, and *controlling* (Figure 1). Hence, management is choosing between alternatives, i.e., decision-making.

Figure 1. Management Functions

1.1.2. Data

Uninterpreted symbols that represent objects, or events, or their properties, and can be found in any form. The accuracy, validity, or integrity of these symbols have not been available (Nalbant, 2007; Yılmaz, 2009).

The data is in the raw form, not filtered or categorized. The abundance of data is not only related to its quantity but also quality. The required amount of the data is not related to the quantity or quality of it, rather to the perception of the person who will evaluate the data (Aslan, 2020).

A child's grimacing or a patient's facial expression is data. Similarly, all financial transactions such as purchases, sales, loans, payments, investments made by an organization are data because they are not filtered or classified.

For organizations, the definition of data gets narrower; the transactions are in the form of records kept in specific formats.

1.1.3. Information

The necessary material for making the right decisions is information. Reliable and intact information depends on data collected from the right sources. Therefore, data sources should be determined accurately. Data sources are classified as internal and external sources. Data collected from these sources are processed, transformed into information, and then interpreted and converted into knowledge used in decision making at different levels of management.

It is the perception that created in the reader as a result of classification, filtering, and assessing of data (Ürü Sanı, 2018). Grimacing a child's face is only data for any outside person, but it is information for his mother, as it creates a perception of the state of the child. Likewise, the facial expression of a patient is information for a doctor (Yılmaz, 2009).

The company's balance sheet showing all financial transactions of a specific date range, and grouped according to accounting standards, and certain arithmetic operations applied is information. However, just a list of financial transactions without being grouped, filtered, or sorted is only data. The process of the formation of information is also directly related to some other aspects such as the person's level of perception, familiarity with or command of the subject, level of knowledge, organizational or social culture.

1.1.4. Knowledge

Knowledge is the judgment, the conclusion reached by a person thorough analyzing, interpreting, establishing a cause-effect relationship of the information received, and by associating with other information or knowledge possessed (Ürü Sanı, 2018; Yılmaz, 2009). Knowledge is evaluating and reaching a conclusion on new experiences and information by using a frame that created with a blend of experience, values, contextual information, and expert insight. It is embedded not only in documents or repositories but also in organizational routines, processes, practices, and norms (Davenport & Prusak, 2000).

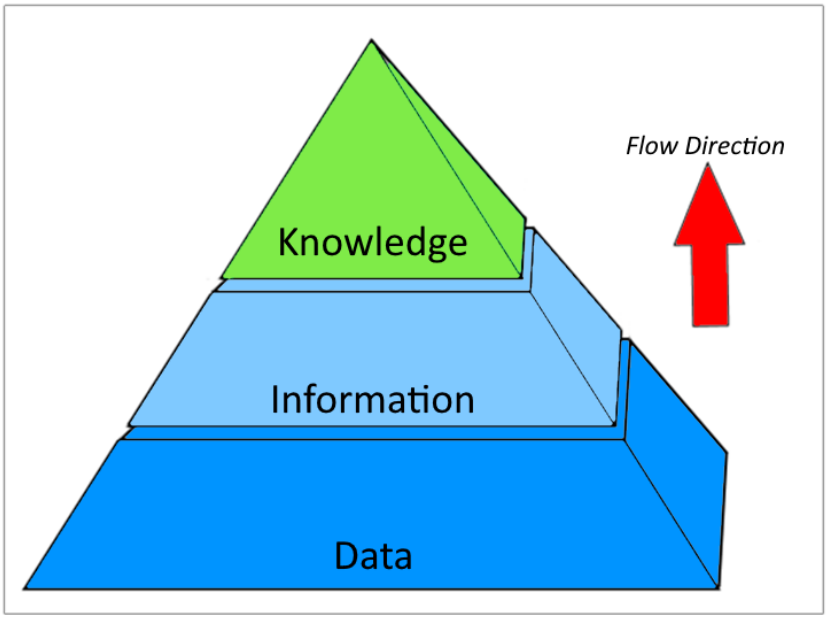

Figure 2. Knowledge Hierarchy

Data, information, and knowledge are directly hierarchically related to each other (see the Figure 2). Data is passed to the information and then to the knowledge. This process consists of certain stages. The data are collected first, filtered according to specific criteria, classified and analyzed, and assessed by the user. The findings obtained as a result of this analysis are information. The interpretation and conclusion of this information alone or in association with other information, experience, and knowledge causes the creation of the knowledge (Aslan, 2020).

The accuracy, reliability, and usefulness of the newly created knowledge and information are directly related to the accuracy, integrity, and validity of the data.

1.1.5. System

Merriam-Webster dictionary defines the system as "*a regularly interacting or interdependent group of items forming a unified whole such as a group of devices or artificial objects or an organization forming a network especially for distributing something or serving a common purpose.*"

A system is the sum of people, machines, and methods organized to perform specific tasks, in other words, it is a group of integrated components that

takes inputs, processes, and converts them into outputs, and sends feedback to the user to achieve specific goals.

The historical development of MIS can be summarized as follows (Dirlik, 2008):

Data Processing (1950-1960's): Accounting and similar commercial records keeping and monitoring data.

Managerial Reporting (the 1960s – 1970s): Reports in a pre-prepared format given to managers.

Decision Support Systems (the 1970s – 1990s): User interactive systems that support managerial decision making.

Strategic Decision Support (1990s-Present): These are the systems that executives use in their strategic decision-making processes. Some of these systems are Management Information Systems, Expert Systems (ES), Strategic Information Systems (SIS), Decision Support Systems (DSS), Business Intelligence (BI), Artificial Intelligence Applications (AIA), Online Analytic Processing (OLAP) and similar applications.

The common feature of all these systems is that data is transformed into information and presented to the management levels. Then managers use the information to support decision-making processes by interpreting information and the processes of transforming decisions into action. MIS is the best known Information Systems (IS) used to support this decision-making process (Tutar, 2010; Coruh, 2018). The features of MIS based on input, transaction, and output processes are shown in Table 1 below.

Table 1. MIS Features

Goal	To support the decision making processes of all management levels.
Inputs	Data related to context and from all departments.
Processes/Methods	Classification, summary, analysis, and dissemination of information to support decisions.
Outputs	Reports that are containing graphics and text, feedback and messages to all related management levels.
Tools	Informatics ve software.
Users	Mid and top-level management positions.

Information systems (IS) can be computer-aided or in the form of manual (hand-made) technology created using paper and pencil. However, today all ISs in MIS are computer-aided digital systems.

1.2. MIS Components

As mentioned earlier, the management information system is composed of interrelated components that collect, process, store, distribute information to support decision making and control in an organization (Laudon, 2011).

The MIS, which transforms all the data received from the internal and external environment into information for the managers, is formed by combining at least five different systems. The subsystems that make up the management information systems as illustrated in Figure 3. The components of the management information system are:

i. Data Processing Systems (DPS)
ii. Management Reporting Systems (MRS)
iii. Decision Support Systems (DSS)
iv. Office Automation Systems (OAS)
v. Executive Support Systems (ESS)

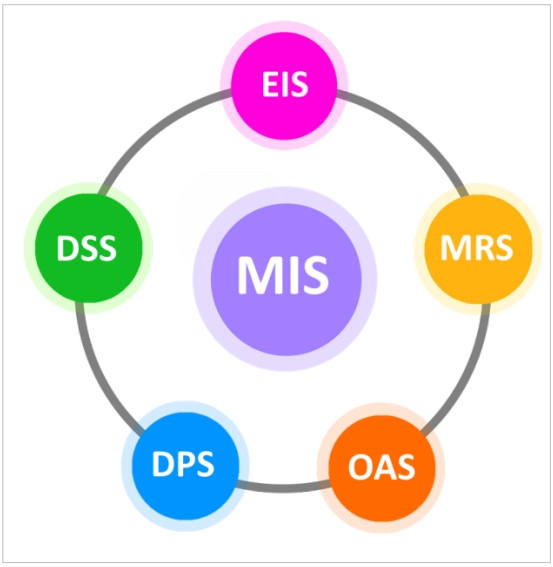

Figure 3. MIS Components

Some other systems such as Business Intelligence (BI), Expert Systems, Project Management Systems (PMS), Customer Relation Management (CRM) Systems, and Transaction Processing Systems can also be added to the list, but since this chapter covers only the basic and standard systems of MIS, others will be left out.

The hierarchy of MIS components (Figure 4) is based on the organizational hierarchy.

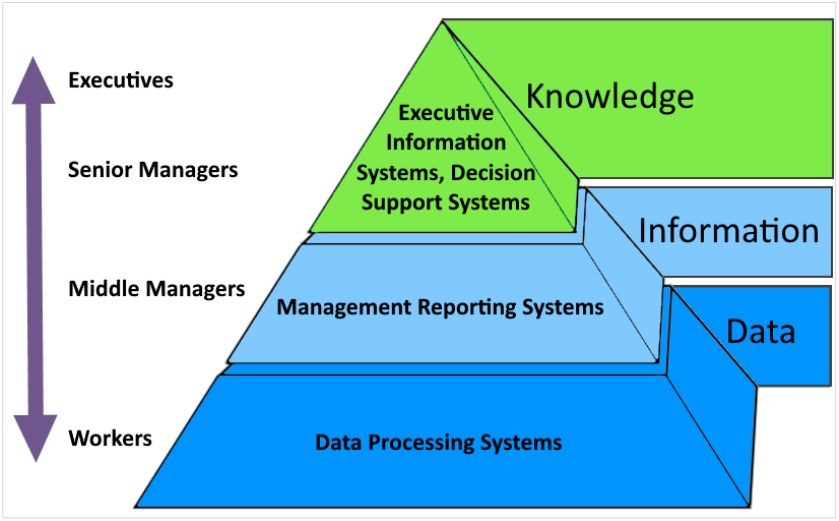

Figure 4. Hierarchy of MIS Components (OAS used in all levels)

As per Figure 4., the Data Processing System is being used by workers and entry-level managers to enter data into the system. The Management Reporting System is using the entered data to produce reports for top management to use in their decision-making processes. Finally, in the Decision Support Systems and Executive Information Systems are using those produced reports and present them to Senior Level Managers and Executives to use in decision-making processes.

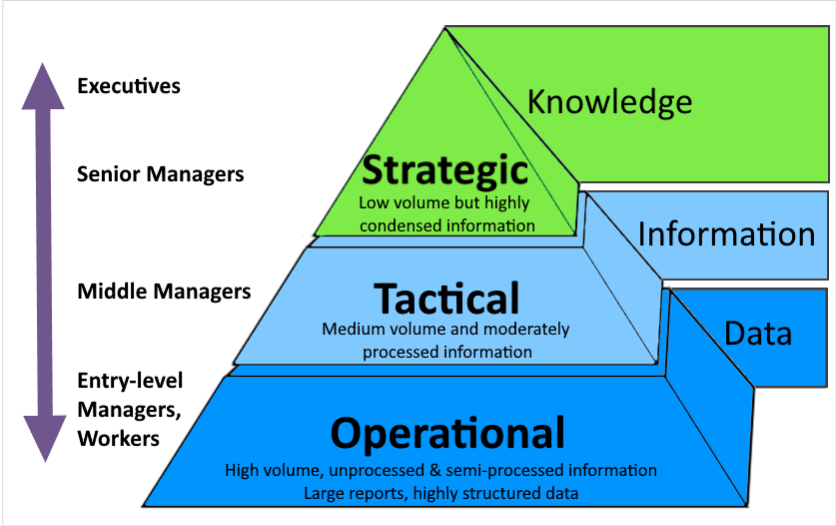

Figure 5. Management Hierarchy And Information Needs

In Figure 5, the management levels and the information needs are illustrated. The executives and senior managers need low volume but highly condensed information. The information they need is going to be used for strategic decisions and long-range planning.

The middle managers need medium volume, moderately processed information, mostly in the form of reports. It is going to be used for tactical decisions, short-range improvements. The entry-level managers and supervisors, along with workers, use high volume, extensive unprocessed or semi-processed, highly structured and detailed data to support day-to-day operations.

1.2.1. Data Processing Systems (DPS)

Data Processing Systems are the systems that record all internal and external activities, transactions. These systems are focused on workers and entry-level operational managers. DPS outputs are the inputs of the Transaction Processing Systems and Management Reporting Systems (Yıldırım et al., 2010).

The history of DPSs goes back to the period when Herman Hollerith developed the punch card reader used in the calculation of the census results in the 1890s. Automated data processing started with the invention of this machine. DPS is sometimes called Electronic Data Processing Systems (EDPS). DPS is developed to collect, store, and process the records obtained during daily operations in organizations and make them ready for the use of managers at various

levels (Anameriç, 2005). In short, DPS are computer-based systems that process and record the routine activities required for daily operations in businesses.

1.2.2. Management Reporting Systems (MRS)

Management Reporting Systems are systems where data retrieved from DPS is classified, filtered, and presented to managers in a report such as Periodic Reports, KPIs, Order Reports, Production Reports, etc. MRS is the system that transforms the data into information and distributes that information in the organization to the related management levels in order to have them make more efficient and effective decisions for issues faced, tactical decisions, and short-range improvements (Anameriç, 2005).

1.2.3. Decision Support Systems (DDS)

These systems enable managers to examine different scenarios and their outcomes during decision-making processes. These systems started to appear in scientific publications for the first time in the 1970s (Bonczek, 2014).

Managers use these systems while making unprogrammed, semi-structured, and unstructured decisions (Karrkkainen et al., 2001; Bonczek, 2014).

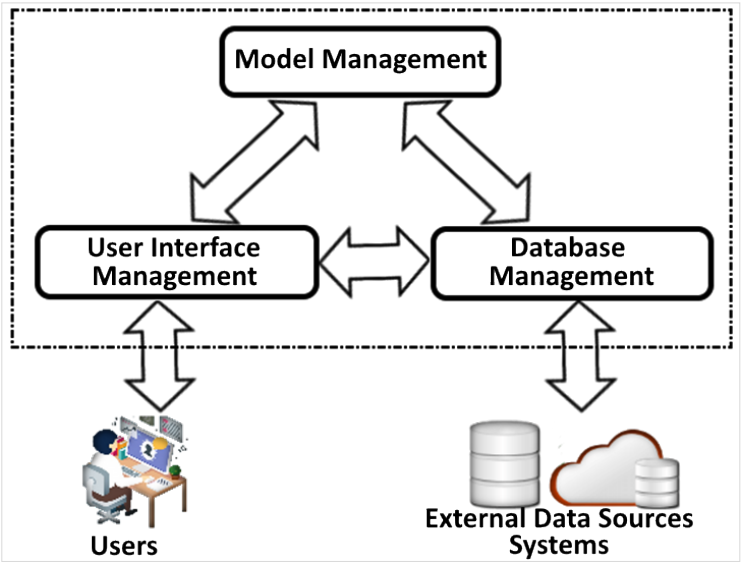

Figure 6. Main Components of DSS

Source: Uyanık, 2016

As shown as a block diagram in Figure 6, and slightly more detailed in Figure 7, DSS has three essential components: Model Management, User Interface Management, and Database Management (Uyanık, 2016).

Database Management: The database management system (DBMS) is a system composed of software packages designed to define, manipulate, retrieve, and manage data stored in databases. A DBMS makes it possible for end-users to create, read, update, and delete data in a database. The most prevalent type of data management platform, the DBMS, primarily serves as an interface between databases and end-users or application programs, ensuring that data is consistently organized and remains easily accessible. The system that contains the database and the management systems of this database is called the Database Management System (DBMS) (Uyanık, 2016). All data obtained from the internal and external environment, previous decisions, and their outcomes, all transactions stored here.

Model Management: Model management is software with different mathematical models, analytical solutions that use finance, statistics, management science, and other related disciplines (Asemi et al., 2011; Uyanık, 2016). Model management also includes a modelling language used to create custom models.

User Interface Management: User interface management is mostly a graphical interface system that works like a bridge, translator between user and application. The queries and commands sent to the Decision Support System by this interface (Asemi et al., 2011; Uyanık, 2016). The output of the KDS system is also transmitted to the user through this interface.

These systems separate from MRS at three points (Bonczek, 2014):

i. There are integrated decision models to process information.

ii. They are designed to assist top management in making unstructured decisions.

iii. Simple but very powerful programming and inquiry language are provided for users to test the outcomes of decisions and solutions alternatives.

Business Intelligence (BI) applications are the best examples of these systems. BI is generally a system used by medium and large organizations to support the decision-making process of senior managers and executives.

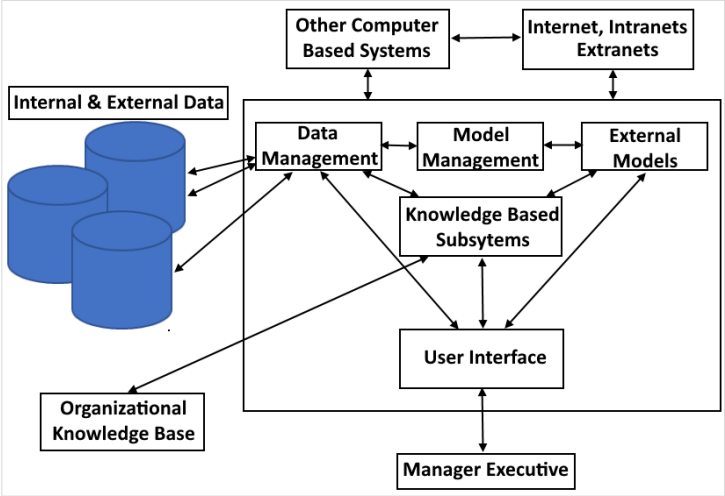

Figure 7. Decision Support System Components

Source: Uyanık, 2016

Decision Support Systems are also being used in daily life. For example, navigation software used by almost everyone can be given as an example of these systems. The navigation software helps to decide by giving several different routes to the destination and the estimated time of arrival for each route.

1.2.4. Office Automation Systems (OAS)

These are interconnected computer hardware and software configurations to increase work efficiency and effectiveness in office. This system automates the routine processes and functions performed in an office through computer technologies. Office automation systems enable the collection, processing, recording, and transfer of communications of any form, including documents, between individuals, groups and businesses, and other organizational structures with which that business is related (Iraz, 1999).

Electronic mails (e-mails), word processors, document management systems, spreadsheet applications are part of the OAS.

OAS has two main components:

i. *Hardware* consisting of computers, smartphones, tablets, printers and similar devices,

ii. *Software* that can create, store, view, print, and send written documents.

1.2.5. Executive Information Systems (EIS)

Executive Information Systems (EIS) are consists of special software that collects, filters, summarizes, combines, compares, processes, and delivers the information needed to make strategic decisions, directly to the senior managers in real-time, without any intermediaries.

The output of these systems is generally in the graphical and tabular form. In most cases, this system built on decision support systems of the organization and the information presented to senior managers and executives on a screen called 'dashboard' (Aslan, 2020).

2. STRATEGIC DECISION-MAKING

Strategic decisions form the base of management activities in an organization. It provides answers to questions such as 'what, where, when, how, why, and by whom' (Işığıçok, 2015).

The survival of organizations in today's fast pacing world depends on the ability of companies to maintain a sustainable competitive advantage which can be achieved by the right strategic decisions made on time (Ürü Sanı et al., 2016; Papulova & Gazova, 2016; Wu et al., 2017). Ürü Sanı (2018: 176) defines decision making as "a process that reflects a series of actions and activities performed in the past to achieve a specific purpose or to solve a problem, a choice made today and a future outcome." Işığıçok (2015: 2) defines decision making as "the activity of choosing or preferring one among many alternatives." Only the decisions that are made for the long-term, carries uncertainties and risks are considered strategic decisions (Çelik et al., 2016), which is also emphasize the difference between daily routine, operational, and strategic decisions.

By considering the above definitions, the characteristic features of strategic decisions (Shepherd, 2014: 17) can be listed as follows:

- The effects of strategic decisions appear in the long term. Reversing the process and its effects are difficult and require significant resources to be allocated.
- Often leads to changes in the organizational structure, processes, and strategic position.
- They are new, complex, intertwined issues, and carry high risks and uncertainties.
- They take most of the time of the top management team members.

When the Strategic Decision (SD) considered as a product of the Strategic Decision Making Process (SDMP), the characteristic features, and the desired level of those characteristic features can be summarized in Table 2 (Aslan, 2020):

Table 2. Characteristics of Strategic Decision

Characteris-	Description	Desired
Fitness for purpose	The closeness of the results to the desired targets, if implemented.	High
Applicability	Applicability of decision under many different influencing factors such as environment, organizational structure, manager's competence.	High
Implementation success	It is not about the applicability of the strategic decision. It is about the degree of implementation of the strategic decision.	High
Implementation speed	The time dimension of implementing the strategic decision and getting the results.	High
Cost-Benefit Ratio	The ratio between the cost of realization of the strategic decision and the benefit of the outcomes.	High
Cost-Effectiveness Ratio	The ratio between the cost of realization of the strategic decision and the effectiveness of the outcomes.	Low
Scope	The degree that the decision can achieve compared to the intended goals and objectives.	High
Integrity-Consistency	The consistency of the decision with the organizational values, vision, and mission.	High
Intuition	The degree that the strategic decision depends on the decision maker's intuition.	Low
Rationality	The degree of rationality and objectivity the strategic decision. The level of the information and analysis used in the strategic decision-making process.	High
Acceptability	Quality of the strategic decision. Acceptance of the strategic decision by all parties in the organization.	High
Politics	The level that the strategic decision serves the interests of decision-makers, not the organization.	Low

Source: Aslan, 2020

In addition to the above characteristic features of the strategic decisions, aesthetic, emotional axis, ethical dimension, and social impact can be added to the list. These are also selection criteria to be applied to all strategic decision

alternatives. The priority of each criterion mentioned above may differ for the decision-maker.

Although the quality of the decision has been defined in the literature as "achieving the targeted goals at the time of issue and positively affecting the performance of the organization" (Amason, 1996; Shepherd, 2014), due to the nature of the strategic decisions, the results sometimes require several years. Also, changes in the internal and external environmental context, conditions, requirements, and the organizational structure make it impossible to measure the quality of the strategic decision just by looking at the outputs.

The quality of the decision is not related to the output of it but to its compliance with the criteria at the time of the decision (Spetzler, 2016). Davern et al. (2008) stated that the quality of the strategic decision is related to the quality of the decision-making process.

Six factors determine the quality of the decision (Spetzler, 2016), and all of these elements must be above a certain level. These elements are:

i. Suitable framework,
ii. Creative and powerful alternatives,
iii. Relevant and reliable information
iv. Knowing the benefits to be provided and the costs to bear,
v. Loud reasoning that is, explicitly exposing causes and consequences
vi. The implementation is the determination of the action.

2.1. Strategic Decision Making Process

The strategic decision-making process (SDMP) is a series of activities that involve setting up criteria, collecting information, developing decision alternatives, and selecting one or more decisions among alternatives in light of the criteria set (Ürü Sanı et al., 2016). SDMP has been a subject of great interest for researchers since the second half of the 1950s (Papadakis et al., 1998; Ürü Sanı et al., 2016).

Factors affecting SDMP are generally categorized into four groups as Strategic Choice, Environment, Organizational Structure and Specific Features of Decision (Elbanna & Child, 2007; Ürü Sanı et al., 2016; Shepherd, 2014; Shepherd & Rudd , 2014; Elbanna & Fadol, 2016; Nooraie, 2012; Mehrotra & Gopalan, 2017; Papadakis et al., 1998).

Researchers have developed different perspectives based on each group. Below are brief information on these perspectives:

Strategic Choice Perspective (Upper Echelons Theory): March and Simon (1958) stated that executives were influenced by their cognitive characteristics in their decisions, while Child (1972) stated that the strategic decisions of the top management affected the organizational performance. Subsequently, the perspective developed by Hambrick and Mason (1984), named as the Top Management Theory (Upper Echelon Theory), provided a theoretical framework that enables us to understand how experiences, personality traits, and values of top management affect the strategic decisions and performance of the organization (Ürü Sanı et al., 2016; Cannella & Holcomb, 2005; Driesch et al., 2015; Abt & Knyphausen-Aufseβ, 2017; Diks, 2016; Papadakis & Barwise, 1996; Papadakis & Barwise, 2002; Ürü Sanı et al., 2016).

Environmental determinism perspective: As per this perspective, Strategic Decision-Making (SDM) (and SDMP) is the organization's effort to adapt to the change in the external environment. The organization's effort to assess opportunities in the external environment, eliminate threats and pressures, and balance with other environmental effects. The role of decision-makers in this process of balance and harmony has been reduced. (Ürü Sanı et al., 2016; Papadakis & Barwise, 1996; Elbanna, 2011). This perspective seeks to answer the question of how and to what extent SDMP is affected by environmental factors (Aldrich, 1979; Hannan & Freeman, 1977; Fredrickson, 1984; Eisenhardt, 1989; Judge & Miller, 1991; Papadakis et al., 1998).

Organizational structure and resource-based perspective: This perspective assumes that the main factor affecting SDMP is the organizational structure such as size, age, degree of formalization, degree of centralization, performance, and slack resources, (Ürü Sanı et al., 2016; Baum & Wally, 2003; Bourgeois & Eisenhardt, 1988; Eisenhardt, 1989; Miller, 1987; Miller et al., 1988; Şimsek et al., 2005; Papadakis & Barwise, 2002; Frederickson, 1985; Elbanna & Child, 2007; Frederickson, 1985; Papadakis et al., 1998 Hickson et al., 1986).

The specific features of the strategic decision perspective: It assumes that decision-makers' perception of importance, ambiguity, purpose, and similar stimuli will affect both strategic decision-making processes and the strategic decisions made since strategic decisions based on perceptions of the managers (Elbanna & Fadol, 2016; Papadakis et al., 1998; Shepherd, 2014).

2.2. Strategic Decision Making Process Variables:

SDMP and the dimensions of the factors affecting this process are quite high, and no existing studies are in scale to cover all of these dimensions (Elbanna & Younies, 2008; Hart & Banbury, 1994). Therefore, the most important ones mentioned in the literature are briefly explained below:

Procedural Rationality: One of the essential SDMP dimensions discussed by researchers in the literature is the degree of rationality of the strategic decisions made. Although different criteria are added in different cultural settings (Easen & Wilcocksen, 1996), it can be defined in general as a systematic and consistent process that involves information gathering, data analysis, and a comprehensive study of all alternatives (Elbanna & Younies, 2008).

Comprehensiveness: It is the measure that shows how detailed the determination of the objectives, environmental analysis, determination of firm capacity, and the number of factors taken into consideration in the SDMP (Fredrickson, 1984).

Researches revealed that there is a positive relationship between the comprehensiveness of the SDMP and the quality of the decision (Forbes, 2007; Priem et al., 1995) and firm performance (Fredrickson, 1984; Bourgeois & Eisenhardt, 1988; Fredrickson & Iaquinto, 1989; Meissner & Wulf, 2014; Forbes, 2007; Priem et al., 1995).

Behavioral Integration: The harmony among individuals participating in the strategic decision-making process also causes a high level of quality information exchange (Shepherd, 2014; Shepherd & Rudd, 2014). This situation, in turn, positively affects the development of ideas and alternatives, clarification of goals by eliminating ambiguity and the quality of the decision. Also, the studies of Bourgeois and Eisenhardt (1988), Eisenhardt (1989) and Gu et al. (2016) showed that this harmony within the strategic decision-making team also had a positive effect on the speed of decision making, which is vital for many sectors that require immediate actions.

Intuition: Strategic decision-makers give the final form of the decision by using different personal characteristics, professional reasoning, experience, sectoral knowledge, culture, and cognitive awareness (Simon, 1987). Studies reveal that managers make strategic decisions based on their intuition more than formal analysis (Adsız, 2016; Burke & Miller, 1999).

Political Behavior: It is about how much the decision serves the interests of decision-makers, not the organization (Ürü Sanı et al., 2016; Shepherd, 2014; Elbanna, 2006). The main factors affecting political behavior are firm structure and decision-specific characteristics (Elbanna et al., 2014).

3. MIS EFFECT ON STRATEGIC DECISION-MAKING

The globalization brought both opportunities, along with threats (Tezcan, 2002). In order to avoid threats and take advantage of opportunities, organizations have to access, gather, and validate information as fast as possible. The lightning speed in the development of communication technologies made it possible to obtain, interpret data instantly, and transform it into information, and subsequent knowledge on a global scale. More important of all that the organization structures transformed from information consuming to information producing one since the survival of organizations is also depends on reading their competitors' strategies and adapt to changes by developing strategies in accordance with changing conditions (Demirhan, 2002). Only the organizations, hence, evaluate the data obtained from both external and internal environments and transform it into information and make it available to the organization-wide will be able to survive. Thus, each unit will be forced to produce the information and contribute to this organizational information system. This process also reshapes all related behavior patterns of its employees, including production, communication, and technology, according to this new requirement.

It is a fact that an organization creates, manages the information, centralizes and distributes information organizational-wide, and uses information processing systems effectively and efficiently, improves production processes, becomes innovative and competitive (Ürü, 2009; Mustapha & Ismail, 2013).

Therefore, information processing and managing information emerge as a vital process for organizations. These systems build on informatics, information technologies, and MIS built on top of these systems as an integrated process (Huber, 1991; Kalkan, 2006).

Organizations use the MIS effectively and efficiently turn their cumbersome management structures and practices into lean, flexible, and fast decision making entities (Vincent, 1990). Most importantly, the use of MIS causes organizations to tend to use rational SDMPs more. The rationality is the most

emphasized issue in the strategic decision-making process (Dean & Sharfman, 1996; Ürü Sanı et al., 2016). It is the indicator of the extent to which the decision-making process and the strategic decision are based on the amount of the information collected, and the level and details of the analysis performed (Simon, 1997; Ürü Sanı et al., 2016; Dean & Sharfman, 1996). Therefore, the rationality of strategic decisions is proportional to the amount of information under the dispose of decision-makers (Dijksterhuis & Olden, 2006; Dean & Sharfman, 1996).

As Simon (1997) pointed out in his bounded rationality theory, in decision-making, the rationality of individuals is limited by the information they have, the cognitive limitations of their minds, and the finite amount of time they have to make a decision. Therefore, decision-makers' access and use of the amount of information should negatively affect the use of intuition in SDMP. At this point, the MIS takes part by providing the information needed by decision-makers.

In other words, the Management Information Systems Usage Level has an impact on both the SDMP and SD itself.

CONCLUSION

Because of the developments in information technologies and the internet, companies are not bound with geography anymore. Companies, regardless of their size, are able to reach their potential customers, even if they reside in the remotest village of any country. These developments in technology have changed the business world and increased competition so much that a wrong step may be the last step because there is no time to take actions back anymore. In this highly competitive and hostile business world, there is only one thing left to determine the success or failure of the companies: strategic decisions taken by top management.

While shaping the organizational strategies, top management has to decide the desired position of the company in the distant future. Then they create strategic plans to achieve that target. This planning process is actually nothing but decisions that are related to the future. Therefore, management is the decision making, and the manager is the person who makes the decision. Moreover, there is no bad manager but a manager who makes bad decisions or cannot make decisions on time.

Although all strategic plans are about the future, the data that the management team has is related to the past. The data has to be transformed into information then knowledge in order to be used in the strategic decision-making processes. MIS realizes this transformation process for TMT to help during their SDMP.

Without MIS, all strategic decisions are vulnerable and may have deficits since no one may be able to comprehend the situation in both the inner and outer environments, due to bounded rationality. In other words, the MIS has a significant impact on both the speed and accuracy of the strategic decision-making process and, hence, the strategic decision itself.

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CHAPTER 10

FINANCIAL INFORMATION SYSTEM AND MANAGEMENT IN BUSINESSES

Bilgehan Tekin

INTRODUCTION

Information is vital in businesses. Knowledge is an indispensable resource for organizational planning and control. Information for the management function in companies can be considered as a critical force that facilitates or prevents organizational success, which forms the basis of all managerial roles (Emhan, 2007:219). From a management point of view, information is accepted as the elements that help managers make decisions (Şimşek, 2002:410-411; Emhan, 2007:219). Emhan (2007) emphasizes that the development of information and communication technologies in cooperation provides a revolutionary change in the production of information and transmission more effectively and efficiently. Data can now be produced and processed more efficiently and effectively and can be transmitted to its users in a faster and refined way (Şimşek, 2002:413).

With an open system approach, organizations receive information from their environment and adapt it to the environment by using it in their organizational activities and even direct the environment. Therefore, the concept of knowledge is essential for businesses (Özyer & Yiğit, 2011: 336). Another crucial element in terms of organizational success is information systems that ensure that information is produced, transmitted, and processed most accurately and beneficially of decision making. It should not be forgotten that technology and human elements work together in information systems. Information technologies refer to the technologies that enable operations such as saving, storing data, producing information through a particular process, accessing, storing, and transmitting this generated information effectively and efficiently (Aktaş, 2009: 9). Many technological innovations that enable information to be shared and

exchanged with everyone on the world simultaneously have led to the fact that today's business activities take place entirely or partially in an electronic environment. Information technology enterprises have made an effort to use the most advanced technologies and to access accurate, reliable and timely information in a fast and easy way to provide competitive advantage (Önce & İşgüden, 2012: 40).

Information systems should be perceived as a technology-human adaptation project rather than external hardware and software change (Emhan, 2007: 220). In other words, information systems are a phenomenon consisting of human resources, programs, and managerial processes that turn data into meaningful information for decision-makers to meet specific targets (Şimşek, 2002: 420). In the development of these systems, Advances in computer software and hardware technology, increased interest in efforts to make decision-making efficiency effective, the desire for complete, accurate, reliable information, fierce competitive pressure, and research at leading universities have played a significant role (Bengshir, 1999:85).

The information system is a collection of interrelated elements working together to collect, store, and disseminating information for planning, control, coordination, analysis, and decision making (Şımga-Mugan & Akman, 2000: 103). The function of an information system is to collect, process, save, transform, and distribute data and information for planning, control, and decision support (Parlakkaya & Tekin, 2002: 676). Parlakkaya & Erbaşı (2009) state that the most critical feature of successful management is that it enables and needs analysis of internal and external information about organizations. Because the success of the management depends on the system being open to knowledge and feeding on the information, information systems that will support the decision process are; It has become an indispensable building block of today, not only is the essential tool of the business world. Informatics activities, which are described as a tissue that will ensure the circulation of information within and outside the organization, should be included in the management system (Parlakkaya & Erbaşı, 2009: 124).

Parlakkaya and Erbaşı (2009) also emphasize that information and information systems are one of the most important weapons of management. One of the other essential criteria in the success of the management is that all useful functions of the organization can be combined in the shared vision of the determined vision and mission. Although the organization's top management does not have severe difficulties in determining the vision and mission, it may not be

able to motivate the stakeholders to implement them in the same way. Because the aim of maximizing the utility that a useful function or field of activity will derive from its position will not be equally beneficial for another place, it may also create adverse effects. The effectiveness of the management will be possible by combining the objectives defined for functional areas of activity around the common purpose of the organization and by the stakeholders in the system to effectively implement their information systems. In this context, information systems of all functional areas of activity should be gathered under a standard management system (Parlakkaya & Erbaşı, 2009: 124).

Applying and using information stands out as the primary principle for an organization's life. The important thing is to make this information available to the personnel in need (Durna & Uzun, 2008: 38). The meaning of information for businesses today is that it is a valuable asset. The ability of companies to benefit from this critical capital value depends on their ability to produce and present information around certain principles and rules (Güney, 2012: 13). Today, information has an important place, but information generated in enterprises is not limited to the information obtained as a result of converting inputs into outputs by specific systems—the information produced by the employee factor, which is essential for businesses. As long as the information is used, it expresses value and meaning (Bulut, 2014: 33).

1. DECISION MAKING PROCESS IN BUSINESSES

The decision-making process is one of the crucial stages facing individuals from every segment at every moment of life. Baltaş (2011) defines decision making as a mental process that the individual (group or an organization) chooses by collecting and evaluating probability related information. Baltaş (2011) states that psychology research shows that the reasons we have based on our decisions and the subjectivity of the way the decision-making process works cannot be denied. There are also common aspects of the mental processes that underlie individual differences. However, studies that consider the differences rather than the commonalities were found to be more published. Baltaş (2011) emphasizes that the basic functioning of the brain shows that our similarities are as significant as our differences. The operation of this mechanism directs individuals to choose the one that will give the best results among the alternatives available in private and business life. Although the value attributed to the "best" is shaped by our personality and past lives, similar regions are activated in the

brain of all of us while experiencing the moment of decision. In our brain maps, we observe the result of the same administrative functions. According to Baltaş (2011), it is expected that the decisions taken will reflect the corporate strategies of the employees by avoiding the proper orientation of the employees.

Due to managers not only take on the task of managing their organizations but also are in a decision-making position, decision making also refers to the management function of any organization. Emhan (2007) states that decision making is an integral part of the planning process in businesses. The ability to plan in companies depends on being able to choose the most suitable one among various alternatives. Finding the most appropriate option requires decision making. If we have all the information to enable these alternatives to be evaluated, there is no problem in making a decision. However, this is often not possible. Many factors affect decision making, and it is not always possible to obtain full information about these factors. Deciding is to choose the path to be followed in the most rational way possible. Since we can never have complete, flawless details in the future, we use the term possible. This situation is also called bounded rationality. Bounded rationality is to decide with the best information available (Üçok, 1988:70).

The decision-making process can also be defined as the sum of physical and mental efforts to choose or prefer among various alternatives (Tosun, 1992: 308). The studies that make up the decision process are mainly intellectual. Currents studies on the subject are efforts to collect and process information to help make decisions. Definitions were made in literature covers mostly following items (Tosun, 1992:308): The existence of a purpose, the tools are chosen, the standards that ensure the suitability of the object and the means, the comparison of the results, the determination of a will and will to act or not (Emhan, 2007:124).

Generally, decision-making can be defined as a selection process that leads the manager to adopt a specific mode of action. According to this, the decision is to choose one of the different behaviors (such as activity, alternative, strategy) to solve the problem. In decision-making, it is essential to select the most appropriate of the various forms of action that may be common, based on the possibilities and conditions available. In other words, it is necessary to look for the best solution option in decision-making. However, since the decision is very involved in real life, there is limited rationality, such as choosing the most rational mode of action possible. In other words, it is not possible to eliminate

risks and uncertainties about the future, which is the decision area, but it can be reduced. Decision making, which represents a choice as a concept of business management, is an integral part of management and is present at all levels and functions of management (Karakaya, 2001: 86).

Emhan (2007) emphasizes that to make the most appropriate decision, necessary to know how the decision-making process has been formed and through which phases the decision has been reached. The decision process is an idea creation process, i.e., comprehension and judgment. This quality points to the psychological aspect. However, to choose an effective and productive behavior, it is necessary to conduct the required research and gather necessary and sufficient information (Tosun, 1992:327).

Several decisions must be taken before operating a new business or a new project. Decisions are taken to make changes, prevent confusion, or resolve them. Decision making means making choices. Instead of making the perfect zero-mistake decisions, the highest quality result, the most cost-effective, and the minimum of confusion to occur are decided. Some work needs to be taken in the face of problems that are too big. While making such decisions, decisions should be analyzed in detail and informed. Thus, more efficient or choices are made. The decision-making process consists of the following stages (Uyanık, t.y.):

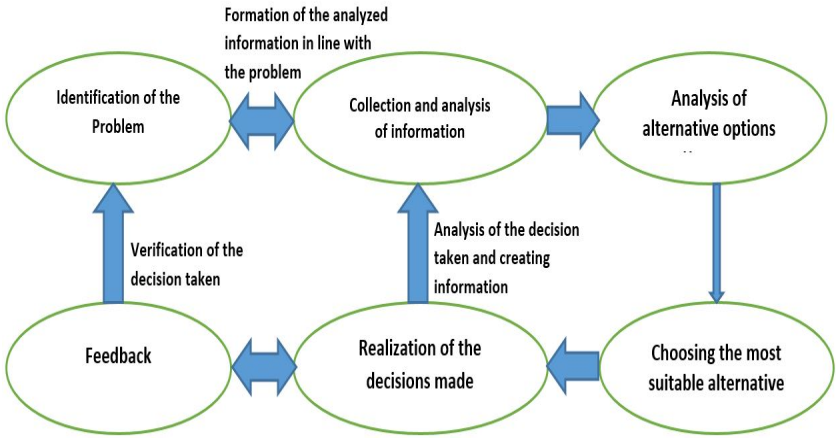

Figure 1: Decision-Making Process

Source: Uyanık, t.y.

1. **Identification of problem:** Determining the purpose of the decisions to be taken, determining the type of the problem, the degree of complexity.

2. Collection and analysis of information: Gathering information about the problem, creating solutions for possible problems, analyzing information

3. Analysis of alternative options that occur: Analysis of the results of alternative solutions of problem solutions designed after information and analysis, analysis of losses, costs, complexity solutions

4. Choosing the most appropriate decision: As a result of the investigation, choosing the best quality, cost-effective and proper decision

5. Realization of the decision made before: While the achievement of a decision made previously, at the same time, information is collected and analyzed.

6. Feedback: Align the result of the decision made with the solution of the problem.

In businesses, the management function refers to a decision-making system in itself. The economic life of the enterprises is directly related to the suitability or non-compliance of the management levels and the decisions made by the lower-level employees with the business objectives, mission, and visions (Emhan, 2007: 212). Therefore, individuals who have taken responsibility for management, reach the goal in a short or long way, meaningful or meaningless, protecting the business's interests or employees, extending or shortening the life of the company, etc. they have to make a wide variety of decisions (Özen, 1997:262).

2. MANAGEMENT INFORMATION SYSTEM

Many scientific discussions have been held since the 19th century about the "management" concept, and many related theories have been developed. Since the people started to communicate with each other, the existence of management can be mentioned. Therefore, the concept of management is a concept that has been in people's lives for many years and has a significant social dimension. Anameriç (2005) mentions that this phenomenon is shaped according to different variables in different situations. The author states that economic, political, and cultural conditions are the factors that determine the effect of management among people. Management has a broad meaning in terms of concept, and almost every branch of science has a relationship with management such as human resources management, money management, document management, and information manage-

ment. The following essential elements are required for management to be realized: Manager (s), purpose (s), goal (s), and managed. It is not easy to maintain the management process. Therefore, the essential elements should be sufficient and accessible to carry out the management process. The manager should know the basic principles of interest; see the organization, its environment, and its employees, have the power to reason and evaluate goals and objectives thoroughly. The goals and objectives should be achievable considering the organization's possibilities such as workforce, money, energy, raw materials, and technology. Managers, on the other hand, should have sufficient knowledge and skills in the field they work in, and the ability to overcome the shortcomings of the manager when necessary (Anameriç, 2005: 26).

2.1. Features of Management Information Systems

Management information systems are an integrated system of computers and users that provide information to support their business, management, analysis, and decision functions in an organization. The primary purpose of these systems will ensure to provide accurate, timely, and meaningful information to decision making authorities that will organize the mutual relations between individual, machine, material, and capital elements in the most appropriate way. Furthermore, they can achieve organizational goals most effectively and efficiently. In this context, management information systems provide corporate information support and a working perspective format (Sevinç, 2006: 68). The main features of MIS are given below as items; (Gökçen, 2007: 41).

- MIS supports Data / Record processing functions (record keeping, etc.).
- MIS uses an integrated database and supports the diversity of functional areas.
- MIS provides operational, tactical, and strategic level managers with easy and timely access to information. It provides services, especially for intensive tactical level managers.
- MIS is partly flexible and can be adapted to the change in the organization's information needs.
- MIS provides system security that allows access only to authorized persons.
- MIS does not deal with daily operations.

- MIS is generally aimed at supporting structural decisions.
- MIS offers different reports to managers.
- MIS primarily focuses on private events, not environmental or external events.

2.2. Management Information System and Sub-Information Systems

Management information systems consist of five sub-systems. These systems are; production information systems, marketing information systems, human resources information systems, financial information systems, and accounting information systems (Bulut, 2014:50-54).

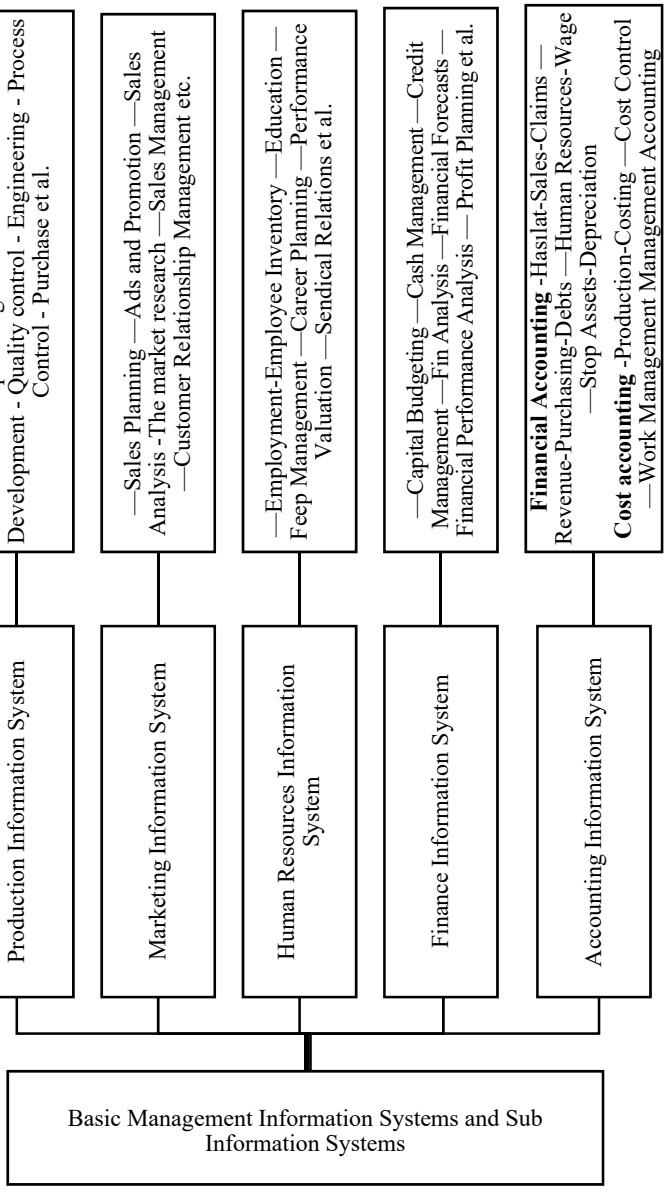

Figure 2: Management Information System and Sub-Information Systems

Source: Sürmeli F. (Ed.). (2007).

Production information systems are information systems that are responsible for the production and transmission of information to all persons and units that will cover all processes related to planning and control of products and services (Durucasu, 2012: 63).

The marketing information system is a set of people, equipment and methods that provides the collection, classification, analysis, evaluation and distribution of regular and fluent information that is necessary for marketing managers to make decisions (Çakıcı & Gök, 2004: 74).

Human Resources Information System is a systematic monitor used to gather regularly, stock, store, organize and analyze data about human resources activities and organizational unit features required by an organization (Karcıoğlu & Öztürk, 2009: 348).

It is possible to define the financial information system as a system that generates certain quantitative information. It enables the transmission of the information it causes to the users to allow the users to make informed judgments and make decisions to help the optimum distribution of scarce resources and achieve the objectives of the business. The financial information system consists of financial and cost accounting, sales and receivables, purchases, debts, inventory transactions, wages and labor, costing and cost control, income and expense transactions, fixed assets, liability accounting, financial analysis, and budgeting sub-systems (Bekçi & Alkan, 2009: 3).

The accounting information system can be defined as a collection of interrelated items that are combined to convert the information, raw data, or ordinary information and to present it to the users of the internal and external through financial reports (Daştan, 2008: 75).

3. FINANCIAL INFORMATION

Information is an indispensable factor for businesses in making the right decisions. Enterprises have to obtain information, product information, and use the information they produce most appropriate for their purposes to continue their activities, to compete, to reach the desired goals. The most needed type of information at this stage is financial information. Managers can compare the current period with their previous periods' thanks to financial information, see where they are at the desired targets, and therefore make more accurate decisions (Coşkun & Demir, 2009: 3). Financial information is also used as input by

corporate audit mechanisms. With the help of financial information, it is ensured that the conflicts arising from the corporate distinction between the manager and the foreign investor are alleviated. It is also the main objective of governance research in financial information accounting. On the other hand, financial information is essential for understanding the use and distribution of resources in the economy (Bushman & Smith, 2001: 328).

Uzunoğlu (2018) described the concept of financial information in different ways by citing the studies of different authors. For example, according to Bushman and Smith (2001), financial information is quantitative data produced by a firm's accounting department or externally provided reporting system that describes the firm's financial position and performance (Bushman & Smith, 2001:237). Financial information is a resource that companies need to disclose their financial information, analyze and discuss their financial results (Guay, Samuels & Taylor, 2016: 235). In other words, information produced in the accounting system of a company, which transfers the financial status of the company to the relevant people through financial statements and reports, is called financial information. Financial information; It is a valuable tool that enables firms to evaluate their financial performance on issues such as investors' decision to invest in a firm, organization, or activity; lenders can trust and provide credit. In this respect, it plays a critical role in evaluating the financial status of companies or companies that they intend to invest in (Mohamed & Handley-Schachelor, 2014:311).

For a piece of information to be qualified as financial information, it must meet certain conditions. In this context, financial information (Küçüksözen, 2004: 1);

- It should be impartial, accurate, and explanatory.
- It must be presented within a specific time.
- Should be suitable for the intended purpose,
- Should be relevant to the intended purpose

Theogene & Akintoye (2018) list and explain the characteristics of financial information as follows:

The relevance of Financial Information: The relevance of financial information requires that its users create different options for decision making, which means that financial information should be capable of predicting a value and influencing decisions to validate the cost of a particular item in the financial

statements provided by management. This is used by shareholders or investors when making their decisions and measuring the return on investment. Financial information eligibility confirms financial information that management provides decision-makers about past and current events or situations that can be used as future predictors of business. The relevant annual report should include useful financial and non-financial information to clarify the decision to be made on the main components of the financial statements. It should be able to provide both financial and non-financial business opportunities, risks, and other useful business strategies.

Consistent Representation of Financial Information: For financial information to be useful, decision-makers must be trusted, meaning that financial information must consistently represent a company's financial status and performance. An entirely consistent representation is exempted from bias and accounting errors in integrity, impartiality and account records, balances, or categories and classification. The financial statements should reflect the economic essence of all transactions made during the accounting period and include clear explanations useful in decision making. Reliable financial information is information free from material or material errors; this means that it must be free from human manipulations and deliberate mistakes that can lead to the wrong decision-making process by all users.

Comparability of Financial Information: Comparability of financial information means that the company's past and present economic conditions are analyzed using at least two years of comparative information about financial position and performance, especially to measure profitability and return on investment. This refers to the internal review of the economic situation and performance. Comparison of financial information can be between two or more companies; here, profitability and financial position are compared with others in the same sector or investment sector using different business periods. Among the different types of decisions to be made, the comparability of financial information aims to help decision-makers or the user find and understand clearly the existing differences that may exist in a company or industry. Comparability of financial information expresses the power to make a clear assessment of the difference between previous information and current year information.

Timing of Financial Information: Keeping financial information up-to-date requires financial information to be presented and communicated without losing its core value for decision making and change. Professional accountants and management need to be aware that financial information is required for a

specific and timely purpose and present them shortly after the end of the accounting period. Timely financial information helps to improve weaknesses that have appeared in the last current period and set strategies for future strengths in line with financial accounting reports. Financial information is essential when presented on time and affects the decision-making process; otherwise, it loses its quality of relevance. In this context, the 21st century requires a transition from the manual accounting information system to the computerized system to prepare and present information on time.

Verifiability of Financial Information: The financial information verifiability feature refers to the credibility of the information that is contained in the financial statements. It aims at assuring that the financial statements provide information that accurately shows the business transactions that took place in nature and is a legal form that can be verified and tested by any third party if users are not satisfied or have issues in the analysis of the financial information issued by management. This can be done in investigating the physical existence of the events that took place and even recalculations of the relevance ending balances of the existing physical assets or subjects. This refers again to the issue of accounting measurement and recognition of events that had taken place in a given period of accounting.

Understandability of Financial Information: The reliability of financial information comes from the financial reports that are easy to read and understand and the ones that do not confuse the readers and decision-makers. Therefore, accountants need to prepare financial accounting information in a recognized language and supply more explanations or details about business activities of their entity in a bright full disclosure even if there is an assumption that users need to have basic knowledge of business and economic activities. Today's business environment has changed, and external finances are procured from different globalized capital markets where local GAAPs are no longer in a position of satisfying the decision-makers, such as stockholders and bondholders.

For financial information to be practical and useful for decision-makers, there must be comprehensive and transparent with meaning attached to every element that contains financial reports (IASB, 2008). This quality is measured by using different measurements, which are (a) classification and characterization of business information, which is how the financial statements are organized in their presentation, means that the more annual reports are held, the clearer and specific they become. (b) they should be presented transparently and clearly; (c) the information is well disclosed to provide useful explanations and

notes to balance sheet/statement of financial position and income statement/statement of comprehensive income by which more descriptions and insights regarding earnings are given, and narrative reports are also used in providing understandability financial information; (d) it was also mentioned that regular economic reports which contain financial information should contain graphic or tabular formats which aimed at improving understandability where the relationships are easily measured and conciseness fully ensured.

3.1. Financial Information Sources

Financial statement information plays an essential role in many types of decisions taken by firms and stakeholders. However, the success of the measures taken based on these decisions depends, among other things, on the quality of accounting information. Accounting information must be accurate, impartial, and reliable to be useful in decision making. It is necessary to comply with universally accepted standards for establishing an accurate and fair view of a firm's performance. On the other hand, real-life situations require flexibility in choosing the accounting policy that maximizes the benefits of the firm. One of the areas that need to be reconciled in the process is the different treatment of long-term assets in tax accounting and financial statements (Čšernius & Birškytė, 2020: 51).

With the financial status and operating results of an enterprise; Owners, managers, competitors and suppliers, regulatory, supervisory agencies, banks, lending financial institutions, and similar individuals and institutions are involved. These individuals and institutions that form the environment of the business need reassuring, comparable, and provable information about the company. The source of information regarding the operating results of the enterprises is obtained from the accounting records and documents of the enterprises and the financial statements prepared based on these (Dokur & Dora, 2009: 9).

Financial Statements: These are financial reporting tools that enable the information gathered and processed from the relevant sources to be presented to the users of information in specified periods. Financial statements make it easier to understand the financial situation of the business and allow comparisons to be made between the periods over time, allowing the parties to reach a judgment about the company. Therefore, it is essential to present the information in the financial statements to the users of information in a correct, reliable, and comparable manner, considering the generally accepted accounting principles and

standards (Çelik, 2016: 10). Information users; Financial information must have certain features to make decisions by making use of the financial statements. The information in question should be made available on time and should be impartial, reliable, provable, and comparable (Çelik, 2016: 10). Information sources in businesses; balance sheet (financial position table), income table (income-expense table), sales cost table, fund flow table, cash flow table, equity change table, networking capital change table, profit distribution table, independent audit reports, footnotes, management discussion, and analysis consist of particular case explanations (Yörük & Doğan, 2010: 15).

3.2. The Users of Financial Information System

According to the International Financial Reporting Standards (IFRS), financial statements are a fundamental tool that provides information about an organization's financial status, performance, and changes in them to users who want to make decisions about this institution and operate in a wide range of fields. Therefore, based on this definition, anyone who wants to be informed about the financial structure and performance of any organization for various reasons can be considered as a user of the financial statement and become a party to the financial reports (Uzunoğlu, 2018: 9). Financial information about the financial status, assets, and resources of the business is valuable and necessary not only for business managers but also for many people and institutions. Those who use the information obtained from financial statements can be defined as related persons or users of financial information.

Financial Information Users: It can be examined in two groups as internal and external users. In-house users are employees and managers and partners who can obtain any financial information related to the business. External users of the enterprise are those who do not directly participate in the decisions regarding the activity of the enterprise (Çelik, 2016: 18). Business users; business owners, managers, and employees. Non-business users, potential investors, credit institutions, and other lenders to the company, vendors, and other commercial suppliers are customers, government, labor associations, trade associations, and financial analysts. They use financial statements to meet different information needs (Koçak, 2015: 34).

Financial information plays an essential role in the decision making of shareholders who are critical users of the financial information system. Investors provide capital to businesses and entrust this capital to professional manag-

ers who need to act to meet and protect the interests of partners. Investors have become multinational companies based on the development of capital markets. Therefore, managers must have a quality of information that shows what they are doing and accomplishing with the resources, autonomy, and power entrusted to them (Theogene & Akintoye, 2018: 1). As the qualities of financial information such as relevance, reliable representation, comparability, verifiability, timeliness, and understandability enable economic and financial decisions to be made forcefully, professional accountants should pay more attention to these qualities when preparing financial statements (Theogene & Akintoye, 2018: 1).

The purposes and interests of financial information users to use the information in published financial statements and reports are different from each other. Therefore, while conducting financial analysis, the purpose and interests of the parties involved in the business should be taken into account (Aydın & Ayıkoğlu, 2009: 5). The interests of financial information users can be summarized as follows (Table 1);

Table 1: Financial Information Users by Interest

Related Users		**Reviewing Tables**		**Purpose of Interest**
Short Term Debt Lenders	→	Receivable Assurance	→	The Adequacy of the Revolving Fund and the Company to Pay Short Term Liabilities, Liquidity status
Long Term Lenders	→	Receivable Assurance	→	Degree of Enterprises to Pay Debt
Investors (shareholders)	→	Efficiency of Investments	→	Profit rates of the business, Earning Per Share
Management team	→	Growth, Productivity / Profitability Rate, Internal Audit,	→	The efficiency of Total Assets, Efficiency of Equity
State (Tax Administration)	→	Tax Revenue, Productivity of Businesses	→	Generally Accepted Accounting Principles Compliance, Value Added, Profit Per Share

Source: Aydın & Ayıkoğlu, 2009:5

As can be seen from the Table 1, the purpose of analyzing the financial statements of short and long-term lenders is to have information about the repay

ability of loans. In this, they are interested in the firm's ability to pay its debt, capital, and liquidity information. Investors, on the other hand, want to have information about the efficiency of the investment they have made or are considering; they are concerned with the profitability rates of businesses. Business managers, on the other hand, gain knowledge about business profitability, internal control, and growth rate by analyzing financial statements. The state uses financial information for reasons such as determining the correctness of the taxes paid, identifying tax policies, and compiling statistical information (Çelik,2016:20).

3.3. Principles of Financial Information System

There are some principles that the financial information system must have to be useful (Koçak, 2015: 26). Although these principles of the financial information system are not strict rules, they are a guiding guide in system design, developed because of long experience. The principles that may be effective in the success of the financial information system are as follows (Bekçi & Alkan, 2009: 4):

Affordable Cost Principle: The measure of the eligible cost depends on comparing the money spent on the system with the measurable benefit of the system to the enterprise. In other words, it is possible to talk about the appropriateness of the cost spent on the system in cases where the benefits provided and measurable from the system meet or exceed the system cost.

Reporting Principle: The financial information system should be developed to provide an efficient reporting order for inward and outward. The purpose of the financial information system is to provide information to relevant places and people effectively. This is only possible with reports because the output of the system is financial reports.

Human Factor Principle: The effectiveness of the financial information system depends on the human factor. Accordingly, the system should be developed, taking into account the human element. People are responsible for the operation of the financial information system, and these form the social structure of the system with their experience, expectations, and desires. For this reason, an effective financial information system is only possible with a solid social structure based on certain foundations and the adoption of the system by those who make up this social structure.

Organizational Structure Principle: The financial information system should be developed to function within a specific and clearly defined organiza-

tional structure. An effective financial information system will be provided by a good definition of system elements and their relationships. An organization where job descriptions are not well done; will not allow accurate determination of decision centers, control points, and work areas.

Flexibility Principle: Business is a dynamic and open system. The enterprise is in continuous development due to its dynamic system. As an open system, it is continuously affected by internal and external conditions. It is only possible for the company to adapt to internal and external developments and innovations by being a flexible system. A flexible system, on the other hand, is a system that can respond to events and innovations with only a few additions without requiring re-arrangement from 27 innovations and developments.

The Principle of Being Clear and Understandable: The financial information system needs to be developed clearly and understandable to monitor the actions within the system quickly. The fact that the system is clear and understandable allows people responsible for the operation and effectiveness of the system to learn the system more easily and quickly. This enables people to monitor the system more efficiently and comfortably.

Data Accumulation and Processing Principle: The financial information system should be timely, meaningful, and relevant to provide managerial information. This principle concerns the flows of data or information in the form of 'input-processing-output' within the system. The provision of this principle depends only on the first records of the data in the system. In this regard, the first record must be accurate and detailed. Having the first record in the required detail allows multi-purpose information to be retrieved from the system.

4. FINANCIAL MANAGEMENT

Planning, providing, depositing, and controlling the funds needed in businesses are defined as financing (Akdemir, 2006: 219). Parlakkaya and Erbaşı (2009) state that financial systems will add value to businesses through in-depth analysis. The key to modern information systems is the ability to correctly define and understand the work done (Akyön, 2001: 171). Detailed analysis is needed across product lines, target markets, geographic boundaries, and customer portfolios to identify opportunities in the business to provide added surplus value. A financial information system is needed in enterprises to make these analyzes (Parlakkaya & Erbaşı, 2009: 126).

Financial management is the rational balance of the costs of funds that can be obtained from existing alternative sources and the benefits to be obtained from existing alternative usage areas where these funds can be invested (Bolak, 1998: 2). In other words, financial management is all of the activities related to obtaining the funds required by the enterprise and directing them to projects that will maximize the firm value (Moyer, et al., 1995: 4). The primary purpose of financial management is to maximize the wealth (wealth) of partners. The financial information system is an information system that supports the existence of financial resources of the business, investing these resources in business assets and supervision of all financial activities (Şahin, 2001: 300). What is expected from the financial information system is to provide the information flow that will meet all kinds of financial information needs of the users? The financial information system fulfills this information flow through general and particular purpose financial reports it prepares (Parlakkaya & Erbaşı, 2009: 126).

4.1. The Importance of Financial Information in the Scope of Financial Management in Businesses

Entrepreneurs establish enterprises or businesses to provide goods and services to society, the market, and people, and also to earn money from their activities. They need money, or funds or capital, to continue their actions during the establishment phase and after the start of the work. The said fund or capital is invested in office equipment, furniture, human resources, office space, and other vital areas for the organization. The funds needed are generally provided by banks and other financial institutions to be repaid with interest over a while. Expense items diversify and increase as the business starts operating and expands its activities such as marketing, supply chain, etc. The fund, which comes out of the company as a result of the investments in the elements, then returns to the business as a result of the business transactions carried out by the company. In the organization in question, the flows of funds and capital will continue continuously due to various activities. Information on all events carried out in the enterprise is adequately recorded to refer to the status of funds and information about any occasion when needed. Budgeting or capital allocation should be recorded most accurately and impartially, including details of employee salaries and all other tasks related to the distribution of funds. These details will enable managers to be aware of the financial status of their businesses and to know the availability of funds in this context. This information will allow managers to quickly make decisions regarding the most accurate use and investment of funds.

In addition to being time-consuming to save all these processes manually, the process of searching for necessary data promptly requires a very time consuming and tedious process. It is not possible to meet the demands and expectations of the enterprises and give a clear photo of the financial status of the business, by recording the information that occurs as a result of the activities carried out in the enterprises and recalling the information needed by the managers with poorly managed software programs and recalling them when needed. To finance the organization's information system in businesses, it keeps not only track of activities related to funding flows, but also various financial rates, financial scales, etc. It is necessary to calculate. Such information systems, which process data about the fund and produce information about the fund, are called financial information systems. Financial information system (FIS) in businesses related to funds, budgeting, revenues, expenses, etc. In addition to adequately storing and managing data, it has a function of converting this data into a variety of information that can assist in processing and financial decisions. FIS also maintains all the information regarding the investments made by the enterprises, the loans they use, and the taxes they pay. The Financial Information System (FIS) is a system that enables the evaluation of financial data.

Today, the information needs of organizations are changing rapidly. In the future, the success of any business organization will depend more on its ability to manage information rather than its ability to control operations (Ateboh-Briggs, 2013: 87). Ateboh-Briggs (2013) mentions that as the size and scope of their operations increase, many parts need to be coordinated so that the left hand is aware of the movement of the right side. The increasing competition environment and scarcity of resources lead organizations to the abyss of failure. Efficiency criteria must be used to prevent this. The changing and uncertain environment of the organizations brings along renewed efforts for effective management. Organizations should keep their awareness high and keep their environment under surveillance to be aware of new opportunities and threats. Therefore, information system management is the connection process of effective and efficient management of modern organizations (Ateboh-Briggs, 2013: 87).

The volatile global economy, large numbers of financial and other information sources and complicated structures; It has led to the need for individuals who cannot establish a connection between financial numbers, numbers or indicators and the real world to process, understand, and analyze these sources of information (Gouws & Shuttleworth, 2009: 148). Understanding how organizations manage information, especially financial information, has a significant

impact on decision-makers' ability to plan strategies and create a competitive advantage. Knowledge and the ability to develop and use this information is one of the most important sources of competitive advantage in organizations (Ateboh-Briggs, 2013: 87). Creating knowledge focuses attention both on education and on the ability of individuals to use it. Edwards, Collier, and Shaw (2003) see organizational information as an asset "its use is an important driving force for competitive advantage." Sharma (1999) states that useful information is necessary to provide a rational approach to decision making in solving critical problems. Therefore, the primary role of the information system is to provide information for decision making, planning, and control activities. In short, the function of the information system in enterprises is directed to management; to provide information for decision making, planning, and control purposes (Ateboh-Briggs, 2013: 87).

Financial information plays a vital component role in administrative decisions (Daferighe, 2009: 196). Financial information is probably the most used information in managerial decisions. The most important task of management is to obtain the right information at the right time and in the right way. Accurate information is the information necessary for the effective functioning of the organization. Sajady, Dastgir, & Nejad (2008) emphasize that information obtained from a financial information system can be useful in decision-making processes related to purchasing, installation, and use when the benefits from operations exceed costs (Ateboh-Briggs, 2013: 87).

Demir and Coşkun (2009) talked about the need for companies to compete and maintain these features for the continuity of their operations in an increasingly globalized world. Competition of businesses depends on learning modern management techniques, technology, and institutionalization required by age. There is a regular flow of information, and users should use this information when necessary to provide these features in firms.

In their study, Demir and Coşkun (2009) state that financial information comes first among the information that business managers need. Because, thanks to financial information, managers learn their past and current situations and, therefore, can make their decisions more accurately. In this context, it is through the financial information system that the financial information is circulated within the enterprise within a system. Managers working in the business need information about their organizations to manage their organizations correctly and effectively. The fact that the organization can be managed effectively and adequately requires the management function to be effective. The more quality information a manager collects about his organization, the better the

management process is. As with any task, the management function needs information. The need for information is higher in this function. Information in management is expressed as a collection of information for decision making. The management information needed is a collection of meaningful data for an organization that shows its activities, can be stored, processed, modified, and, most importantly, can be reported to different levels and managers (Anameriç, 2005: 26-27). The information needed by the management during the decision-making process is provided by the management information system. Since most of the information that needs to be taken as a basis in management decisions is information showing the financial status of the business, the result of the activities and the emergence of this result, the financial information system is closely related to the business management (Bölükoğlu & Birgili, 1992: 74).

CONCLUSION

The information system is used by the managers to carry out the business more effectively. The information system consists of a set of components that collect, process, store, and distribute information in an organization to support decision making, coordination, and control processes (Kenneth & Jane, 2000). Managers should consider technology and management perspectives as a whole to develop effective strategies and organization. The information system in enterprises collects, processes, distributes, and stores the data related to the transactions of the organizations resulting from their necessary activities (Rainer & Turban, 2009). FIS in businesses is mainly associated with the monetary issues of businesses.

Every business or organization has its own needs in business. For this reason, FIS can be designed in different ways for each enterprise and can be used at different levels for various purposes. In this context, FIS can be used for performance measurement purposes for some businesses, while for some, it can be used in decision-making processes and for others as a combination of both. FIS is an information system that takes data as input and produces reports that contain information. Periodic financial statements of businesses are one of the primary data sources for FIS. Financial statements show the financial status of the firms as a result of their activities in the current and previous periods. Financial statements can also be used by financial information users or stakeholders to predict future earnings and dividends, and also they involve businesses' existing assets, short-term foreign resources, net, and gross sales, stock items, receivables, total assets of the business, etc. The information is presented to the benefit of financial information users through its financial statements. These data can

also be used by FIS for company performance, use of company resources, evaluation of managerial performance, etc. it is used as an input to generate a report on goals. FIS uses a variety of financial analysis tools, such as financial ratios, to evaluate company performance. Liquidity ratios, asset management ratios, debt management ratios, profitability ratios, and market value ratios are some of the financial rates used to understand the situation of companies at a certain point in time and the results of their past activities. Besides, companies can be analyzed by evaluating financial statement performances with various financial analysis methods.

FIS can also be used in investment decision making. Companies that intend to realize an investment project will make these investments with a reasonable return expectation from their investments. At the same time, people often do not like risk. Individuals invest only in risky assets when it comes to higher return expectations. However, to determine which investments are safer or more hazardous than others, it is necessary to compare different alternative investment options in terms of risk. There are various financial methods developed for these purposes. With FIS, it is also possible to analyze the time value of money. Finance managers are expected to have a good understanding of the time value of money and its effects in different directions, to help decision making. There are many applications of the time value analysis principle. For example, the inclusion of loan payments in a specific program, as well as decisions on how to supply new equipment. Therefore, the time value of money is an essential concept in financial management. This concept can compare different investment options, loans, leases, savings, etc. It can be used to solve problems on issues. Corporate financial management is concerned with the management of funds and capital in businesses. This management approach helps companies to achieve their financial goals. Financial management aims to reveal the financial status of the companies based on the financial statements of the companies. The financial management function in businesses helps to decide how risk can be minimized, how money can be used effectively, and how borrowing is minimized. Along with this, the main features of FIS are the calculation of financial ratios, keeping all records related to income-expense, loans, and investment, keeping all documents related to budgets, calculating tax and interest payments.

Financial information is useful when it is relevant and most accurately represents what it claims to represent. The level of interest and consistency are vital qualitative features of useful financial information. The level of importance of financial information should be understood as financial information that can make a difference in the decisions of its users. Financial data must have a predictive value, confirmatory value, or both, to make a difference in decisions.

Financial information should not only be relevant but also accurately represent the facts and trends that it claims to represent to be useful. This key feature aims to maximize critical traits such as integrity, impartiality, and flawlessness. These features make financial information reliable (Černius & Birškytė, 2020: 52). FIS, availability of funds, budget information, etc. It helps to keep up to date information about transactions. In summary, the FIS of businesses helps financial decision processes, some of which are listed below:

- Since information about funds is easily accessible, purchasing decisions can be made quickly.
- Decisions about investments can be made easily.
- There is information about payments such as interest, loan, rent, the invoice in businesses.
- It helps to gain trust by paying suppliers immediately, thereby improving relations with suppliers. The ability to pay suppliers directly depends on having information about the funds.
- FIS helps to determine the level of returns the company gets from its investments and what the status of the investments are.
- FIS helps to track the company's financial assets and fund flows.
- FIS also provides more straightforward answers to questions such as "What is the current state of financial assets? or Are existing assets sufficient for expenses such as payments, receipts, payroll?"

Financial information systems are expected to assist employees in understanding the roles and responsibilities, making the most effective use of organizational resources, producing useful financial reports (generating financial statements on time), and briefly making effective decisions, as well as planning, budgeting, and managing activities in businesses. When all these activities are performed well by financial information systems, the needs of organizations are fully met. For this reason, FISs need improvements to meet the needs of organizations fully. FIS can only offer an organization complete satisfaction if it has the right features. Some financial information systems may have features that are never used by organizations and therefore remain idle. At the same time, more research is needed to find possible solutions to the problems encountered in FISs. Managers who reach the information when and with the quality they want through FIS, perform their management activities more effectively and efficiently. Managers set their goals better, business activities are better controlled, the way of management is systematized, and as a result, competence and efficiency of business activities increase.

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CHAPTER 11

MANUFACTURING INFORMATION SYSTEMS

Emre Bilgin Sarı

INTRODUCTION

Information systems consist of subsystems which are interrelated. Each information system contains different information byself. Information management is required to manage this information together and integrated way. The companies, while carrying out their operations, direct their activities by obtaining various information from the internal and external systems of the business. One of these information systems is "Manufacturing Information System". Manufacturing information system is purposed to obtaining data about the work done in all production stations and their flows. Enterprises utilize all business information to achieve the objectives their competitiveness. Therefore, the information is important to management of the companies. Business decisions for different periods are taken based on this information, which is daily, weekly, monthly, annually and so on.

In the global business environment consisting of customer-centered markets and characterized by short product life curves, production functions play an active role in coordination with functional units in the enterprise in order to give the organization a competitive edge. The use of advanced information technology applications is a crucial point in increasing this success. Production processes have shown significant changes in intellectual work rather than physical efforts. In that regard, advanced production technology cannot be considered separately from information technology. Manufacturing systems, evaluated together with information technologies, are the basis of effective work. Manufacturing information system is an integrated information system that covers all activities related to plan and control of production processes of goods and services and supports the production function of the enterprise. In parallel with the automation of manufacturing systems with information, various applications were developed such as material requirement planning, inventory management, product

development and design, resource planning, and with the support of these applications, decision makers had the chance to access accurate and reliable information in a shorter time (Şahin, 2006).

The main objective in the establishment of the manufacturing information system is to assist the manager in planning all the production activities, organizing the resources required, managing the activities and controlling the results. Apart from this, as an information system allows the production managers to better understanding the various relations related to the production process. A manufacturing information system based on sound basis ensures that managers can obtain accurate, complete, timely and concise information. In addition, when this information is used effectively, they make important contributions to the development of the managerial decision-making process (Thierauf, 1975: 92).

This book chapter in the Data, Information and Knowledge Management book aims to explain manufacturing information systems, to draw attention to the importance of information management in production management, and to reveal the necessity of not considering production management independently of information systems. In the organization of the book chapter, first, the system approach in operations management is included. In system approach, the place and the importance of information is explained. Then, the manufacturing information system is taken with decisions taken at various levels of management. Finally, smart manufacturing systems and information technologies are included. The relationship between smart systems and business intelligence and managerial decisions has been used to explain information management.

1. SYSTEM APPROACH IN OPERATIONS MANAGEMENT

The management of the production function, which refers to the activities that businesses need to perform in order to transform their inputs into desired product / service outputs, is a typical management area where the system approach is widely and effectively implemented. The system approach can be described as an important principle in understanding and resolving operations management problems. Operations management can be applied to all forms of organized work (Roy, 2007). Operations are not only limited to manufacturing, all the operational systems required to produce goods and services are part of operations management. Manufacturing is only one of the many subsystems of the system faced by the production management. Manufacturing as a system can be explained with its basic elements as shown in Figure 1.

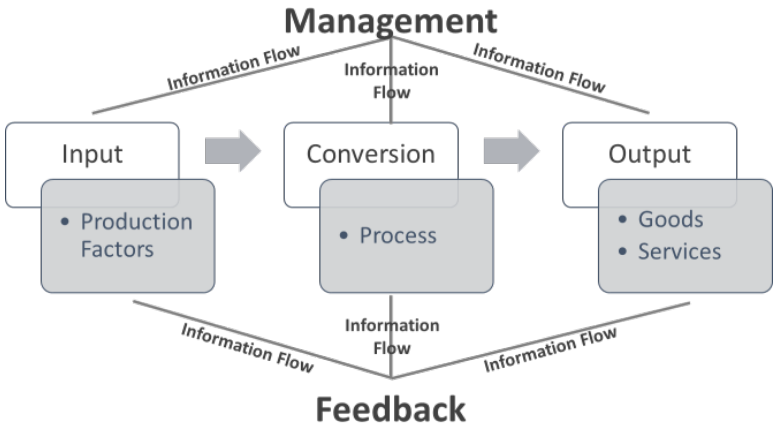

Figure 1. Manufacturing System

Ref: (Doğan, 2016)

In the manufacturing system, inputs such as employees, raw materials, machinery-equipment, technology, energy, product-process information are defined production factors. The main outputs of the manufacturing system are products in the form of goods and services, knowledge and experience accumulation. In addition, there are three types of feedback in the manufacturing system regarding human, information and environment. Production managers carry out the planning, organizing, directing and controlling of this system consisting of input - conversion process - output and feedback (Doğan, 2016).

The introduction and development of the system approach in production management coincides to a great extent after the Second World War. In this period, the development of advanced mathematical techniques and information-processing tools that allow the solution of complex and comprehensive problems applied by these techniques played an important role in the development of the system approach in production. After this period, it is observed that information systems are increasingly used in both design and implementation of operations systems (Jackson, 2007). Today, the systems in which the production manager has to operate are human systems, dynamic, and highly complex systems that interact intensely with their environment. The ability of the production manager to reduce this complexity on the one hand and to understand and recognize the problems and environment which is faced, on the other hand, is related to the effective use of information systems (Halevi, & Wang, 2007).

1.1. The Importance of Information for Manufacturing Systems

Many of the problems encountered in production management and the areas that make up the subsystems of production interact with each other and most of them have an integrated feature. Business design has a close interest in topics such as material handling, product design, machine-equipment selection, in-plant placement and determination of the production process. Similarly, the inventory policy to be followed is partially dependent on the instruments controlling the level of production. The determination of the most appropriate manufacturing process also depends on the availability and quality of the idle labor and equipment. In such a company, it is inevitable to move away from the optimal solution if the inventory problems are examined without considering the effects of changes in the production level. Because a solution that minimizes inventory costs can lead to very high cost production fluctuations (Wong, 1994). Here, a solution that minimizes all relevant costs should be determined. In an approach that aims to address a problem as an independent whole, it is always possible for an negligible relationship or a factor that is not taken into account to have a significant weight on the final outcome. Therefore, the application of the system approach in production provides managing the sub-systems together and establishing the correct and understandable information flow (Wild, 2002).

The necessity of manufacturing information systems is increasing with the idea that production is understood not only as a series of manufacturing processes in a factory, but also as energy, information and material conversion activities of all enterprises producing goods and services. In this regard, materials, parts, cards or forms and customers are inputs. These inputs are transformed through a series of processes. These processes can be of different specificatins such as mechanical processing, chemical analysis, assembly, surveillance and inspection, receiving, sending, filling out forms. The outputs of the system are completed parts, products, chemical compositions, completed processes, completed forms etc. It also includes information and control and decision making subsystem (Yin, & Zhang, 1996). The production system draws attention to the basic elements of production information systems, which express control and decision making with information flow.

Operations system, while organizational structure differs from business to business, is depending on the nature of the produced goods, management poli-

cies and external factors, and manufacturing mostly play an immersive role as a central or leading system within business systems (Wu, 2001). Some other subsystems of the company, such as procurement personnel and financing, have to provide various inputs to the manufacturing subsystem. On the other hand, the marketing subsystem also carries out activities aimed at the release, distribution and development of the outputs of the manufacturing system. There is an intense flow of information between the departments of the enterprise such as accounting, public relations and research and development, and the manufacturing subsystem (Chryssolouris, (2013). This interaction cannot be established without communication. As the manufacturing system and other business systems cannot be considered independently, the manufacturing system is evaluated together with other systems within the business upper system, while the information systems provide inter-system information sharing.

In a business, if different functions are evaluated as separate and distinct jobs, this will cause the organization to move away from optimization in general (Caramia, & Dell'Olmo, 2006). For instance, when the production manager and marketing manager want to minimize their costs independently of each other, they will encounter much higher total cost than they would have achieved if they ventured together as an integrated system. This is because the sales manager wants to reflect demand fluctuations directly to production in order to minimize inventory costs, while the production manager desires a stable level of production and machine and labor use to minimize costs, regardless of additional inventory costs. The result is a low-level optimization. If the efforts of these two managers are regulated together, a balance can be expected between the inventory costs and the costs of production fluctuations and optimization for the organization (Çelik & Şimşek, 2013). For these reasons, it is imperative that business managers and especially production managers know exactly the correct relationships between the subsystems of the business. The information needed for this requirement is fulfilled with manufacturing information systems.

2. MANUFACTURING INFORMATIONS SYSTEMS

Nowadays, the way products and services offered by businesses to their customers have changed drastically compared to the past. Today, computers, robotics and information systems structure are dominant in the field of production. Many businesses around the world know that working with knowledge is based on information systems. Because, many decisions are made through com-

puters, about how much and when to produce from which product (Gupta, 2000). Manufacturing Information Systems is an important tool that supports business decisions in this regard.

The manufacturing information system is mainly aimed at obtaining information on the physical flows of products within the enterprise. For example; it contains information on business actions such as production planning and control, inventory control and quality control. The manufacturing information system relates to internal and historical information. Such a system is useful to managers in solving problems that are important and have high solution costs, by processing high-quality information accurately and on time. Production is the area where automation is used the most in the enterprise due to the iteration of actions. Due to this automation trend, there is an increasing dependence between production, strategy, rules and methods, and software - hardware database and communication (Boggs, 1990). Changes in production strategies, rules and methods, also requires changes in software - hardware database and communication.

Manufacturing systems cover all the processes necessary to produce products or services. In order to fulfill these functions, the system determines the production area, plans the layout and creates the production plan (Matsui, & Sato, 2001). The manufacturing system must obtain the necessary raw materials, parts and sub-assemblies to produce the product or service determined in the production area and allocate the necessary workforce. In order to realize the right amount of product at the right time in order to fulfill the orders, it has to get these resources on the production schedule in the most appropriate way. In addition, while the production process continues, the system must monitor resource usage and cost (Boggs, 1990). The manufacturing information system manages all these operations on virtual area.

Manufacturing information system contains operational functions such as; operation process functions (workflows, technology, tracking orders, warehouse and warehouse information, etc.), production, control and reporting functions (production control, cost control, input control etc.), non-structural production planning functions (input supply, planning, production, maintenance, transportation and storage), structural production planning functions (location selection, capacity determination, technology selection, structural production resources, long-term demand forecasts) (Gupta, 2000).

The production plan, orders and sales estimates determine the main production schedule. The main production schedule forms the approximate production capacity plan. In addition, the main production schedule creates an approximate workforce plan in coordination with the human resources information system. The information from the goods acceptance information system supports the material inventory information system. The main production schedule creates the material requirement plan interactively with the material inventory information system. The cost accounting information system provides information flow in order to make the approximate workforce capacity plan, approximate production capacity plan and material requirement plan capacity requirement plan. Information from capacity requirement plan, cost accounting information system, purchasing information system and quality control information system are used in the management of production processes. Semi-finished and finished inventory information is obtained from the production processes. Inventory information also supports the material requirement plan. The material requirement plan is linked to the purchasing information system. The customer dimension of the system is supported by market research data and customer service data. The product design and development information system receive support from customer data. The product design and development information system determine the product trees. Bill of materials interact with the material requirement plan again and forwarded to the purchasing information system when necessary.

The activities that the operations management can do, depend on the possibilities of the customer, supplier, purchasing, quality control, human resources and accounting information system. The appropriateness and effective functioning of information systems play a crucial important role in increasing the success of production management. Figure 2 shows the evolution of information technologies (Kling, et al., 1992). This evolution supports the formation of information that can be used at different levels of management according to the complexity of production management at various stages.

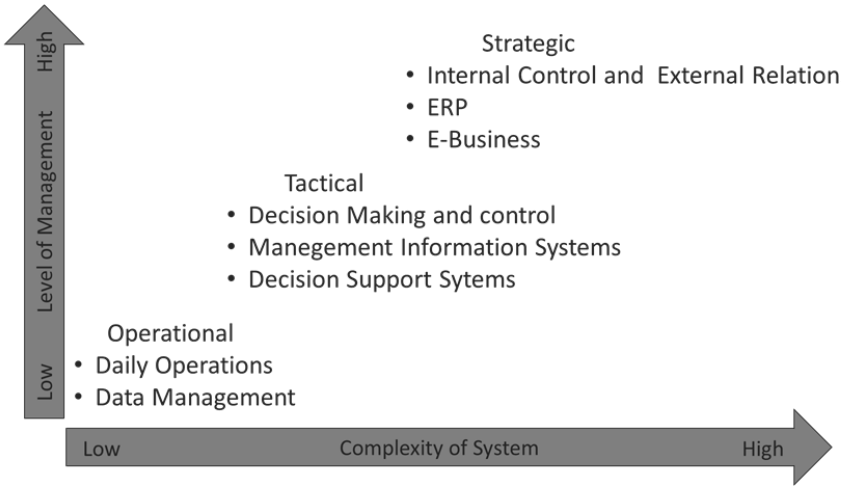

Figure 2. Evolution of Information Technologies

Ref: edited by author

Manufacturing information system is an information system that support production management functions and production systems in various management levels in operational, tactical and strategic terms (Boggs, 1990). From this point on, manufacturing information systems are examined in operational, tactical and strategic decision structures within the enterprise.

2.1. Operational Manufacturing Information Systems

Manufacturing information systems support decisions regarding the planning, assignment and operation of production factors. At the operational level, manufacturing information systems provide the necessary information to manage production functions such as purchasing, inventory control, quality control, computer-aided design and manufacturing (Boggs, 1990; Schultheis & Summer, 1997).

- Purchasing; In order to produce the product, the company must have sufficient raw material and supplier information. In addition, there are targets such as reaching suppliers and raw materials at the lowest cost and at the most convenient time. The purchasing system maintains the raw material prices and supplier information for each supplier in order to make the best selection among the suppliers in the supplier database. It also keeps undelivered order information. In this way, it keeps track of inventory information, order and transportation information.

- Quality control; It gives information about the process of the product from the raw material level to the semi-finished and finished products. The quality control system monitors the compliance of the supplied raw materials with the desired specifications and the product quality in the manufacturing process. The quality control system draws the required data from the information collection systems inside the manufacturing.
- Process; Employees enter data that provides the amount of product and working time to the in-production data collection terminals. In-production collection data may operate depending on the local area network within the enterprise. It is used in robots in the local network of production in production, programmable controllers that control the process processes, various systems that monitor the produced product, barcode readers that determine and regulate the production quantity and various data collection.
- Product Development and Design; It uses the data provided by the quality control systems to determine the specifications of the products under design. This information for purchasing system is used to determine the appropriate properties of raw materials and suitable suppliers.
- Inventory control; Control and management of raw materials, manufacturing semi-finished products is one of the most important parts of manufacturing information systems. Management and control of these stock items will bring significant profits to the business. The inventory control system uses information from operational level systems such as goods acceptance, purchasing and order entry.
- Computer Aided Design and Production; These are computer programs developed to design new products for product engineers and enable the development of old products. These products have simulation features that enable the selection of materials to be used in the designed product plans and enable various experiments on the product. Computer-aided production programs turn the drawings created with the special machines they use and design programs into products.

2.2. Tactical Manufacturing Information Systems

Tactical manufacturing information systems are systems that collect and report the information required for the control and management of production resources. Material Requirements Planning (MRP), just-in-time production

(JIT) systems, Manufacturing Resource Planning (MRPII), production scheduling systems are manufacturing information systems that support tactically semi-structured production decisions (Boggs, 1990; Schultheis and Summer, 1997).

- Material Requirements Planning (MRP); In the planning process, the MRP system assigns the amount of inventory available to gross needs and verifies the timing of the opened orders that are taken into consideration and the net needs. In order to meet the net needs, the system prepares a plan with a schedule for each stock unit. This chart includes both the orders to be placed immediately and the orders that are planned to be placed on the dates determined in the future. It contains all the parts and materials needed for the realization of the master production plan and information on meeting these needs.
- Manufacturing Resource Planning (MRPII); Manufacturing Resource Planning has been developed by making various additions to MRP system to improve system usage over time. MRP II supports the manufacturing information system with other business functions such as finance, marketing and human resources.

2.3. Strategic Manufacturing Information Systems

Manufacturing Information Systems at the strategic level are used to support the production decisions of senior management. These decisions require large amounts of capital and long-term planning (Boggs, 1990; Schultheis & Summer, 1997).

- Location Planning and Selection; External data sources such as the number of trained and experienced staff, transportation costs of raw materials and finished products, land cost, raw material suppliers and proximity to customers, and energy availability can be used in location planning. In addition, the outputs of other tactical and operational manufacturing information systems can be used in addition to the human resources information system, finance and accounting information system.
- Technology Planning and Selection; Access to new production technologies allows senior management to make good decisions about which technologies are used in product or service production. Technology assesment systems can evaluate new technologies in many areas for strategic purposes.

- Process Positioning; It is the decision to make certain manufacturing processes to be realized by using the resources. The degree of process positioning structure in the enterprise requires internal and external knowledge. This structure is realized with a good information system infrastructure.
- Facility Planning; The facility planning system needs a wide variety of information about the proposed factory. This information includes engineering information of the proposed factory, machinery technologies, personnel transportation systems, water and energy systems.

3. SMART MANUFACTURING SYSTEMS

Businesses that understand that they cannot go any further with their traditional efficiency enhancement strategies and that they should turn to technological investments in order not to lose their competitive power, are turning to solutions aiming to integrate the entire production and value chain with digital systems from the supplier to the end consumer. Smart manufacturing comes first among these solutions. Smart manufacturing is called network-based data and information integration, which provides real-time information flow in a production and supply chain, can establish logical cause and effect relationships, can be used as a planning and management tool (Knapčíková & Balog, 2019). Smart manufacturing provides ease of analysis, modeling and simulation of sensor-based data in real time. Throughout the design, engineering, planning and production lifecycle, all this data is always available and in the most appropriate form (Choi & Kim, 2002). The development of manufacturing information systems for many years has been achieved by processing the data collected from the production site and interacting with the information systems in other operating subsystems. Nowadays, production systems are explained as smart systems at the point that information technologies reach. Smart manufacturing systems are production tracking and management systems that make it easy for you to monitor production machines and production plans instantly. Data collected from machines, products and product components instantly through sensors provides continuous information flow to smart manufacturing information systems (Saenz de Ugarte, et al., 2009). This flow of information is explained by a hierarchy from the production area to the business dimension. Figure 4 shows the plc & scada-mes-erp hierarchy.

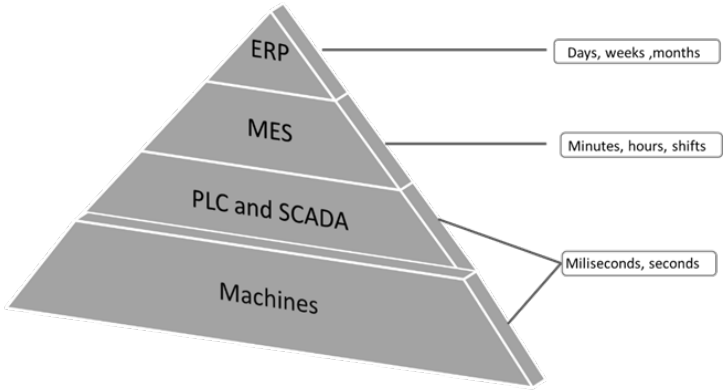

Figure 4. Information Flow Hierarchy in Smart Manufacturig Systems

Ref. Tj Industrial Solutions (2020)

- At the Shoopflor level, PLC (Programmable Logical Controller) is an automation device used in the control of processes such as production departments in factories or control of machines. SCADA monitors and operates data collection processes from machines and tools used in production. It enables the input and output units in the system to be controlled with PLC devices. Data is collected from machines using these systems every second or even in milliseconds. These systems allow planning work orders, following production according to pre-defined production routes, as well as controlling material movements and making production control more effective. PLC and SCADA are supplements for management systems and production control. It offers comprehensive solutions for data collection and process control. Because the collected data is used for checking the factory structure and equipment at the analysis stage, determining all the infrastructures for the data communication to be applied at the design stage, at the same time listing the equipment to be installed, finally establishing the whole network structure and starting monitoring (Boucher & Yalçın, 2010).
- MES (Manufacturing Execution Systems) is a structure formed by information technology systems that support the basic manufacturing process in a production facility. These applications fill the gap between ERP systems and PLC & SCADA systems. MES systems that collect information and control real-time production to increase production performance are one of the most important tools of manufacturing

information systems (Lucke, et al., 2008). MES serves to manage and observe the work being done at the manufacturing site. Facility managers and production personnel manage the common strategy using information from the supplier, production site, quality laboratory, inventory site and ERP (Enterprise Resource Planning) systems with MES applications (Kletti, 2007).

- ERP (Enterprise Resource Planning) is an integrated management system that adopts the principle of ensuring the efficient use of resources such as workforce, machinery, and materials required for the production of goods and services in enterprises. It enables the management of an integrated structure with all the business processes such as accounting, inventory, warehouse, sales, purchasing, import, export, technical service, production, maintenance-repair and quality (Grabot, et al., 2008).

In this hierarchy, the complete and accurate transmission of information makes management of production functions intelligent. The right decisions made with instant data provide an effective management. As a tool that provides regular data flow, these systems have a structure that can support operations such as quality and maintenance from master data management.

- Central data and management; Central management of corporate master data in horizontal and vertical integration, ensuring its accuracy from a single center.
- Order Acceptance; In order fulfillment, customer orders are evaluated based on conditions, acceptance, rejection, special conditions are taken into consideration.
- Order Management; Monitoring the status of customer orders during the production stages. Creation of status information such as rough order, detail plan, production order created, operational stages, completed, ready for dispatch, dispatch.
- Requirement Planning; Determination of material needs of different levels (such as raw materials, semi-finished products) in order to meet the order.
- Order Fulfillment and Time Calculation; Determination of the most appropriate production date based on workflow and capacity utilization.
- Capacity Requirements Planning; Determination of usable capacity control and capacity utilization needs in order fulfillment.

- Availability Control of Production Resources and Tools; Checking the suitability of production resources and tools to meet the order.
- Order Publishing; Publishing the work order in different statuses (planned, strictly planned, sent to production) as a result of the final order confirmation.
- Replacement; Sort of work orders according to their characteristic features (priority, setup,…).
- Business Center Planning; Planning and scheduling of related operations on a work order basis.
- Workforce Planning; Planning of the workforce based on conditions (single, multiple, cost, competence etc.).
- Transfer, Transport Planning and Control; Planning and controlling inventory transfer movements (such as picking, pulling).
- Creating Work Order Documents; Creation of work order related documents (such as instructions, drawings, quality procedures).
- Production Data Collection; Collection of production data (such as start, finish, stop).
- Machine Data Collection; Collection of machine data (such as speed, temperature).
- Collecting Employee Time Information; Collection of employee time information (operator identification, active work, etc.).
- Production Order; Displaying production orders (status information, before / after operations, consumption, productions).
- Production Control (reporting, statistics); Production data analysis and reporting.
- Maintenance Management; Analytical applications for maintenance inventory tracking, planning, creation of work orders, approval, procedures, data analysis and reporting, predictive maintenance.
- Quality management; Quality features, templates, quality work orders, approval, data analysis.
- Document Management; Access to all documents related to operations, providing control.
- Traceability; Tracking and backtracking of the product using lot / lot / serial number.

Smart manufacturing systems are associated with all production processes and detailed with other operatinal subsystems information systems infrastructure. This is an interaction, a fully integrated and collaborative system that responds in real time to meet the changing demands and conditions in the factory, supply network and customer needs.

CONCLUSION

Manufacturing information systems have an important place in modern management systems. First of all, these systems that make any time of production become traceable, whether medium-sized enterprises or large production facilities, production information is at the center of businesses. This place becomes even more important in decision making situations where management is based on information and data. However, how healthy this system works, how efficient it is and how traceable it depends on usage. Manufacturing information systems, which prepare the ground for decision making in the works carried out at operational, tactical and strategic levels, act as a kind of consultancy center for businesses according to the scope of its use.

With the manufacturing information system, many questions such as production amount, waste rate, production plan, capacity utilization are answered. The manufacturing information system answers all these questions with instant data and enables to easily manage the entire production process. With the manufacturing information system, every stage of production can be easily monitored and managed. Smart manufacturing systems have also been developed in this context. Smart manufacturing systems are production monitoring and management systems that make it easy for you to monitor production machines and production plans instantly, and the data collected instantly from sensors, products and product components through sensors provides continuous information flow to smart manufacturing information systems. Thanks to these instant data, more accurate decisions are made, and sudden interventions are applied without delay.

The development of manufacturing information systems will continue to progress in line with the developments in information technologies. With these improvements, forecasting and managing skills will be developed for businesses and optimum decisions will be made. The existence of production information systems will continue as long as businesses are alive. Therefore, along with the developments experienced, there will be titles to be researched in this field.

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CHAPTER 12

EFFECTS OF THE KNOWLEDGE ECONOMY ON THE LABOR MARKET

Semih Serkant Aktuğ

INTRODUCTION

Knowledge Economy has emerged by explosion in computer sales, software development, internet, telecommunications, and multimedia in developed countries by the rapid growth in the World Economy. The knowledge economy has spread all over the world in a short time and affected socioeconomic life. The most important effect of the knowledge economy has been experienced in production and working life. The traditional industry sector collapsed and knowledge-based production came to the fore. It is not only the dizzying speed in the production of these products but also the conventional production in developed countries. Services and its use in services have become widespread.

The development of the profession does not have the technology business and discredited the generations of the popular notion that has become the line. In this process, new technology either eliminated workers who performed their professions or made them unskilled. With new technology, companies are now able to produce more output by employing fewer workers. From this perspective, it is possible to say that a new type of worker and a current labor market have emerged. New technologies have made it possible to produce cheaper compared to past; producing by lower prices and increasing the real income of consumers are also possible. In return, the demand and export potential of these and other products which expanded the demand increased.

Technological changes have had an impact on employment and qualification at different levels. They are as follow: an individual in the workplace pin roses; in full production in the workplace; the company (in other workplaces, consists of lyre); the industry are in production and the economic zone econo-

my. Single no-logical innovations can reduce employment and individual qualifications in the business, and sometimes even in the company. However, these innovations play different roles based on industry, sector, economy, and region.

1. CONCEPT OF THE KNOWLEDGE ECONOMY

In the last two decades, technological, economic, social, and cultural developments have been observed worldwide. These developments brought with it a new economic development. This new development is called the Knowledge Economy.

Since information and knowledge economy has a very complicated structure, it is used in different contexts and meanings. This complexity is not only for knowledge; technology that provides the transmission of knowledge is seen as a factor that characterizes the knowledge economy. Strategical position of the internet in the knowledge economy has become popular today. (Powell & Snellman, 2004: 199).

There is currently no definitive definition of information economy work available based on these developments. It is stated that the information economy assessed until the Second Industrial Revolution, which was the golden age in production and efficiency thanks to the innovations that took place between 1830 and 1900, and also thanks to the innovations in the industries such as electricity, motor, air transportation, film, radio, chemicals, pharmaceuticals and the like. There is indistinctness (Brinkley, 2006: 19).

However, with the advances in information, communication and data processing technologies, it seems that almost the carrying of business life to the top of the computers and the widespread use of the internet are the basic building blocks of the new economy together with the increasingly important human capital (Drahos & Braithwaite, 2002: 32).

Since information is a human-related concept, the knowledge economy expressed in the form of "activity that deals with the application of scientific, systematic and organized knowledge of human beings to production, consumption and sharing" (Drahos & Braithwaite, 2002: 32).

The knowledge economy concept is often used to cite companies that are associated with internet and communication technology. Besides, mining, manufacturing and transport as a conventional so-called 'gun so traditional economy' companies, as opposed to a concept or industry worshipers moment, be used (Rooney, Hearn & Ninan, 2005: 25).

The concept of the knowledge economy was first used by Machlup. Machlup used this term to describe a new sector that hidden within three classic sectors. However, knowledge economy concept became popular, especially after taking part in Drucker's "Age of Discontinuity". Along with the vital emphasis on technological development in the transition to a knowledge-based economy, the process of transition to globalization and knowledge economy is in mutual interaction. In this process, economies increasingly integrated into the world economy, with goods, services, investment, people and ideas moving easily internationally. Thus, this process increases the areas of new competition and cooperation among the firms and encourages the spread of new ideas and technologies (Rooney, Hearn & Ninan, 2005: 25).

In the evaluations about the information age and information society, in general, periods that contain certain features throughout the historical process defined by waves. These periods are 'early mechanization' between 1770-1830, 1830-1880 'steam power or railways', 1880-1940 'electric and heavy industry' and 1940-1980 'mass-production' periods. This period we live in is called the information society (Külcü, 2018: 41).

1.1. Features of the Knowledge Economy

The industrial economy replaced by the information economy in the server of developments in information and communication technologies,. The knowledge economy covers the processes of obtaining, processing and transforming the information, as well as its distribution at the same time. The most important feature of the information society is the developments arising from the process of collecting, organizing and disseminating the information. Determines the information society, said the basic essentials like in the following manner as a general class could be stratified into (Cooke & De Laurentis, 2010).

- Transformation in the economic structure: One of the most important features of the information society is the trend from industry and commodity production to service production. In this framework, education, health, social services etc. in the information society. As well as individual-oriented services such as a computer, system analysis, scientific R&D, professions and services have gained intensity.
- Rising new class: In the new society, not only the workplaces where individuals work but also the type of jobs they do (business lines) have changed. Therefore, the social and professional class has increased in

the information society. The proportion of employees also shifted in favor of emerging professions. In this context, scientists, engineers, technicians and teachers qualified as information workers have increased in number. These are some of the most important powers and prestigious elements of society. As a result, the power and prestige in society passed to the class that controlled and managed knowledge.

- The increasing role of knowledge: The new society focuses on knowledge and the knowledge also constitutes the main axis of society. Therefore, information has become a strategic resource in the information society.
- Information and communication technologies: Information and communication technologies require a more skilled workforce. The concept of information society also means economic and social changes caused by new technologies.

2. EFFECTS OF THE KNOWLEDGE ECONOMY ON LABOR MARKETS

2.1. Technology and Employment Relationship

The effects of technological development on employment have been a subject of debate for a long time. The issue is addressed within the framework of the impact of process and product innovations, and whether the skill deviation of technology at sector and industry and macro levels is addressed, in other words, from the point of complementarity or substitution effect. These discussions are at both theoretical and empirical levels. Discussions in many countries, notably the USA, have focused on the effect of technological change on skill requirement. (Sheehan & Tegart, 1998: 74; Kelleci, 2003: 21).

However, with the advances in information, communication and data processing technologies, almost the working life is completely on the ground of computers and the widespread use of the internet, together with the increasingly important human capital, are the cornerstones of the knowledge economy (Sheehan & Tegart, 1998: 74; Kelleci, 2003: 21).

The international capital in the origin of countries with advanced technology products reduces the cost of the labor-intensive manufacturing and the production processes by using cheap and unprotected labor in these countries

through increasing foreign investments in the manufacturing industry (Powell & Snellman, 2004: 216).

The concept of technology can be defined as technical innovations that will take expertise and knowledge in any field one step further. Technological developments in information and communication technology and flexible working styles brought along by these developments have deeply affected the labor market (Acs, de Groot & Nijkamp, 2013).

The labor market, which emerged with the knowledge economy, differs considerably from the traditional labor market. The developments in this process, and especially those related to the labor market, have brought several opportunities and greater harmony to many countries. The most affected by this adaptation process are the unskilled, the poor, the children and the women. On the other hand, due to the cheap transfer of information on the internet, it has become widespread to perform job and employment activities over the web. Ease of communication on the internet offers members the service of transmitting their messages and the information they want to a wide audience over the internet (Acs, de Groot & Nijkamp, 2013; Kelleci, 2003: 22).

Another problem that is important for the labor market is that workers who have experience in sectors where technological and organizational changes are fast face aging in their qualifications. Even old workers with high human capital may fall to lower levels than the old skill levels due to aging skills (Webster, 199: 213).

It can be said that the impact of new technological developments on employment is twofold. In other words, technological change can reveal new jobs and eliminate some of them. There is a large literature on the fact that technological development deviates in favor of a highly skilled workforce, in contrast, the status of low skilled workforce deteriorates in this process (Webster, 199: 213).

As a result of technological developments, not only the low skilled workforce but also some highly skilled workers can be negatively affected by the incompatibilities between the skills they have and the skills gaining importance in this process (Webster, 199: 213).

Recently, discussions in various countries have focused on the effects of technological change on skill requirements. Undoubtedly, trans-industrial transformation and globalization also accelerate the interaction of these factors affecting employment. In most parts of the world, there has been an increase in unemployment rates and a decrease in employment since the last quarter of the 20th

century. Many developed countries around the world have faced problems such as continuous and high unemployment, low wages and inability to create employment for an unqualified workforce (Webster, 1999: 213; Kelleci, 2003: 30).

2.2. New Ways of Working in the Knowledge Economy

As an inevitable result of technological development, with the transition from labor-intensive technology to capital-intensive technology, machines have been replaced by workers on the one hand, while the qualitative light of the working worker also changes. The structural change led by micro-technology in both the world economy and national economies increases the demand for highly skilled employees in the business world (Loo, 2016: 39).

The labor market is also undergoing a structural change. Continuous developments in technology, using machines instead of arm power, replacing computers instead of brainpower, fundamentally change the production or life standards of the world as well as consumption or living standards. As technological developments prepare the infrastructure for globalization, organizational relations intensify as new technological nail polishes require both the physical and intellectual participation of employees (Loo, 2016: 39).

With the effect of new technological developments and changes in the production model, traditional working styles have changed and flexible working styles such as part-time work, job sharing, flexible time working, telework, on-call, work at home have started to gain weight in the economic structure. Technology has changed people’s business life, as it affects people's lifestyles (Clarke, 2001: 44; Aktuğ & Kiracı, 2014: 19).

Especially the technological changes that took place after 1970 and the developments in IT, which gained speed in the 1990s, brought many new issues to the agenda in working relations. Technology is a multidimensional concept that includes production techniques, computers, and information technology. The effects of technology on the current outlook of working life occur simultaneously and in coordination with the effects of globalization and neoliberal economic policies. The most obvious aspect of the change is the shifting of employment from the industrial sector to the service sector, and the creation of a production structure where the clarity of intellectual labor is felt more (Clarke, 2001: 44; Kelleci, 2003: 34).

The expression of a typical employment types is used to refer to various forms of work such as part-time work, temporary work, borrowed employment

relationship, telework and subcontractor practices. Various types of atypical contracts are applied together or intertwined in many cases. It is observed that an increasingly different kind of caste system is being formed within the companies, and a "peripheral" workforce is increasingly being utilized around a "core" workforce (Clarke, 2001: 44).

Technology; the transformation of this process, as it is a concept that expresses the way the workforce is organized around the means of production; as a result of the differentiation in production technology and technical division of labor. It means that the workforce's relationship with the production tools, with each other and those controlling the production tools changes (Rooney, 2005: 405).

Countries have tried to adapt to supply and demand shocks with the flexibility of the labor market. A labor market capables of responding to demand and supply shocks by providing flexibility in working hours has also been important for countries to achieve stability from economic pain. For this reason, in many countries, the state has encouraged flexibility with legal regulations that will provide freedom for workers and employers in working life. It has ensured that the rules governing labor force legislation are harmonized with the functioning of the goods and services market (Brodsky, 1994: 57).

Flexibility can be defined as the softening of working rules in terms of working time, employment patterns, production systems. The concept of flexibility means stretching and softening strict fordist regulations and standardization in employment volumes and shapes, quality of the product, labor markets, business practices, technology and organization. There are important developments in this new way of working in the world. For example, the number of teleworkers in the European Union was around 9 million in 2009. The same figure is 16 million for the USA and the shares in total employment for both country groups are 6 percent and 13 percent respectively (Sala, Silva, & Toledo, 2012).

Flexibility has affected both skilled and unskilled workers. However, even the US companies that maintain the "permanent" central workforce are making small but rapidly growing subcontracts in their centers for use in technical and professional jobs. In addition to their core business, many professionals are consulting part-time or full-time to increase their income and bargaining power (Sala, Silva, & Toledo, 2012).

Types of telework can be seen below (Kelleci, 2003: 35):

a. Part-time or full-time telework at home.

b. Telework in telecenters. These are the employees that are far from the headquarters but connected to it.
c. Work partly at home, partly at the office.
d. Mobile work.

2.3. New Employees Class in the Knowledge Economy: Knowledge Workers

The striking dimension of the transition to the information society with the globalization and the technological developments that form the basis of this process reveals different results in terms of low and highly skilled workforce.

Using the brains of all employees should be seen as the only strategy that is not used to classical management and economics but is the creator of wealth today. In this respect, creativity is the most important element of the business world today. In this sense, it is possible to talk about three types of creativity. These are; creativity in technology, product planning and marketing. In the business world, the deficiency of one of them should be perceived as defeat (Brodeur & Dupont, 2006).

The new jobs demand qualifications that the blue-collar worker does not possess and is less equipped to achieve. New jobs significantly necessitate formal education and the ability to obtain and apply theoretical, analytical information. Blue-collar workers represented the majority of those working in industrialized countries until the midst of 1950s. After the 1980s, the number of blue-collar people decreased very rapidly (Brodeur & Dupont, 2006).

It is expected that they will fall to a 20% share among the total employees in the coming period. Meanwhile, the number of information workers has been on the rise. In the information society, businesses want to hold information and make use of information technologies as much as possible to gain an advantage over their competitors. At this point, public relations departments have important duties in both obtaining and using information. In the information age, businesses have to give importance to public relations, whose task is to increase the institution's reputation to bring qualified workforce to the institution (Brodeur & Dupont, 2006).

ILO defines freelancer and intellectual workers who develop mains network and work very fast among the jobs by organizing agreements as 'careful, changeable and confident'. For determinations, this job choice was preferred due to be-

ing more employable in the labor market and more successful in opportunities to access job opportunities. Under these conditions, reputation becomes the rule of being able to be employed (Andrees & Van der Linden, 2005: 61).

Good level of computer skills, software, basic education - mathematics, reading and writing skills - at least one foreign language, various administrative knowledge - analytical thinking, problem-solving, good speaking and understanding, etc., leadership, aptitude for teamwork, the ability to produce new ideas, adaptability, having different specialties together and technical information that vary according to the profession are among the qualifications expected from the knowledge worker (Scott, 2005; Kelleci, 2003: 40).

2.4. The Knowledge Economy and Labor Mobility

In the process of transition to the knowledge economy, workforce mobility becomes important as a means of knowledge transfer. Also, increasing mobility is one of the policies that countries encourage to overcome human capital deficiencies (Kaiser, Kongsted & Rønde, 2015: 91).

Mobility is important for technology transfer for those working in the field of science and technology among various industries, companies and countries. People who work in these fields express their own coded and hidden information to their new society and organizations. (Kaiser, Kongsted & Rønde, 2015: 91).

On the other hand, mobility benefits not only to companies but also to researchers in terms of improving their human capital and access to research networks.

It is a generally accepted view that labor mobility is an important source of information externality. The technical staff in R&D companies, for example, paid the work accrued at work by paying low wages at the beginning of their careers, at least to some extent, because of the potential externalities resulting from labor mobility, at least to some extent in the labor market (Kaiser, Kongsted & Rønde, 2015: 93).

On the other hand, a critical objection of excessive mobility can be highlighted. According to this, academia syens may have to devote less time to teaching eye and basic research as their mobility increases due to various projects.

Mobility can be affected by social, cultural and cultivation (for example, the attractiveness of some regions), and political events or family status.

As a tool of knowledge transfer, alternative methods have emerged in parallel with physical labor mobility and rapid development in ICT. Some of these are temporary staff change and internal mobility of staff, virtual firms and network organizations, buyer-seller relations, R&D collaborations. Cooperation mechanisms between networks and companies can be complementary to physical mobility or alternative to it (Kaiser, Kongsted & Rønde, 2015: 97; Kelleci, 2003: 49).

2.5. The Effect of the Knowledge Economy on Trade Union Movement

With the advent of the knowledge economy, unions are the leading institutions that are most affected by this process. The organizational strategies, collective bargaining practices, and relations with members of the union networks have changed.

The trade union movements that emerged, developed and expanded within the framework of the industrial society seemed to have shifted suddenly when faced with the information society in the 21st century, or the changing social structure forced and transformed trade union movements like other institutions. Because there now are irrevocable changes in the social structure. It is not possible to think that trade union activities should be excluded from this change since they have their share in the economic structure. In this context, unionists are now required to draw a new roadmap for union organizing activities within the framework of the 21st-century information society (Bryson, Ebbinghaus & Visser, 2011: 99; Kelleci, 2003: 51).

Unions have to develop new organizational methods and tools for telework to meet the needs of their members and to update their current working styles (Huws, 2008: 2).

There also are important results in terms of appendix unionism approaches in the process of transition to the knowledge economy. Unions, which can be organized in traditionally vertically organized companies, have difficulties in the new situation, as firms switch to the horizontal organization and/or have both their primary production and non- essential production done to subcontractors (Bryson, Ebbinghaus & Visser, 2011: 99).

On the other hand, in the information economy, it is important for unions to take advantage of these technologies in the process of spreading the ICT, to struggle

for new types of work, such as telework, and for self-employment to enter into legislation and to provide skills training to employees (Kelleci, 2003: 52).

Another aspect of technological developments in terms of employment is that it reduces the role and importance of unions in workplaces. These huge advances in technology have brought the need for labor to decrease. The need for quality, labor, and unemployment has increased by the introduction of machines that save labor into the business process (Huws, 2008: 2).

As a result of these technological developments, the increase in the quality of the work and the worker brought negative problems for the union movement. As the quality of the employees increases with the acquisition of information, they shift from the business sector to the service sector. And so the boundary between blue-collar and white-collar workers, rulers and rulers becomes obscure. As a result, the professions that emerge as a result of technological developments have highly variable qualities, and therefore, employees find it difficult to meet in common interests and act collectively (Forrester, 2004; Kelleci, 2003: 52).

The unions' main objectives are to increase this organization and participation and encourage the "organizational culture" to shift resources in this direction to ensure the participation of new members instead of serving existing members (Forrester, 2004).

CONCLUSION

The knowledge economy that has emerged in the last two decades has led to radical changes in business life. The most important of these changes is the emergence of a new labor market based on the knowledge economy. The labor market based on the information e-economy differs considerably from the classical labor markets. The most important feature of this market is that it makes maximum use of information technologies at every stage.

Two important changes occur during periods of economic change. The first of these is that the new technology has filled the place of the workers and caused a decrease in the demand for the workforce. The second is that the new technology renders most jobs unskilled, leads to low wages, and the working women and men are separated. These beliefs stem from short-term observations of the behavior of a single company or the impact of innovations needed in some production processes. If a company has started using new technology, it will provide cost advantages or product innovations that will allow it to grow.

Most new technologies save labor in agriculture, manufacturing and services; In the short term, companies often reduce their workforce, although they provide more output. From this perspective, it can be said that the new technology reduces employment. Many technological innovations are reducing not only the unskilled workforce but also the work structure based on high-skilled and full-paid workers.

For example, early automobile production used skilled cycling workers. Many analyzes of the information economy have shown that growth in employment is primarily concentrated in the services sector, unreliable and low pay continues outside of a small portion of the population with an increase in salaries to the extent that they contribute to the growth of production.

The social consequences of the new economy model can be stated as the decline of production in many business lines and as a result of the growth of income inequality. Discussions about the new economy around the world; focused on the internet usage of individuals and companies in general. However, to explain the results of the new economy within certain boundaries, it is necessary to examine closely the investment and development activities that increase labor, both inside and outside.

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3rd CATEGORY: KNOWLEDGE MANAGEMENT

CHAPTER 13

ORGANIZATIONAL INNOVATION IN THE CONTEXT OF KNOWLEDGE MANAGEMENT

V. Lale Tüzüner

INTRODUCTION

The main objective chapter is to determine the relationship between strategic human resource management practices and innovation management, under the umbrella of knowledge management. Knowledge management (KM) is a broad concept and has been discussed from various perspectives. In this chapter, KM is considered from the "human" perspective, that employees with their distinct capabilities can create a strategic advantage to their companies. So, the knowledge, skills, abilities, and expertise they bring to companies increases the potential to make innovation.

With the spreading of globalization and lately digitalization all institutions both public or private, companies and non-governmental organizations are struggling for achieving competitive advantage through their employees, services/products. This strong struggle can be defeated with the knowledge of the employees, where they use their creativity, knowledge-based decisions, and analysis. There is a difference between the "old company school" and "the new company school", wherein the former mostly employees' physical efforts are valued, whereas in the latter "knowledge" takes the dominance. In other words, within "old school" times physical efforts were the companies' capital. With the evolution of information age, "intelligence" became the competitive advantage where employees with their distinct capabilities lead companies to produce niche products or services. These people are called "knowledge employees". Especially with the increasing number of worldwide economic turbulences which lead many countries to offshore their activities toward other countries, resulted in companies focusing on their core competencies. The shift from the manufacturing sector to the service sector which eventually directed to the in-

crease of service sector jobs, another reason derives from the increasing use of technology, where only people with specific capabilities or knowledge can use it effectively.

Today's organizations are enriched with knowledge. The valuable and differentiating knowledge either is created within the company or bought. Nevertheless, knowledge should be shared and used in order to create "new knowledge". "New knowledge" created within the firm may bring innovation to different parts of the company. Innovation is an outcome of human capital' organizational expertise, in turn, to create new products or services. In order to increase the level of organizational innovation human capital input like knowledge, expertise, attitudes are highly needed.

Knowledge and innovation can be fostered with strategic human resource practices (SHR practices). The ultimate objective of companies is to increase organizational performance. One of the ways of increasing organizational performance is to invest in human capital. Human capital is the collective value of the capabilities, knowledge, skills, life experiences, and motivation of an organizational workforce. That human capital creates a competitive advantage to the companies with their specific knowledge, expertise, and competencies. One of the strategic human resource management (SHRM) approaches posits that resources that firms possess enable them to be competent enough in the market provided that the resources qualify four criteria: being rare, valuable, inimitable, and doesn't have substitutes. The one, and for sure, the most critical of these resources is the human resources, is not easily subject to imitation by competitors unlike the other resources, such as technology.

Human resource (HR) practices are the means by which companies can affect and conceive the skills, abilities, attitudes, and behavior of individuals to accomplish their work. With these particular practices, organizations can achieve their goals.

Still, there is a huge need for some practices in order to create an environment where knowledge workers work and perform effectively. Companies' investment for their employees will result in an increase in organizational performance levels. However, the link is not so direct. There is a need for various HR practices aligned with organizational strategies. The results of the Huselid and Becker's study reveals that "employee strategic focus", "HR strategic alignment" and "effective knowledge management" drive strategic implementation and eventually firm's financial performance (Becker, Huselid and Ulrich, 2001). The fit between the company strategy and HR strategy is vertical or external

alignment. The fit between HR strategies is called either horizontal or internal fit. In general, the "fit" condition shows us HR policies, principles are strategically aligned. So, from the results of the empirical studies, it is concluded that innovation is achieved in companies where HR policies are aligned with each other. So, the integration of knowledge management and HR strategic alignment increases the company's financial performance.

1. KNOWLEDGE MANAGEMENT FROM "HUMAN" PERSPECTIVE

There are a lot of discussions about what the proper definition of knowledge management is or should be. Scholars practitioners are still arguing in the field of management what is it or how should be interpreted. Thus, it leads the KM to have various definitions and the term is still ambiguous. Knowledge management definitions can be categorized "with the human factor" and "without human factor" perspectives, Just to provide what kind of perspectives are used, the following examples are presented.

Knowledge management is defined "as a range of strategies, tools, and techniques focusing on the generation, communication, integration, and exploitation of knowledge" (Torrington, Hall, Taylor and Atkinson, 2011: 353). One definition of KM "is the use of tools, techniques and strategies to retain, analyze, organize, improve and share business expertise within the company" (Slagter, 2006: 601). In this definition the emphasis is on the organization where in order to diffuse KM in companies the information technology is needed. In this definition human factor is not considered.

There are other definitions of KM focusing on creating, sharing, and using knowledge by the organizations (Martin de Holan and Phillips, 2004). Other researchers define KM as the attempt by an organization to explicitly manage and control the knowledge of its workforce (Alvesson and Karreman, 2001). Another definition of knowledge management is, "the way an organization identifies and leverages knowledge in order to be competitive" (Mathis and Jackson, 2011: 254). Among the many definitions of KM, Rastogi's is one of the enriched and takes into consideration the human factor, stating: "Knowledge management as a systematic and integrative process of coordinating organization-wide activities of acquiring, creating, storing, sharing, diffusing, developing and deploying knowledge by individuals and groups in pursuit of major organizational goals. It is the process through which organizations create and use their collective knowledge" (Rastogi, 2000: 43).

In this chapter, Rastogi's definition will be used, since this definition recognizes the importance of the human factor. Taking into consideration the "human factor" innovation (s) can be made with the support of knowledge management understanding. There is a need for people who can apply sophisticated techniques and tools to the working environment. These people are called knowledge workers. As it is mentioned above, "the shift from the production floor to clerical, technical, and professional jobs resulted in the existence of a new group named knowledge workers" (DeCenzo and Robbins, 2005: 8). One of ways to increase organizational performance is to invest to human resource development practices. From this perspective HR professional's role is to spread the knowledge or information and create an environment where knowledge is appreciated by the employees. The information technology contributes and accelerates to the spread of knowledge in organizations. The focus of human resource development is to create an environment where knowledge can spread out easily. This objective can be provided by creating an organizational culture with the belief that knowledge is critical for the organization's survival and sustainability.

1.1. The Contribution of HR to Knowledge Management from a Strategic Perspective

As the role of knowledge management is to identifying relevant and valid information and distributing it, so learning will take place. The spread of knowledge is achieved by linking people with people, by linking them with information, so that they can learn from recorded experiences (Armstrong and Taylor, 2014: 79). The purpose of KM is to capture a company's collective expertise and disseminate it to different parts of the company, where it can get the payoff. As the resource-based view emphasizes mainly the value of inner resources, knowledge is in the company and people. HR function role is to create an environment surrounded by learning culture, design the organization, formulating organizational development programs wherewith knowledge created organizational performance and competitive advantage can be achieved. Armstrong and Taylor (2014: 81) suggests some ways how the HR function can contribute to the dissemination of KM. These are:

- Developing an open culture with an emphasis on sharing knowledge.
- Promote a climate of commitment and trust.
- Counseling on the structure of organizations mainly based on teams, networks, committees.

- Better staffing policies, especially attracting knowledge employees.
- Emphasizing the use of both tacit (information in people's mind) and explicit (recorded, kept in databases, intranets…) knowledge.
- With the support of IT, creating new technology-based systems (knowledge can be kept in files).
- Take the support of top management by encouraging them to exert to exercise leadership in KM practices.

2. INNOVATION AND ORGANIZATIONAL INNOVATION

In this part, innovation and organizational innovation concepts will be differentiated based on the theoretical background.

2.1. Innovation Definition

In today's throat-cutting competitive business world, securing a one-time competitive advantage cannot be a guarantee for the company's lifetime. Hence, probably the only way to ensure sustainable competitive advantage is to think differently than the others, so is to be innovative. From another perspective today's life or the environment, the organizations are in is changing, flexible and uncertain and complex. All these components increase the need for innovation. Before introducing innovation, the differences between innovation and creativity is considered, because these two concepts overlap. Creativity is related more to "idea generation", whereas innovation is following step of implementing ideas toward better procedures, practices or products (Patterson and Zibbaras, 2017: 418). Innovation "is the process of taking a new idea and putting it into practice" (Schermerhorn, 2013: 94). Innovation, as defined by Schumpeter (1934, 1950), refers to the introduction of new products, new processes, and new sources of supply, new markets' exploitation, and new ways of organizing business (Innovation, 2015). Consistent with the above definition, Damanpour and Schneider (1996, as cited in Martins, Lopes and Barbosa, 2012), defined innovation as the adoption or creation of "new product, service, process, technology, politics, structure or administrative systems. Innovation is a process of creating new idea and converting into practicable results. Necessities cause interventions consequently companies make innovations taking tolerable risks. So innovations are result of some necessities by taking risks of finan-

cial losses or losing time and effort. Companies in this unceasing change environment need to manage innovations as well as risks at the organizational level.

2.2. Organizational Innovation

Organizational innovation (OI) can be described as necessity of change. By fostering organizational innovation companies' performance and competitiveness will increase. That is the one of the major reasons why organizational innovation is critical for business world. Organizational innovation can be defined as the implementation of new organizational methods in business practices, in organization' settings and in external relations (Organisation for Economic Co-operation and Development [OECD], 2005). Innovation, is the introduction of firms' new practices, new relations and new way of doing things within the company with the contribution of talented employees, technology and suitable environment. It is also defined as the organizational capability to renovate ideas and knowledge into new products, services, or processes continuously for the benefit of its stakeholders (Razavi and Attarnezhad, 2013). Even though there are variations among the aforementioned definitions, it is possible to capture common ideas: the notion that OI comprises process, product, and administrative dimensions.

In the related literature, it is possible to see different taxonomies of OI and one of such classifications is the 'dual-core' and 'triple-core' typology. The former includes technical and administrative innovation while the latter consists of product, process, and administrative innovation. Other distinctions of organizational innovation include radical vs. incremental, initiation vs. implementation (Subramanian and Nilakanta, 1996: 635). The innovation taxonomies, especially the 'triple-core' approach will be discussed in the following paragraphs.

Many authors (such as; Damanpour, 1991; Tan and Nasurdin, 2010) also adopt the 'triple-core' typology of organizational innovation: product, process and administrative. For instance, Jimenez and Valle (2011) have discussed the three dimensions of organizational innovation.

Product innovation is the instrument for production (Osalao, 2008) and refers to the development and new products and services. Process innovation is the extent to which an organization employs new technologies and tests new methods for doing organizational tasks (Prajogo and Ahmed, 2006). Finally, administrative innovation refers to procedures, policies, and new organizational forms. It in-

cludes changes affecting policies, resource allocation, and other factors related to the social structure of the organization (Jiménez-Jimenez, Valle and Hernandez-Espallardo, 2008). Administrative innovations constitute the introduction of a new management system, administrative process, or staff development program. An administrative innovation does not provide a new product or a new service, but it indirectly influences the introduction of new products or services or the process of producing them (Damanpour, et al., 1989: 588 as cited in Subramanian and Nilakanta, 1996: 637). Enterprise resource planning, which is developed to facilitate organizational processes, increase effectiveness, decrease costs, to save time is an example of administrative innovation.

In order to cultivate the implementation of innovation in companies there is need of suitable environment for innovation. Senior level managers acting a leaders should perpetuate "innovation culture" with business – specific practices. The culture of innovation is created and sustained if the environment, talent and process combination work effectively. The company environment should be open to new ideas, to experimentation even though some of them may fail. Talent should be supported with different training and development programs, employees should be able to act autonomously in their decisions, new idea generation and collaboration within teams should be part of the innovation culture, that will affect innovation positively. The processes can be reconsidered in a vague manner by creating new concepts and processes.

In creating innovation culture, trust and transparency are changeless variables. The innovation culture requires specific HR practices like detailed recruitment & selection, intensive training, innovation based performance systems, reward systems. HR practices are the fundamental of innovation atmosphere in order to gain competitive advantage and increase organizational performance.

3. STRATEGIC HUMAN RESOURCE MANAGEMENT

In organizations, one of the HR main roles is through the employee's specific competencies enhance organizational effectiveness. Almost thirty years ago HR strategic role in formulating and implementing value-adding people-related strategies began to discuss as one of the main contributors to increasing companies' performance level efficiently and effectively. This view gained popularity especially during the mergers and acquisitions of many firms during the

’90s. Those successful companies in the competitive environment with their human capital created a competitive advantage. These developments directed HR function to think strategically, act proactively related companies’ main issues like orienting line managers towards new mergers considering the companies and market potential.

With the increasing importance of the human capital in firms, the role of HRM becomes more visible to businesses and hence captures the attention of researchers. Nowadays, firms started to use their human resources strategically to achieve their strategic objectives, and hence the HR department is securing the position of a strategic partner in companies (Mello, 2011: 4-15; Lepak and Snell, 2002; Huselid, 1995; Dyer and Reeves, 1996).

There are some theories related to SHRM. These are:

Universalistic Approach: according to this approach, there are a series of “Best HR Practices” which increases the overall organizational performance. These practices are universal and they are the best under any condition. One of the critics on the universalistic approach, taking into consideration the differences between the various sectors, best HR practices can change accordingly (Becker and Gerhart, 1996; Delery and Doty, 1996).

Contingency Approach: seeks to match human resource practices with competitive business strategies (Stewart and Brown, 2011: 54). Thus, HR policies should be consistent with business strategies. This approach accepts business strategy as the main contingent and this is called vertical alignment or fit.

Configurational approach: The third approach, emphasize both “vertical alignment” (company strategy and HR policy), and “horizontal alignment” (fit between the HR practices) is called a configurational approach. According to this theory, a series of unique HR practices (bundle) can affect organizational performance levels. These series of unique HR practices or bundles serve to develop and implement several HR practices together so they are interrelated and therefore compliment each other (Armstrong and Taylor, 2014: 25). So the sets of HR practices that are internally consistent with each other, help the organization to create a consistent work environment (Stewart and Brown, 2011: 52).

Besides the stated above approaches, there are some general HR strategies that are related especially with the organizational innovation.

Many practices related to hiring and motivating employees cluster naturally into two bundles. One bundle is based on a control strategy, the other one is the commitment strategy. Control strategy emphasizes managerial control and tries to

streamline production processes. In other words, narrow job descriptions, formal communication channels, control-based performance evaluation systems, low employee involvement are some representative examples of this strategy. Due to the increase in technological developments, intensive competition, and with the changes in employees and customer demands the effectiveness of control-based strategies has begun to question. In the meantime, employees' knowledge and skills, from the perspective of the above-mentioned change, were not at a satisfactory level. These circumstances increased the need for commitment-based HR. The objective of the commitment-based strategy is to enrich employees' knowledge and skills in order to contribute to the organization.

High – Commitment Based Strategy: A human resource bundle that builds strong attachment to the organization and emphasizes worker empowerment (Stewart and Brown, 2011: 52). Examples of typical bundle commitment strategies are shown in Table 1.

Table 1: Examples of Commitment Strategy Practices

Practice Area	Typical Examples
Job Tasks	• Broad job responsibilities • Meaningful tasks • Rotation across a variety of tasks
Empowerment	• Inclusive decision making • High level of responsibility • Building employee confidence
Teams	• Organizing around work teams • Self-management within teams
Communication	• Two-way communication • Quality of life surveys, • Encouraging suggestions
Training	• Extensive new employee training • Formal training for everyone • Multiple job skill development
Compensation	• Pay for performance • High levels of pay • Ownership forms of pay such as stock
Staffing	• Highly selective staffing • İdentification of skilled workers • Long-term relationships with employees

Source: Stewart, G.L., Brown, K.G. (2011).

High-commitment HR practices are defined in various ways. According to one definition high-commitment, HR practices provide an environment where people become involved in the organization and identify themselves with their overall objectives. By this, they will take initiative and willingness to "put themselves out for the organization" (Wood and De Menezes, 1998: 485). As it is understood from the definition, the aim of these high-commitment HR practices is to increase employees' level of commitment to direct them to act beyond their job descriptions. In order to achieve the stated objectives, employees should know the companies' mission and objectives. Just knowing the companies' mission and vision is not adequate, but they should adopt them in their behaviors. They have to be a volunteer to act for the sake of their companies. High commitment strategy includes sets of organization-wide human resource policies and procedures that affect employee commitment and motivation (Whitener, 2001: 517). Another definition is, a series of HR practices serve to develop a talented, motivated, and strongly tied workforce, that serves the company to create a distinct competitive advantage (Kwon, Bae and Lawler, 2010). This definition is aligned with the roots of the resource-based view, In other words, employees are rare, valuable, not easy to imitate, and not easily substituted by the competitors. They include selective staffing, developmental appraisal, competitive and equitable compensation, and comprehensive training and development activities

3.1. The Characteristics of Commitment-Based HR Practices

There are some characteristics that differentiate traditional human resource management from the High- Commitment based HR practices. High- Commitment based HR practices involve recruiting employees from internal sources, assessing to fit company rather than job requirements, providing incentive systems based on team or company level, training programs and performance appraisals with long-term growth, and the development of firm-specific knowledge (Collins and Smith, 2006: 544).

Companies in a continuous changing environment, they need to be equipped with knowledge workers. Employee participation, knowledge sharing systems, commitment – based reward systems, intensive training programs are the main characteristics of commitment based HR practices (Arthur, 1994). Innovation focused companies encourage their employees to take risks, experiment with new things. Based on this infrastructure, provide job security, reward

innovative employees, in order to increase their commitment towards the organization long-term incentives schemes like profit sharing are used (Toh, Morgeson and Campion, 2008).

These companies that adopt, high- commitment-based HR practices invest heavily in their employees to have new knowledge, skills, and abilities (Thompson and Heron, 2005). Especially those companies that their HR practices support one another, in other words internally aligned, increase employee knowledge, motivation, and provide them an opportunity to show higher performance level. Companies need to develop a specific HR system tailored for knowledge employees because of their unique qualifications add high value to the companies.

Bundles of HR practices as opposed to individual HR practices has been increasingly recognized by researchers to be valuable for the company's long-term sustainability. They suggested, emphasizing multiple or interlinked practices aimed at enhancing motivation and ability would more effective than having a single HR practice (Toh et al., 2008).

3.2. Commitment-Based HR Systems and Organizational Innovation

The studies to determine the relationship between HRM and innovation dates back to around fifteen years. Within these years many empirical studies have been published (Seeck and Diehl, 2017: 913). The reasons for large discussions on these topics derives from the importance of both topics as a tool of competitive advantage. Internally aligned HR practices are an effective tool for developing a qualified workforce that in turn contribute to organizational innovation. These HR practices can be labeled as "high- involvement HR practices" or "innovation directed HR practices where their common components are that they regard the employees as a valuable source and make large investments on them.

Seeck and Diehl (2017), reviewed the articles on the impact of HRM on innovation published between 1990-2015. Their result indicates that internally aligned bundles of HR practices are linked to organizational innovation. They concluded that practices that cultivate loyalty, learning and intrinsic motivation are transferred to innovation.

Chen and Huang (2009), examined the role of KM capacity in the relationship between strategic HR practices and innovation performance in 146

Taiwanese firms. They determined that SHRM practices are positively related to SHRM practices, in turn, has a positive effect on innovation performance. Their results prove that staffing, employee participation (with the highest score), performance appraisal systems, and incentive-based compensation positively explains the company's innovation performance.

De Saa-Perez and Diaz- Diaz (2010), in their study on 157 companies in Canadian Island found that HR-related internal factors affected the innovation capability of firms. Another interesting result of the study is those companies that highly emphasizing the use of commitment based HR practices compared to those less emphasizing commitment-based HR practices they had more "process" "product" innovation (De Saa-Perez and Diaz-Diaz, 2010).

In a study conducted on 103 Turkish manufacturing companies reveals that commitment-based HR practices relate four types of innovation and innovation performance (Ceylan, 2013).

In conclusion, the studies support that, commitment- based strategies foster innovation through knowledge employees. The commitment bundle creates a climate of trust and cooperation which in turn leads to knowledge exchange and ultimately increased performance (Stewart and Brown, 2011: 54).

Employees are no longer work for a stable environment, this dynamic environment looks for employees with knowledge. That is the reason why employee participation, sharing of information, intensive training, good rewarding systems are needed in this commitment-based system.

3.3. Commitment-Based Human Resource Management Practices

This section covers the practices which constitute the commitment- based HR practices. Even though the composition of these bundles changes according to researchers, but many of them are common.

3.3.1. Flexible Job Design

Today's organizations in order to survive in a competitive environment, they have adopted flexible working patterns, by moving away from traditional ones. The traditional working patterns are characterized by too much specialization, formalization, centralized decision-making, formal and one -way communication. In such a system, employees conduct predetermined and simple jobs

set by the organization. However, in a fast-changing environment, they might have difficulties to be flexible enough to meet fluctuating demands. So, in order to overcome these difficulties, employees should be;

- part of the decision-making process in the related areas,
- use a variety of skills
- see the processes as a whole
- share business knowledge with each other (Torrington, Hall, Taylor and Atkinson, 2011).

3.3.2. Selective Staffing

Activities in HRM concerned with seeking and hiring qualified employees is called staffing (DeCenzo and Robbins, 2005: 40). Before the staffing process, there is a need to determine an organization's human resource needs in terms of number and qualifications. Based on these needs, employee recruitment and selection steps take place. Commitment-based HR practices emphasize highly the use and development of internal sources. These companies in order to recruit from internal sources invest in their current workforce (Lepak and Snell, 1999). Nevertheless, in order to take advantage of creative thinking or perspective, they recruit also from the external labor market.

Today companies refer to a variety of electronic recruitment sources like job portals, company's own web sites, social and professional sites like Facebook and Linkedin. Besides, there are corporate talent networks systems that provide information to candidates about job opportunities and careers. Innovative recruitment methods could be a useful tool to attract "innovative-minded" candidates.

3.3.3. Intensive Selection Methods

The recruitment process is followed by the selection which is the systematic process of deciding which applicant to hire. Selection is a prediction of how likely the candidates selected will be successful in their current job in their potential jobs (Lepak and Gowan, 2010: 184). There are a variety of selection methods like application forms, tests (general aptitude, ability, personality tests) assessment centers, interviews but some of them are more relevant to determine innovation capabilities. One of the most garnered attention is the Big Five approach. According to this approach, all the personality traits can be grouped under one of five dimensions: extraversion, agreeableness, conscientiousness, emotional stability, and openness to experiencer (Lepak and Gowan, 2010:

194). So, companies searching for innovative employees should take advantage to use personality tests. Many studies show that different personality traits are related to individual innovation capabilities. As an example, people showing extraverted orientation like being social, talkative, and positive, are more creative and innovative. However, agreeableness (being cooperative, good-natured gentle, cheerful) characteristic has been found negatively related to innovation. In another study, openness to experience is positively related to creativity and innovation, whereas some aspects of conscientiousness are negatively associated with creativity and innovation (Patterson and Zibbaras, 2017).

Besides personality tests, HR professionals may assess candidates' innovation capability with another effective method, which is called " Innovation Potential Indicator (IPI)". IPI actually assesses one's capability to implement innovative ideas in a particular environment (McEntire and Greene-Shortridge, 2011: 269). This instrument consists of four dimensions:

- motivated to change (an intrinsic motivation to change, characterized by persistence and ambition),
- challenging behavior (tendency to challenge others' points of view. It is a risk-taking behavior and ambition),
- adaptation (focused on working within existing boundaries rather than novelty),
- consistency of work (associated with a methodical and systematic approach to work, conformity to organizational rules) (Zibarras, Port and Woods, 2008).

According to this instrument, people open to change, query others' opinions, problem solvers, and able to be flexible in a changing environment are more prone to be innovative. As innovation is an activity that relies on knowledge, people who work should be knowledgeable. So the methods chosen for employee selection can be sophisticated and various.

3.3.4. Intensive Training & Development

One of the distinctive characteristics of knowledge workers, compared to other occupational groups, is the need for continuous development. As it is mentioned above, commitment-based HR systems' objective is to increase employees' knowledge, skills, and abilities and increase their commitment to the organization. From this perspective, in order to gain competitive advantage

through products/services, there is a huge need to create "firm-specific tacit knowledge" with intensive training.

One of the key contributors to training and development activities in organizations is the organization learning climate. Training is an attempt to improve current or future employee performance by increasing an employee's ability to perform. The need for training and development can arise for many reasons (Schuler, 1994: 504). One of them is to cultivate employees' innovative skills or mind-setting. Continuous and intensive training programs would contribute to the creative idea generation and idea implementation stages of innovation.

3.3.5. Performance Appraisal & Incentive Based Reward

The performance management process mainly involves by evaluating employee performance against the standards set for them and helping them develop action plans to improve their performance (Lepak and Gowan, 2010: 260). Performance appraisals are one of the components of performance management. Performance management activities may be used for administrative and /or developmental purposes. For the scope of this particular chapter, only developmental purposes will be discussed. Employees based on the performance evaluation results can improve their performances. Developmental purpose serves to organizational innovation efforts by management development programs, identification of potential employees, providing feedback, and communication performance improvement activities (Schuler, 1994: 308). Companies practicing commitment-based HR practices, in order to increase employees' motivation, development, and commitment they refer to development -based performance appraisal system.

Reward management is an HR tool to attract talented employees and to retain them in organizations. Rewards are the sum of total payments in exchange for employment relationships. There are mainly three components of reward management. These are base pay, incentives, and benefits (Schuler, 1994: 384). A high level of performance can be achieved not only by selecting qualified employees or developing them but also a satisfactory incentive should be provided. Mainly there are three levels of incentive systems. The incentives can be shared within the company at the individual, group/team, and company levels.

Companies refer to incentive-based systems to increase the level of organizational innovativeness. Relying upon only individual incentives would limit the sharing of information among employees. Especially from the context of

KM, the spread of information is a critical activity, so in order to reinforce knowledge sharing and integration team-based incentive rewards are eligible.

There alternative compensation approaches that are suitable for the organizations considering their employees as a "human capital". In these organizations employees input to the job and their output is critical to organizational success (Lepak and Gowan, 2010: 305). Some of the alternatives are "skill-based pay" or "knowledge-based pay" and "competency-based pay" (Mathis and Jackson, 2011: 369). These systems are directly linked to employees' acquiring new knowledge or skills or competencies. These reward systems encourage employees to learn various skills, be open to innovation, flexible to changes, and take risks. Whereas, team-based rewards support employees' cooperation and information sharing.

Intrinsic and extrinsic rewards, reinforce knowledge workers' innovative behaviors. From this perspective, working in an autonomous work environment, the presence of incentive-based rewards, being supported with promotion and recognition-based programs supplement employees to take risks, to create new ideas and products.

CONCLUSION

In this chapter, the role of strategic human resource management practices discussed in the context of knowledge management. Notwithstanding, a large number of researches on strategic human resource management, knowledge management, and innovation, on the other hand, there are few studies covering their relationship together. In this chapter knowledge management debated from the human perspective, where employees with their distinct capabilities create a competitive advantage. Those people who are working in an environment where is a development, distribution, and integration of knowledge are called knowledge workers. These people with their specialized knowledge have more potential to create new opinions, ideas, and to innovate. Innovation requires careful and elaborate human resources activities. Innovation is the output or result of the employee's ideas, opinions. Organizational innovation can be supported by human resource practices. As innovation is a strategic choice, HR professionals should link HR practices accordingly. Studies show that among the strategic human resource management approaches commitment-based HR practices approach is the most supporting the innovation. The studies support that, commitment- based strategies foster innovation through knowledge employees. The commitment bundle creates a climate of trust and cooperation which in turn leads to knowledge exchange and ultimately increased performance.

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CHAPTER 14

KNOWLEDGE MANAGEMENT AND BUSINESS INFORMATION SYSTEMS

Remzi Reha Durucasu

INTRODUCTION

Today, it is accepted that technology is everywhere especially through internet, computers and mobile phones. Most people in the world are likely to use technology for free time activities such as playing games, communicating and socializing. Further to that people who use technology during their free time have to use it in their work time for different purposes. There is no business today without PCs, internet, mobile phones. Because they are the essentials of the corporations for to operate their business productively and effectively. Those essentials are the key to succeed in producing more, communicating safer, interacting with costumers immediately, taking sudden actions and making the right decisions faster. Therefore businesses along with the sufficient technological equipment, loyal staff and trustworthy system are ready to make profit, to generate satisfied workers and delighted customers that conclude progression. Progression is the common idea for corporation and it affects the success of the businesses directly. However the success of the business is not only gained by the top managers but also by all the workers from the bottom to the top of the business hierarchy. This idea brings the fact that success must expand to each department of the corporation. For this purpose, knowledge management is beneficial in business. Knowledge management stands for operating the business in the best possible way and making vital decisions for corporation on behalf of itself. Thus gathering, expanding and using information in time is essential for knowledge management. Development in technology and wide use of internet enable information systems to support knowledge management.

In this chapter, analysis of the relationship between knowledge management (KM) and business information systems (BIS) is discussed as a business functions perspective of information systems. Firstly, the basic concepts of the

framework including data, information and knowledge are defined. Secondly along with the support of the basic concepts, system and information system concepts are clarified. Thirdly, business information systems as a business functions perspective of information systems including accounting, human resources and marketing information systems are expressed. Fourthly, the relevance between business information systems and knowledge management is exhibited. And finally, this chapter of the book is concluded with the importance and the benefits of business information systems towards knowledge management.

1. THE BASIC CONCEPTS OF THE FRAMEWORK

Data, information and knowledge were analyzed first since they play an essential role in both information systems and business information systems.

Information is a term which oftused in daily life instead of data and knowledge. Nevertheless information as a term in the literature has an obvious difference from data and slightly different from knowledge. There is a continuous misuse of both information and knowledge. To clarify the subject, Alavi and Leidner (2001) stated “information is converted to knowledge once it is processed in the mind of individuals, and that knowledge becomes information once it is articulated and presented in the form of text, graphics, words, or other symbolic forms”.

In practice, the terms data, information and knowledge are often used interchangeably. The differentiation is often tough and users interpret data only when they use them. Both the information manufacturing process and contexts of users make it difficult for users to determine exactly whether a piece is considered as data, information, or even knowledge.

When business processes are performed data represent created facts. Objective facts about an event, action or elementally the structured record of a transaction could form as data (Tiwana 2000). They are also the lowest level of known facts. Data do not have to be numerical. They could be quantitative or qualitative values represented with various letters, numbers or other symbols and signs. Data are unstructured records of activities carried out in accordance with institutional objectives (Lezki & Dorak, 2017:8). Data are collected, stored, grouped, analyzed, and interpreted (Huang et al. 1999). Data can be stored in a structured relational database system or in an unstructured document management system, and includes non-text information, such as voice and image.

There is a relationship between the terms data and information and they usually used synonymously. Also there is a similar situation between information and knowledge. Managers differentiate between information and data by their opinions in practice. It can be described by managers that information as data that have been processed. Information includes both purpose and intention. There are different ways in which meaning can be added to data in order to transform it into information. Data become information through condensation, contextualization, calculation, categorization and/or correction processes (Tiwana 2000). Unlike data, information is meaningful by itself. What qualifies as useful information is a subjective judgment; it has a meaning only for the related person or unit. It gives an aspect to the related person to interpret the events and objects (Lezki & Dorak, 2017:8). Information moves around in both electronic and hard format, through electronic and social networks.

In the business context knowledge called actionable information. This is an idea that is accepted commonly and also it occurs the key link between them. Information have to merged with context and experience to create knowledge. Knowledge is a mixture of experiences, insights, information and values. This mixture maintains an environment for evaluating experience and information. It is originated and applied in the minds of those in possession of the relevant knowledge. In other words knowledge is the meaningful and value adding form of data and information which are transformed as a result of some processes and adjustments to be effective in decision making (Lezki & Dorak, 2017:8).

In organizations it often becomes embedded in both documents or repositories and organizational routines, processes, practices and norms (Tiwana 2000). Data and information are essential, but it is the knowledge that can be applied, experience that comes into context, and skills that are used at that moment that make the difference between a good and a bad decision(Galandere-Zile, & Vinogradova, 2005:181).

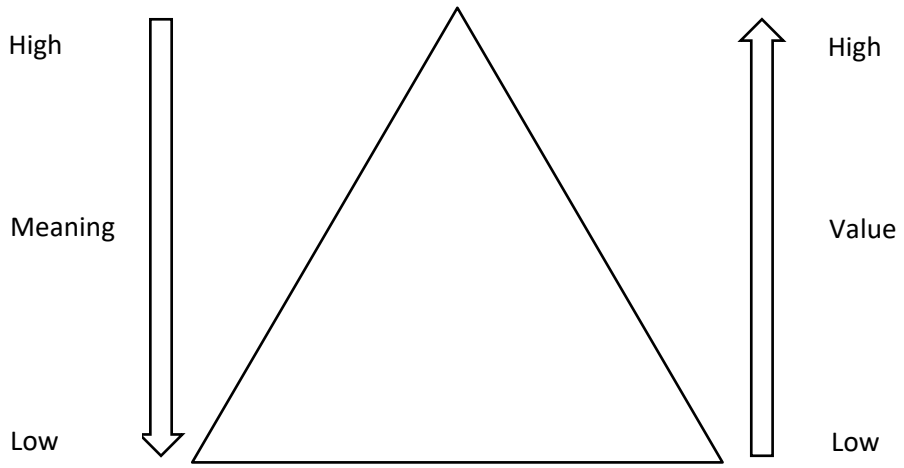

Figure 1. Data, Information and Knowledge.

Chaffey, D. & Wood, S. (2005).

In figure 1 Chaffey & Wood (2005) state the relationship among data, information and knowledge. Knowledge is classified as tacit knowledge and explicit knowledge based on the attribute (Lezki & Dorak, 2017:24).

Tacit knowledge is the settled knowledge in individuals' minds and perceptions. This knowledge is interiorized and settled into people's memories through experience and business applications. Also, it consists of intuitions, emotions, abilities, values and beliefs. Because they are placed in human consciousness, behaviors and perceptions, they are human-specific and their comprehension, attribution and sharing is difficult. For instance, you may watch how the mechanic repairs your car, and he tells you how to do it. Plus, you may watch some videos online about how to repair your car. You think you have the courage to repair your car then. However in practice you can't repair your car as fast and productive as your mechanic. What the mechanic has rather than you is tacit knowledge.

Explicit knowledge is the knowledge that may be expressed with words, numbers, scientific formulations, various visual-audial tools or some other ways. This kind of knowledge takes part in books, documents, reports and notes or it is created in service-training of business. Because they can easily be expressed, they can also be generalized and edited easily by transforming them

into rules and procedures. To go on with the same example above, videos online about how to repair your car is explicit knowledge.

Simply it can be said that knowledge is born from information and information from data, respectively. Knowledge seems the most valuable item for knowledge management to make the optimum decision for business. Therefore the correction and timing of knowledge is vital for knowledge management. And this finally increases the importance of the right data and the right information to create necessary knowledge for businesses to use it in knowledge management.

2. SYSTEM AND INFORMATION SYSTEMS

Business information systems are essential for knowledge management. It is necessary to emphasize on the concept systems and information systems, respectively in order to comprehend Bis smoothly. There are plenty of definitions of the concept system, here are a few remarkable definitions. In one definition, it is called “a set of things working together as parts of a mechanism or an interconnecting network.” (“System,” n.d., par. 1)

In another definition *system* is a collection of conceptual or physical components that are brought together to reach one or more specific purpose or conclusion (Esen, 1993, p.10). And also a *system* can be defined as a collection of components that work together towards a common goal. The objective of a system is to receive inputs and transform these into outputs. Collectivity and connection are the basic concepts of the definitions above.

Nevertheless not every system has a single goal and often a system contains several subsystems with subgoals, all contributing to meeting the overall system goal. For example the human resources operations and marketing departments of an organization should all have their own goals departmentally which together help to achieve overall business objectives. It can be seen that in systems data are used as the input for a process that creates information as an output. In order to operate the system properly monitoring the performance of the system is vital, thus, some kind of feedback mechanism is required. In addition, control must be exerted to correct any problems that occur and ensure that the system is fulfilling its purpose. There are thus five components of a system in terms of input, process, output, feedback and control (Hardcastle, 2008:7).

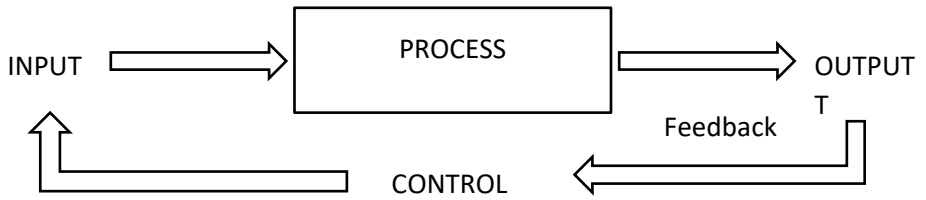

Figure 2. Components of A System

Adapted from Lezki Ş., & Dorak, Ö. (2017).

There are also plenty of definitions for information systems in literature. In one definition *information systems* is accepted as "the study of complementary networks of hardware and software that people and organizations use to collect, filter, process, create, and distribute data". In another one, "*information systems* are interrelated components working together to collect, process, store, and disseminate information to support decision making, coordination, control, analysis, and visualization in an organization" (Bourgeois, 2014:5). Especially in the second definition one of the benefits of information systems for an organization is stated as supporting decision making. Decision making might be the most important purpose of knowledge management to build a future for business. There is a role of the information systems to provide information to management. That information allows managers to make decisions for a controlled organization. Besides, the organization could be under control only if it meets the requirements of the environment. In relation to control systems, they can be classified into open-loop and closed-loop.

On one hand, an *open loop control system* is the one that has no way of ensuring objectives are met for a process. This means they are not suitable in the environment which organizations exist for the reason of environmental complexity. On the other hand, *closed loop control systems* can have two types of control mechanism referred to as feedback control and feedforward control. Feedback control systems generally provide a way of ensuring that system is under control. Feedforward control systems attempt to overcome the time-delay associated with feedback systems by incorporating a prediction element in the control feedback loop. Feedforward systems are not as common as feedback systems in business settings (Hardcastle, 2008:7).

Information systems comprise of different components that work together to provide value to an organization. There two components (technology and

idea) and there are five subcomponents gather to reveal information systems: hardware, software, data, people, and process. These subcomponents are briefly explained below to hold a view about information systems.

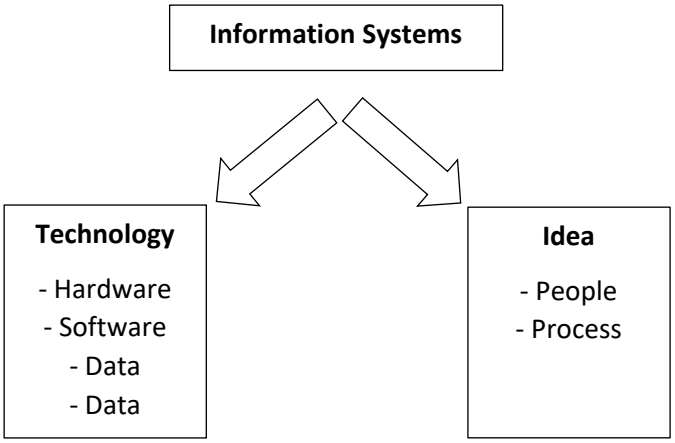

Figure 3. The Components of Information Systems

Adapted from Hardcastle, E. (2008).

While technology includes hardware, software and data, idea includes people and process to reveal information systems (Bourgeois, 2014:5).

Hardware is the physical components of the technology. Smartphones, computers, disk drives, tablets, and flash drives are examples of hardware which is the tangible part of information systems.

Software gives instructions to the hardware about what to do. Software is not tangible. Simply, programmers type out lists of instructions that tell the hardware what to do to achieve creating software programs. There are two main categories of software. First main category is an operating system that allows hardware to run such as MacOS and iOS. Second category is an application software that does something useful within hardware such as Microsoft Power-Point and WhatsApp.

Data could be thought as a collection of facts. For example, email addresses, names, gender etc. are all pieces of data. Data is not tangible just like software. Aggregated, indexed, and organized together into a database, data can become a powerful material for businesses. That means they are almost meaningless for business when they just exist as pieces. Organizations collect all

kinds of data and use them for decision making. Therefore it can be said that information systems start with data.

When information systems come to a word, technology components are the first thing to come into the mind. However a technology without a user is useless. A focus on the *people* involved in information systems is the next step, yet it is significant to look beyond the both tangible and intangible components of technology to fully understand how they integrate into an organization. People all the way up to the chief information officer (CIO) such as programmers, front line workers, systems analysts etc. are the essential elements of the information systems that shouldn't be underestimated.

Process is a series of steps undertaken to achieve an aimed result or object. It is the ultimate goal to manage and improve processes via using technology, both within a company and externally with suppliers and customers, Examples of the application of information systems in doing business such as Enterprise Resource Planning (ERP), Decision Support System (DSS) and Transaction Processing System (TPS) all have to do with the continuous improvement of these business procedures and the integration of technology with them (Susanto & Meiryani 2019:146). The fact that businesses desire to gain a major advantage over their competitors are highly focused on this component of information systems.

3. BUSINESS INFORMATION SYSTEMS (BIS)

In this chapter of the book knowledge management and business information systems are discussed. Analyzing the relationship between those two subjects is focused. Therefore the infrastructure of BIS such as the software and the hardware are not referred deeply.

Several companies for operating the business, improving process and increasing effectiveness in business mostly use information systems. This is a way for companies to enable their business activities. In addition it can be said that information systems support the pleasure and satisfaction of costumers about the goods and services.

Companies aiming to develop are required to continue to innovate both in terms of quantity, quality and information systems used in order to operate properly and correctly, businesses must deal with many different parts of information about suppliers, customers, employees, and payments, of course and

their services, they must manage the overall work activities of the company. (Susanto & Meiryani 2019: 145)

Business information systems play a vital role in whole perspectives of organizations. For example marketing information systems (MKIS) as a subsystem of business information systems are ready for supporting function to create new opportunities and see new market segments, increase sale, maximize customer satisfaction on goods and services. To substantiate, MKIS make connection to gather information with many different sides such as customers, rivals, employees, suppliers, goods and services. To use this information to operate productively and develop the overall performance of the organization it is significant to put work activities in order. Business information systems let the organizations make possibly the best decisions and develop their business above dreams via managing and using the whole information of their own.

In another aspect business information systems both produce and provide information for the requirement of the managers to control the beneficial usage of the resources of business such as cash, technology, quality of labor etc. In other words, business information systems are here to generate information maintaining the business to direct its resources in the best manner. In addition, it is a priority to create a network among the departments and units of the organization to communicate with each other when necessary.

In both literature and implementation of information systems in business, enterprise resource planning, decision support system, executive information system and transaction process system are the first things to consider. Those are the soft types of information systems. It is mentioned above that the main focus about business information system will not be on software and hardware types of information system in this chapter. However, business information systems also differ from organization to organization under their demands and use of information. In this chapter we will approach business information systems with sub-information systems corresponding to the business functional subsystems in order to reveal the relationship between business information systems and knowledge management. Correspondingly, marketing information systems, accounting information systems and human resources information systems are the components and the subsystems of business information systems. Those subsystems are not independent from each other yet they were designed separately. Therefore those systems are always ready to produce and transfer the information needed by organization via being in an interaction with each other.

3.1. Accounting Information System (AIS)

Accounting Information System (AIS) is one of the major subsystems of business information systems. It is known that accounting is vital to all organizations, however AIS is likely to produce the most valuable information as a Business Information Systems for knowledge management to make very significant decisions about the business. Perhaps, every organizations either profit or non profit-oriented need to maintain the AISs (Wilkinson, Cerullo, Raval & Wing, 2000: 3-4).

An integrated framework with a business which needs physical resources such as funds, current and fixed assets, equipment, staff etc. to convert economic data into financial information would be indicated by AIS. That financial information created for not only conducting the firm's operations and activities but also providing information concerning the entity to a variety of interested users. Indeed, the combination or interaction between human, technology and techniques would permit an organization to administer its knowledge effectively (Bhatt, 2001; Thomas & Kleiner, 1995).

To assign quantitative value of the past, present and future economic events are the main function of AIS. For instance an organization through its computerized accounting system could easily produce the financial statements namely income statements, balance sheets and cash flow statement. Towards the users' requirements such as internal and external users, the system that contains the stages of input, processing and output would process data and convert accounting information. Wilkinson (1993) noted that an effective AIS performs several key functions throughout these three stages such as data collection, data maintenance, data management; data control (including security) and information generation.

The basic relation between AIS and knowledge management is creating result concerning reports for the top level managers. In other words the system helps especially the operational managers out to have current reports (daily, weekly, monthly etc.) for the top managerial level (i.e. tactical and strategic) plan, control and decide resources allocation. Besides, Sory (2009) suggested in his study that AIS add value to information processed within the company. It may still be innovative for some organizations to have automated AIS but to extinguish classical human error margin and accelerate information system a software usage for AIS is a must. AIS also support the management of resource and help knowledge management of the business to obey its projection of continuing business profit. The use of AIS indicates the growth of tacit and explicit

knowledge for future reference and training by indicating the growth of tacit and explicit knowledge, where staff were trained intensively and experience and troubleshooting were recorded. Indeed, the successful implementation of an accounting information system can be described as a series of complex, interconnected activities necessitating participants to have technical and managerial skills to sort out prospective problems (Ponemon & Nagoda, 1990:1).

3.2. Human Resource Information System (HRIS)

Human resource is one of the key departments of a business to operate efficiently. Creating products for costumers, to satisfy them and serving costumer through the best way are the basic components for making money. Thus it could be accepted that the components mentioned all start with qualified, addicted, talented and hardworking employees. In addition, it is a challenge not only hiring employees with those specifications but also satisfying them during their jobs for a long time. Briefly HR has a lot to do, however it is possible to get some support from HRIS today, which is an advantage. Therefore knowledge management in business needs valuable knowledge from HRIS to make the most important decisions such as growing, downsizing, innovation etc. Timing and correct information is vital for a business nevertheless transforming information to knowledge is something crucial which should not be done by a human being. Here HRIS comes forward with the technology oriented to terminate any possible faults from an employee about information that the knowledge management concerns.

Human Resource Information System (HRIS) is a systematic way of storing data and information for each employee and each candidate to aid planning, decision making, and submitting of returns and reports to the top level managers as a usage of knowledge management. HRIS could be called as a tool for human resource management including HR activities and processes with the information technology field. It can be used to maintain various kinds of detailed reports such as employee profiles, absence reports, salary administration and more. It is respectfully accepted in the corporate world as one of the benchmark HR implementations (Jahan, 2014: 33). Although over the last decade there has been a considerable increase in the number of organizations' gathering, storing and analyzing information regarding their human resources through the use of Human Resource Information Systems (HRIS) software or other types of software which include HRIS functionality (Ball, 2001).

Nowadays adopting the acceptance and importance of HRIS, generally HR departments of corporations or outsourced HR practice automate and devolve routine administrative and compliance functions. When it is implemented, on one hand HRIS make it possible for organizations to significantly reduce the costs associated with HR delivery, on the other hand HRIS reassess the need for retaining internal HR capabilities. Above all these HRIS also provide HR professionals with opportunities to enhance their participation to the strategic direction of the firm. In other words HRIS presents valuable information for knowledge management. This is made possible through the followings (Hendrickson, 2003):

- HR professionals with the time needed to direct their attention towards more business critical and strategic level tasks, such as leadership development and talent management are provided by HRIS via by automating and devolving many routine HR tasks to line management.
- The fact that ability of HR to generate metrics can be used to support strategic decision making is an opportunity for HR to improve its strategic role.

3.3. Marketing Information Systems (MKIS)

Marketing department is the one and only connection tool for communicating with costumers to sale and promote both the product and brand that affects the sustainability and the profitability of the business. Therefore the information made by marketing will elucidate the strategic decision making of the top managers. In addition, it is believed that marketing concerns about rivalry, just in time decision making matters. These circumstances reveal the demand of Marketing Information Systems (MKIS) which is a technological information infrastructure system of marketing.

As a definition; MKIS is a computer supported system that is designed to provide an organized flow of information to enable and support the marketing activities of an organization. The MKIS serves collaborative, operational and analytical requirements. Firstly, MKIS allows sharing information and working together virtually for managers in the collaborative function. Nevertheless MKIS allows customer collaboration about innovation of product designs and customer demands. Secondly MKIS appeals to operational needs through customer management systems in the operational function. Through this method, MKIS presents simultaneous information about day-to-day processing of customer transactions from the initial sale through customer service recked by cus-

tomer management systems. Thirdly, analytical function of MKIS is vital for knowledge management since it is addressed by decision support applications that enable marketers to analyze market data on customers, competitors, technology and general market conditions. These insights are becoming the foundation for the development of marketing strategies and plans (Harmon, 2003:2).

MKIS are designed to be flexible and detailed, additionally to integrate with each other functionally. To create competitive advantage MKIS are foresighted, formal, and essential to the organization's ability.

Information technology contacts customers and provides brand new reasons for collecting marketing information, which is supported by internet based technologies that allows new approaches for sales. The ability to collect, analyze and act upon marketing information more swiftly is the main advantage of rivalry in a knowledge-intensive economy. MKIS ensure the information technology structure for the strategic operations of marketing department. Therefore it becomes more important for knowledge management since it produces timely and organized flow of information required by both marketing and top level decision makers. In order to adjust this system to meet its organizational goals, MKIS contain the equipment, software, databases, and also the procedures, methodologies and people that are necessary (Harmon, 2003:3). MKIS comprise wide range of activities from top to toe just as from complex marketing strategy decision making to simple transaction processing.

Decision making is all about choosing the best option available. Thus the number of the options that presents reality matters for the decision makers. In this case decision makers demand the increased number of options available and MKIS guarantee that. In addition, it supports each element that the marketing strategy includes. MKIS is an information network for the distribution channel (supplier, customer etc.) The following are accepted as the primary benefits of MKIS in the areas of functional integration (Harmon, 2003:4):

1. *Market Monitoring*. MKIS can enable the identification of emerging market segments, and monitoring the market environment for changes in governmental policies, economic conditions, competitor activities, new technologies, and consumer behavior through the use of market research and marketing intelligence activities.

2. *Strategy Development*. As a key strategy of a marketing department such as product positioning, personal selling, customer service, new product, marketing communications etc. can be supported by MKIS for strategy development.

3. *Strategy Implementation*. The MKIS can be called as a section for customer relationship management, sales force automation, customer service systems. In addition, it allows the coordination of marketing strategies and supports product launches.

Briefly, MKIS is the "window in the world" of the organizations and, it is the primary customer interface which is inevitably beneficial. MKIS, as a subsystem of business information systems are crucial for producing information about both marketing operations and marketing based actors to the strategic decision makers of the organization.

4. THE RELATIONSHIP BETWEEN BUSINESS INFORMATION SYSTEMS AND KNOWLEDGE MANAGEMENT

The support of business information system to knowledge management was briefly explained before in this chapter with the aspects of the subsystems of BIS that are accounting, human resource and marketing information systems. Now it is time to exhibit the main relation between BIS and KM to make sure how BIS helps KM as a tool of KM especially for decision making briefly.

Finding and choosing knowledge that is of the highest values to the organization or the individual worker seems to be almost an impossible task. Organizations are required to apply new technologies and to innovate timely in anticipation of changes in the marketplace rather than as a reaction to business decline. Knowing when, how and what to innovate, therefore, is a key competence for organizations (Amidon, 1997 & Owen 1999: 7). Those reasons give rise to an approach or a process or a discipline. Thus set forth the concept of Knowledge Management.

To make it clear here are just two different type of definitions for Knowledge Management. Firstly, "knowledge management is an approach based on the central role of knowledge in organizations, with the objective to manage and support knowledge work and to maximize the added value of knowledge for the organization" (Tissen, Andriessen, Deprez, 1998 & Owen 1999: 7).

And another definition for knowledge management developed by Royal Dutch/Shell is "the capabilities by which communities within an organization capture the knowledge that is critical to them, constantly improve it and make it availa-

ble in the most effective manner to those people who need it, so that they can exploit it creatively to add value as part of their work" (Chaffey &Wood 2005: 227).

Knowledge management achieves goals with the accomplishment of business information systems to share perspectives, ideas, experience and information; to ensure that these are available in the right place at the right time to enable informed decisions; and to improve efficiency by reducing the need to rediscover knowledge (PinkSCAN, 2012: 46). Here are the objectives of knowledge management led by the business information systems:

- BIS improve the quality of management decision-making by ensuring that reliable and secure knowledge, information and data is available through the service lifecycle for knowledge management
- MKIS enable the service provider for knowledge management to be more efficient and improve quality of service, increase satisfaction and reduce the cost of service by reducing the need to rediscover knowledge
- HRIS ensure that staff have a clear and common understanding of the value that their services provide to customers and the ways in which benefits are realized from the use of those services for knowledge management
- BIS maintain a computerized information system for knowledge management that provides controlled access to knowledge, information and data that is appropriate for each audience
- AIS present unique financial statements for knowledge management that irradiate the future of the organization such as investment, global economy and capital etc.

As a sum, knowledge management is the prize possession of an organization for both decision making and operating. To operate knowledge management with the business functions, BIS and its subsystems play a vital role to gather, analyze, store, share, use and maintain knowledge, information and data throughout the service provider organization.

CONCLUSION

The main goals of running business are both to make profit as high as possible and to operate continuously. To achieve these goals, a corporation should produce the best product and sell it with convenient price and present impressive advertising and distribute the product to the costumer whenever needed. And to accomplish the objectives above, a corporation should have the staff that

is not only loyal to what they do but also satisfied with what they get in return. Unfortunately this is a scenario of a corporation that is seen rarely. Those should be the targets of a business that may never be achieved. Nevertheless trying to get close to them is a big step. As a matter of a fact, this is about decision-making; from establishing a corporation to ending the operations of a corporation, starting as a small sized enterprise and converting it to a global sized enterprise occur with one little decision.

It is always essential to make the best decisions for the benefit of the business. Managers are the mechanisms that will make not only simple but also difficult decisions. Considering the fact that human being could make mistakes, it is useful to get benefit from technology. Thus managers could get support from information systems as a computerized system that presents information. However, just gathering information is never enough. The value, perspective and timing of the information make it more substantial. Business information systems, in which information systems as such as accounting, human resources and marketing are handled from the perspective of business functions, provide information for knowledge management to the required level managers of the company.

As an example let's think about a CEO who is willing to make an investment in an overseas country. HRIS present information about the qualifications of the workers who could possibly work in that country. AIS present information about the taxes, salaries, costs of producing etc. in that country. MKIS present information about available markets, possible distributing channel, and appropriate promotion methods etc. for that country. CEO gets the information through BIS, adds his/her tacit knowledge and experiment of business (explicit knowledge) and finally make the decision of either being positive or negative about the investment via knowledge management. Consequently, managers who use knowledge management could get segmented information from the different departments of the company via business information systems to make the best decision which has vital effect for the future of the corporation.

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CHAPTER 15

INFORMATION MANAGEMENT SYSTEMS AND CORPORATE PERFORMANCE IN DIGITAL TRANSFORMATION

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Yüksel Yalçın

INTRODUCTION

Corporate performance management in organizations has become the reasons for the existence of enterprises with the impact of digitally supported global competition. Enterprises can survive to the extent that they can make their resource utilization skills efficient. Enterprises, which cannot manage their corporate resources well, can collapse partly or completely, as in the case of many companies that have lost their resources in the pandemic health crisis today. This may bring the companies' decades of gains, experience and efforts to an end together with their financial resources.

The success of enterprises is possible by effective management of resources through the construction of risk plans in all processes. From this point of view, the effective use of data systematics, generated by the activities of the enterprises, during decision support processes requires the technology supported information systems management. The development of digital technology and the establishment of infrastructures of new cyber systems such as augmented reality, artificial intelligence, Internet of things, blockchain and virtual reality in enterprises besides product and system management require the mandatory transformation of the technological developments of information management systems in enterprises.

Information management in enterprises will be possible through the establishment of a technology-based system, especially in the integration and data flow between functional units, management of resource optimization processes,

and effectiveness of decision support processes. In today's world, where the lifetime of products decreases due to the developing technologies, the investments of the companies besides the production and management systems technologies have turned into a great competitive advantage together with the development of the field of cybernetic science.

Information Management Systems are described as network management coordination which integrates corporate software and physical hardware with integrated installations that connect functional units in enterprises, and it is the structure affected by the continuous and rapid development of technology on a global scale. The fact that this network structure is open to stakeholders systems such as customers, suppliers, legal units (such as e-government structure), semi-official institutions (chambers, professional associations etc.) has become a necessity for the vital functioning of the enterprises. Information Management Systems in enterprises have gained a more technological aspect through digital transformation especially in supply, production, marketing, distribution and finance, and have made all business processes in need of re-design.

All these developments have evolved into a process such as “Forget what you know as IMS, everything is just beginning”. This change, which transforms the usage of all functional structures in enterprises, has also affected the aspect of corporate performance. The transformation from the structures that take time required to collect the data necessary for the decision processes to the data tracked online through the digital transformation process provides more efficient decision processes infrastructure through the development of reporting techniques. It is obvious that all enterprises should prepare a strong infrastructure against this change that will take even management from the human and digitize it in the near future. Many issues from the physical recording units to cloud technologies, manual algorithms to Internet of things, physical counting systems to smart labeling technologies, and to distribution and logistics processes where the product is monitored with microchips, and physical money activities to blockchain world have become compulsory processes that will be encountered without any experience in the past.

Therefore, enterprises can be as successful as they can manage the systems that carry their resources to dynamic processes as quick as possible. For this reason, the direct impact of Information Management Systems on corporate performance also forces all processes to digital transformation. When this digital transformation process can be managed effectively, it will turn into a sustainable competitive advantage for the enterprise. If this process cannot be man-

aged well, the life of the enterprises will be as much as their investments in information technologies. The interesting thing is that we are in a situation where there is no time even to think about making investment in this transformation. For this reason, it would be healthier to consider this transformation process not only as the modification and development of Information Management System infrastructure, but also as a collective transformation program that evolves the management methodology in the enterprise into digitalization.

1. INFORMATION MANAGEMENT SYSTEM

It will be useful to examine the information management system as "information management systematics" and "relations between functional units" in terms of internal and external stakeholder expectations in all functional units of businesses, mission, vision, goals and objectives.

1.1. Information Management Systematics in Businesses

The importance of information for enterprises is directly proportionate to the growth rate and success. Information is defined as a strategic resource for the enterprise and systematic management of it is becoming important day by day. Based on this definition, information is the main power for an effective management of stakeholders system, including competitors and customers, at all stages of the supply process (İnce & Oktay, 2006: 17).

In order for any information to be important and valuable, it must have some characteristics. Some of them can be described as accuracy, completeness, timeliness, accessibility, comprehensibility, reliability and efficiency. Today, enterprises that access the accurate information before their competitors are advantageous in terms of competition and will take a position to renew themselves by keeping up with the changes (Sipahi, 2013: 293).

Information is one of the indispensable basic inputs in the production of all kinds of goods and services such as decision production, program production, research production, goods and services production. In information management, data refers to unprocessed, unedited or raw information, and knowledge refers to understandable status of information (Yükseltürk & Çakır, 2010: 505).

Rapid developments in information and communication technology have led to the necessity of developing scientific approaches to manage information from inside and outside of organizations as a technical instrument. In the first

conference on information management held in Boston in 1993, information management is handled conceptually, and writers such as Nonaka, Buckman, Sveiby, Stewart, Allee, Davenport and Pursak are shown as the founders and pioneers of the information management field. One of the approaches in these pioneering initiatives has defined information management as providing appropriate infrastructure and technical conditions for collective and systematic transfer of it to individuals, teams and the entire organization in order to achieve better organizational objectives (Şentürk, 2008).

Information management is essentially all of the activities aimed at providing competitive advantage in every field by transforming all types of information arising from the operations carried out in all units of the enterprise into classified and meaningful form, making them more efficient in the decision processes in listing and reporting (Atılgan, 2009).

Information management can be defined as a new discipline and management tool that enables the creation and use of information collectively and systematically in all the functions of the enterprise in order to achieve the corporate goals, vision, mission and objectives of it. In information management, it is especially aimed at producing, collecting, researching, sharing, editing, recording, and securely maintaining data. The main objective of the information management concept can be expressed as assisting the activities of the company and guiding the employees (Güçlü & Sotirofski, 2006).

It is very important that the information, which is the intellectual capital of the enterprises, including all internal and external open and closed knowledge, is quickly and safely accessible in all functional units for production, use, development, renewal and use as a sustainable competitive tool. This situation is essential to establish the information system as a management system for systematic access by all units within the enterprise. This system is called information management system, and its action is called information management (Özkol, 2015).

Information management systematics refers to a dynamic structure used in an integrated system such as web pages, networks, databases, time and quality management, including personnel, budget, regulations for legal responsibilities, computer software-hardware and recording units during the design, accessibility, use and storage processes of the information within the enterprise in accordance with the determined rules (Sipahi, 2013: 294).

Information management systematics includes the following characteristics (Çapar, 2003: 421-432):

- It allows information to be productive,
- It ensures transfer of the created information between units in the corporate field,
- It considers it as an interdisciplinary activity that utilizes the fields such as psychology, sociology, finance, linguistics, system analysis, organization, information science, information and communication technology,
- It is the entire continuous applications with indefinite tendency,
- Information management is an important tool for providing organizations with new opportunities and creating an efficient working environment.

Information management can be defined as the systematic classification of all information owned by the organization and ensuring the safe access and use of it through an organized method. The appropriate software and hardware infrastructure of the information systems of a company enables the use of corporate information resources more effectively (Barutçugil, 2002: 125; Spiegler, 2003:534). The use and management of information management in parallel with current technological developments is very important for the adaptation of enterprises to wide business environment and global integration, and technology-based resource investment in information management is one of the critical issues to achieve this. Efficient use of corporate information resources will provide a strong competitive advantage for the enterprise. Being aware of the existence of countless data, nowadays it has become mandatory to store information and access it quickly when necessary (Tiwana, 2003: 78).

According to another definition, corporate information refers to all kinds of information produced within the organization or obtained from outside the organization. All kinds of information created within the organization and obtained from outside the organization pursuant to business processes are the corporate resources of the enterprise, that is, its intellectual capital. Considering that each serves for a particular goal of the organization, systematic protection and security of information is part of the information management (Townley, 2001: 44).

The fact that the correct use of corporate information is of strategic importance for enterprises shows how critical the concept of corporate information

resources is and that it is a value that should be emphasized in today's world (Ceven, 2006: 5; Özdemirci & Aydın, 2007:165). It is a necessity for the enterprises that want to establish a successful system in accessing and using corporate information resources to invest in information technologies. These investments, which will provide competitive advantage to enterprises, will also provide strong information communication ability within the organization. Backup systems infrastructure is needed to recall the information and make it ready for reuse for the possibility of an unfavorable situation based on data loss. A developed organization should have a structure that manages a more technological and innovative information management system than its competitors (Kalseth & Cumming, 2001).

1.2. Relationship of Information Management Systems with Other Functional Units

Enterprises have to include assets such as social capital or organizational learning, which will positively contribute to the content of their short, medium or long term balance sheets, in their profit growth objectives. These values which were created with information management systems also have economic effects on all functions of the enterprises. These processes are in the form of localization, acquiring, developing, sharing and storing information, and these processes are under the assigned positions of all functional units (Arpacı & Toylan, 2015: 53).

Information management systems are the processes or strategies that enable the information owned by the company to be used effectively in all units of the company and by all employees to achieve the objectives of the enterprise through the capacity and facilities of information and communication technologies (Kahya, 2014: 32). The initiation of these studies, the encouragement and motivation of employees to participate in the system, produce and share information in all functional units depends on the managerial perspective. Taking care of information management in enterprises and establishing information management teams will show the employees the importance that the company attaches to information management. The greatest role in the formation of the information management structure, which also takes the support of the employees, belongs to the management (Öztürk, 2019: 86).

The strategic management approach focuses on the information-based perspective of enterprises. At the same time, it is necessary for the employees and management of the enterprise to know that information is an important resource

for the enterprise in terms of a sustainable competitive advantage. Management has a great role in understanding the effectiveness of information sharing and its critical importance for the entire enterprise and transforming it into an organizational culture (Güleş, 2002: 64).

Information Management System performs tasks such as keeping the data arising from the activities of the enterprise, accessing external information and presenting this information to the decision maker by filtering them. It is important for the total performance of information management to provide all the information needed at various levels of the enterprises to their authorities. This access also facilitates the management of integrated information systems developed for the production, marketing, sales, accounting, financing and personnel units of the enterprises from a common data center. All units are functionally related with this form of application (Newman, 1991).

Information management processes are also relationships and interaction management. For the effectiveness of information management systems, the value of employees' contribution is determined by the quality of the added value that person provides to the information management system rather than his/her position in the organizational hierarchy. The responsibility of management here is to adopt the importance of information management and to provide the necessary infrastructure, resources and financial support during the installation and operation of the system (Davenport & Prusak, 2001: 215).

2. COMPONENTS OF INFORMATION MANAGEMENT SYSTEM

In this section, Information Management System Components in Businesses, hardware systems, corporate information management system programs, reporting and MIS system applications are discussed as risk management and business continuity.

2.1. Hardware Technologies in Digital Transformation Process

Information-based technologies that enable information to be processed practically and transformed into useful forms of service for people are called informatics. Technologies in information systems are examined in four categories: software, services, equipment and hardware (Cengiz, 2019). Hardware technolo-

gies are classified as telephone, computer and electronic hardware. These tools are the infrastructure technologies required for information management systems. Network technologies (network) software and equipment connection systems require physical communication tools and constitute the infrastructure of information management technologies. Within this context, network technologies and interconnected systems play a role in producing, sharing, merging, internalizing, socializing and externalizing information (Karabağ, 2005: 311).

Digital system technologies constitute the last phase of the transformation of electronic data transfer methods. Digital communication is the communication performed with a new technique called binary, instead of the analog system, which has been used until recently and allows the information to be sent and received over a frequency by changing the electromagnetic current values. This system allows arithmetical creation, storage, processing and transfer of information units (data) in binary order (Yahyagil, 2001: 10).

With the Third Industrial Revolution, electronic and information technologies have been integrated into production, and Industry 4.0, a concept introduced in Germany in 2011, followed this period, during which computers and the internet were moving at an unprecedented pace and which was called as the informatics revolution. In this process, the new technological plane is described as digital transformation (İrge, 2020: 140).

In the study of Rusman et al. (2015), the system structures in industry 4.0, which was described as digital transformation process, are listed as Internet of Things (IOT, IoT), Big Data and Analytics, Additive Manufacturing, Cloud, Advanced Robots, Simulation, Augmented Reality, Horizontal/Vertical Integration, and Cyber Security.

It is observed that these technologies are the most used and discussed concepts in Industry 4.0. Corporate networks connect all local and remote departments, branches and external stakeholders of the enterprise to all places where network connections can reach, regardless of the distance. In this way, the integration of all processes within the enterprise is ensured through the information processing software and hardware providers. Corporate networks also hold many applications for the data security of the system with their software and hardware infrastructures which support hundreds and thousands of users. Corporate networks ensure data exchange by connecting many systems, such as computers, printers and servers. Corporate network systems, and mainly the

data sharing tools, servers, main frames, firewalls, network devices, network connections and intrusion detection systems are the most important parts that constitute the Information Processing Centers (Akbaş, 2010).

2.2. Corporate Information Management System Programs

Information Management Systems include stages such as the creation of demands for corporate programs that will perform the managerial transactions of the business processes of the functional units within the enterprise such as the execution, control, audit and corporate resource planning in an integrated manner, supply processes, commissioning, security, backup, and updating.

Advanced information technologies have become an indispensable part of enterprises in today's competitive and rapid environment. One of the advanced information technology systems widely used worldwide is Enterprise Resource Planning (ERP).ERP is a computer-aided business management system having a wide integration feature that covers all functions of an organization. ERP system gathers a wide range of planning, operation and accounting functions in an integrated structure such as production, production planning, accounting, finance, logistics, inventory management, procurement, marketing, quality management, maintenance/repair, human resources, and customer relations management (Levine, 1999).

ERP- Enterprise Resource Planning systems are one of the most important information software technologies that continues its development rapidly. In this respect, the value that ERP systems provide to enterprises and the reflection of this value on performance gains importance. ERP seems to be a management information system that will always be up-to-date for researchers as a system that is constantly evolving and will continue its development in parallel with technology. In addition, high objectives of the system for the enterprises, an integrated software application system, a general coordination, and a coordination covering the entire value chain are the issues that will attract the attention of the researchers (Gök, 2005: 402).

Enterprises need technological tools and programs (software) to meet changing customer demands regarding production, supply, quick delivery, better quality and service. Global companies must be able to access timely and accurate information and have the conditions they will use when necessary to manage resources at different addresses. Sometimes decisions involving differ-

ent time zones and geographical regions may have to be taken simultaneously in an interactive manner with each other (Palanisvamy & Frank, 2000).

The reasons for the need of a program open to functional units in the corporate structure that will provide general follow-up and control of the works carried out in enterprises can be listed as follows (Davenport, 2000: 152; Ross and Vitale, 2000):

- Automation of background works,
- Coordination between units physically distant from each other,
- Providing common terminology between different units of the enterprise,
- System requirement that can manage processes and facilitate the way of doing business between units,
- Existence of a system that enables managing information systems and technological infrastructure,
- Performing strategic planning studies,
- Cost reduction expectation,
- Managing the expectations of the broad customer environment in the processes,
- Coordination between functional units and integrated way of doing business

2.3. Reporting Management and MIS Applications

- KPI Designs in Integrated Systems, Unit Based Performance Reporting Systems,
- General MIS Applications, Senior Management Reporting Processes

Integrated reporting in enterprises is a holistic reporting model suitable for the business purposes in line with the organizational strategy that predicts the risks and opportunities that the organization is expected to encounter at every stage, establishing the interaction between performance-oriented, financial and non-financial data in terms of creating corporate value. Integrated reporting is among the most critical processes of systematic information management for the overall efficiency of the enterprise in terms of the quality of corporate reporting, and the quality and speed of business decision processes (Öztürk, 2019).

Integrated Reporting has been defined by Mervyn King as “a report in which the company activity clearly describes the link between key finance and sustainability issues and how sustainability issues are integrated into the long-term strategy to sustain value creation”. Integrated reporting (Integrated Reporting Turkey Network-ERTA, 2020) aims to:

- Improve the quality of the information provided to financial report users,
- Bring a more holistic and efficient approach to corporate reporting,
- Strengthen accountability and manageability,
- Encourage short, medium and long-term value creation.

Corporate reporting in enterprises aims to provide the information needed for any action taken by employees, investors, customers and other stakeholders. Corporate reporting can be called as the "information function" and also the "transformation function". While the information function assumes that it will not receive any feedback from the counter party, transformation function relieves this assumption by allowing interaction with the counter party (Eccles & Serafeim, 2014: 2).

Quality management systems (QMS) reveal the necessity to make processes and therefore performance assessment of the entire organization for continuous improvement. Performance management is measured and assessed at all levels of the organization at various levels. In this way, the achievements of the organization can be measured. Effective and efficient use of business resources can be possible by measuring the management performance of the organization. To do this, it is important to define all processes and business steps for the objectives of the enterprise, stakeholder expectations, strategies and goals with measurable parameters (KPI) (Karatop et.al. 2017:1).

KPIs defined in the corporate performance model are the indicators that were determined in accordance with the objectives of the enterprise and measure the degree of achievement to these objectives. The points to be considered during the establishment and usage stages of the KPI system can be listed as follows (Chan & Chan, 2004):

- KPIs must focus on critical performance points of the organization,
- The KPI system must consist of only a limited number of indicators suitable for a manageable purpose,
- KPIs must be used systematically,

- The data collection phase of KPIs must be designed to be quite simple,
- In order for the performance measurement to be effective, it must be understood, accepted and adopted by the persons in the organization,
- It must be changed and developed over time to keep step with the organization.

With the rapid development of information technologies, information production has increased in almost every sector and information stacks have started to form. It is of utmost importance to identify and access the correct information that can be used for the purposes of the enterprise among this stack. The most important problem encountered with this access is the processing of this information. At this point MISs come into play. Thus, information that is determined to be valid for the purposes is processed and reporting that will contribute to the correct, effective and efficient operation of the enterprises can be made (Ünal, 2018).

Management Information System (MIS) are systems that are directly related to the management, organization and technology components in the processes of the enterprise and can provide direct coordination between these components, and assist the operation of the organization. When this basic operation architecture is examined, management, organization and technology components constitute the inputs of MIS. System outputs are the results of reporting and decision processes that meet various goals. During this process, increasing the qualitative values of the outputs is provided by feedback to the management (Laudon & Laudon, 2014: 22).

2.4. Risk Management and Business Continuity in Information Management Systems

Risk Management and Business Continuity in Information Management Systems is a sustainable measure program process, including the software in the systems used and the data generated during this process and other information sources, hardware and the entire physical infrastructure, as well as the possibility of disposal of human resources responsible for their use and operation.

The importance of information security has increased with the widespread use of information systems and network technologies in recent years. The key concept in the operational processes of information security is risk analysis. In order to identify and improve the level of security in systems, it is necessary to identify existing risks, analyze them, develop countermeasures and, in short, manage them. Using specialized methods in risk management will be useful for

organizations as it will bring a more planned understanding to their future works (Aktaş & Soğukpınar, 2010).

Risks that may arise in enterprises can be grouped as errors, tricks, abuse of assets, lack of security, natural disasters and violence events. While some risks concern the entire enterprise, some risks are associated with a single unit or activity of the enterprise. For the assessment of risks, it should be identified first which of these risks the enterprise encounters (Doyrangöl, 2001).

Information Technologies audit focuses on identifying risks related to information assets and establishing controls (risk management) to reduce or eliminate these risks. One of the objectives of IT audit for the protection of information assets is to review and assess the suitability, confidentiality and integrity of the information systems of the enterprise. Accordingly, IT auditors seek answers to the following questions while performing their audits (Güneş et al., t.y):

- Are the information systems of the enterprise always available without disrupting the work flow?
- Is the information in the system accessible only by authorized users?
- Is the information in the system always accurate, complete, reliable and current?

Information security is vital as the enterprises are dependent on information, technology and systems, and the need to protect information assets from damage arises from this. In terms of business continuity, it is very important for the strategic future of the enterprise to include the factors such as information technologies security, physical security, risk management, and compliance with laws and regulations among the priorities of the management since they support the various obligations for employees, business partners, customers and society. From this point of view, technical and technological infrastructure investments that will ensure business continuity and preparations for disaster recovery scenarios also support the reliable, open and honest corporate image of companies (Suderbay, 2014).

3. CORPORATE PERFORMANCE IN INFORMATION MANAGEMENT SYSTEMS

Depending on the Corporate Performance Management and Strategies of Businesses, modeling the performance in Information Management Systems makes the performance of process and functional based information manage-

ment systems more efficient. For this reason, it will be more efficient to examine Corporate Governance Performance and Management Performance of İnformation Systems modeling separately.

3.1. Corporate Performance Management and Strategies

Under global competition conditions, companies should be able to develop creative strategies for the future, and employees should focus on these strategies and objectives in terms of the success of the process. In order to generate their strategies and for the sustainable growth, enterprises should increase the efficiency of the processes in all their functions. In this sense, the program that enterprises apply for the purpose of increasing their performances is the corporate performance program or the corporate performance management (KalDer, 2006: 12-13).

The performance of an enterprise is defined as the success of that enterprise to achieve its purpose or performing its duty. In other words, the corporate performance is interpreted as the relation between the resources that is provided to the employees of the company on the purpose of performing the given duty within a certain period of time, and the results obtained. (Halis & Tekinkuş, 2008: 228).

For the success of the performance management, its stages need to be planned very well. Accordingly, in the processes about measuring and evaluating the performance, it is very important to act according to the stages mentioned below with regard to the performance management (Aktan, 2005: 263):

- Establishing the performance plan and setting its objectives,
- Determining the differences between the existing performance level and the desired performance level,
- Carrying out analyses about how to evaluate the new information necessary for the improvement of performance and how to use the outputs effectively,
- Deciding on the methods and techniques that will be applied for the evaluation and measurement of the performance.

Corporate performance management aims for the sustainability of operational efficiency and strategy-oriented development. This process involves analyzing the process performance and taking actions against the deviations from the objective and if necessary, setting the objectives again. Thus, with the per-

formance-oriented management mentality, enterprises can produce high incomes by identifying the revenue opportunities better, respond to the ever-changing market conditions much quickly and ensure the establishment of the continuous development culture within company (Coşkun, 2006).

The performance of the corporation can change in time. The success of the enterprise can switch the satisfying success level towards a higher level. Because the managers can raise the expectations together with the increasing performance. On the other hand, in case of a decrease in the performance, they can reduce their expectations (Donaldson, 1999: 38-39).

3.2. Corporate Performance Modeling in Information Management Systems

Organizations put into practice the performance management models on the purpose of bringing their processes, technologies and human resources management to a more perfect status. Performance management models distinguish themselves as an ever-growing area with the studies on the subject of performance measurement recently. Total Balanced Score Card Model, EFQM (The European Foundation for Quality Management Excellence Model), etc. models offer an objective outline for the enterprises (EFQM, 2009).

The relations between the organization and strategy of the information management systems of an enterprise should be defined clearly and the objectives should be comprehensible In this context, the study developed by Papalexandris et al. is a guide as an integrated model to be able to apply BSC (Balanced Score Card) Model to IMS and integrate it to the information organization. Afore-mentioned model consists of 6 stages (Papalexandris et al., 2005: 214-227):

- **Preparation Stage for the Project:** The very first step to ensure the success of any project is to determine the vision of the project, thereby to prepare the draft of the detailed project plan including the critical milestones and potential alternative scenarios, and the limits of the coverage area of the project and the budget.
- **Comprehension of Vision and Strategy:** In this stage, the project team should comprehend the internal and external environments of the organization, which will assist to better understand the pursued strategic aspect.

- **Identification of Strategic Priorities and Objectives:** In this stage, the aim is to come to an agreement on achieving the strategic objectives of the organization and preparing the strategy map.
- **Selection of Performance Measures:** A practical approach in selection of the performance measures is to establish a potential measurement pool that primarily represents every strategic objective at a satisfying level.
- **Making the Project Applicable:** One of the key activities to set the objectives is to operationalize the strategy, such as determining the challenging objectives for each of the defined measures.
- **Operation and Implementation of the System:** In this stage, the project team should have developed a plan in order to reevaluate the convenience of the strategic objectives, performance measures and default connections of them (cause and effect relations between default factors and expected results) periodically.

The EFQM Information Management Outline, which has been developed as a performance management model that can be utilized in the information management environment, was presented by Rob Van de Spek and Geoff Carter. The information management outline is based on nine criteria that take part in the EFQM Perfection Model with regard to specific information management subjects. Such nine criteria are: Leadership, Employees, Policy and Strategy, Business Partnership and Resources, Processes, Employee Results, Customer Results, Social Results and Key Performance Results. Information management, by way of associating with these criteria, can be converted into integrated situation with self-assessment according to the EFQM Model and thus, with the EFQM Perfection Model based on a sound basis, the gap between the isolated information management initiatives can be closed (EFQM, 2009).

4. THE RELATION OF INFORMATION MANAGEMENT SYSTEMS AND CORPORATE PERFORMANCE IN DIGITAL TRANSFORMATION

The Corporate Performance Relation of Information Management Systems in the Digital Transformation process has been evaluated based on the performance of the Information Management Systems' functional units and the effectiveness of the decision support processes in these units.

4.1. The Role of Information Management Systems on the Performances of Functional Units

Developments in information management systems make a positive contribution in terms of speed and reliability in the collection, utilization and reporting of the information at every stage of the operation in functional units of the enterprises, and then transferring to the decision making units. Adaptation of the enterprises to the developments in software and hardware technologies provides convenience in decision processes through enhancing information communication and speed as well as competition advantage. Therefore, the strategic importance of the information management systems has increased, and providing the most up-to-date and state of art information technologies became obligatory for the enterprises (Rahman, 2017).

Corporate information systems are the most important information and data source in the management of the processes of the functional units, establishing systematic structures of information systems and coordination of performance efficiency in enterprises. Corporate information systems are the systems that coordinate the follow-up, analysis and decision processes of all functions by executing the flow of information between the shareholders - from suppliers to the customers - of the enterprises sturdily (Wallace & Kremzar, 2002).

The quality and performance of the organizations in their strategic plans can be possible via the effective and coordinated operation of information management systems with all units. It is essential for an enterprise being capable of doing strategic planning, the flow and coordination of the data relating to all processes in that enterprise's functional units via information management systems. In functional units of enterprises, these data provide an opportunity for the management of corporate plans such as production and cost, investment and financing (Akpınar & Bay, 2016).

One of the most critical issues that can make enterprises successful in a competitive environment is to have knowledge and their skills to use it. In this context, companies that have improved their processes in the information economy and information management will have competitive advantage. The information economy necessitates the enterprises to produce information, share it in the functional units, develop it; in brief, to have an information-oriented structure. Based on this, the information management will transform it to a factor that will provide a competitive advantage in many subjects such as organizational creativity and innovation, motivation, communication, culture of an enterprise (İnce & Oktay, 2006).

Effective information flow and information management system coordination between the functional units is necessary for a successful business performance in the enterprises. From time to time, the enterprises have difficulties in ensuring coordination and data flow between the departments at all the stages of the supply chain. When the data transfer flow is weak, it causes wrong and inefficient decisions, hence the failure in the main fields of activity such as supply, production and logistics. On the other hand, the subsidiary processes will also make related performances among the functional units weak. The constitution of an effective information flow between the departments will provide an important competitive advantage to the enterprise by producing efficient outputs in the sense of customer orientation such as providing correct products on time. Customer satisfaction realized as a result of these will increase the enterprise performance with the growth in sales and profitability (Aytekin, 2018).

4.2. The Contribution of Information Management Systems to Instant Monitoring Applications and Decision Support Processes

One of the basic duties of business managements is to build an efficient decision support system that will ensure the achievement of the company's vision, mission and goals and to ensure the realization of the decisions taken in the system. Therefore, a management model that is incapable of operating the decision making mechanism sturdily is out of question. Structurally, the decision processes in the management is a decision-making systematics that will make the actions and operational mechanism successful (Çavuş, 2008: 13).

With the effective use of information management system technologies in public institutions and organizations along with the enterprises, enormous developments have started in the decision-making processes at the stages of public policy planning. The fact that managers possess the necessary information in decision support processes more quickly and reliably has contributed to the integration of decision centers. Data gathering from a great number of functional units, analyzing them and the large capacity investments in the units that will provide them for the registration procedures enable access to the necessary information for the decision processes on time. Thereby, they contribute to take rational decisions by offering decision-maker persons or units the opportunity to consider existing alternatives more effectively by means of various models (Iraz, 2011: 416).

The managers are responsible for the basic functions in the enterprises. In the new management methodologies, managers who make decisions should have knowledge basis to have knowledge in many fields from psycho-social competence to mathematics. The manager also needs intellectual and intuitive skills to guide, convince by directing, and establish good relationships with his /her colleagues along with his/her subordinates-superiors and co-workers (Dale, 1999: 138).

The managers also have responsibility to actualize the decision-making processes in the organizations. During this process, certain obstacles may occur in determining the policies of the enterprise and decision processes. Primarily the complication of the decision process, incomprehension of it by the employees, inefficiency of the information gathering stage, strictness of the rules, over-reliance on the prior rules and implementations in the management make the decision-making processes difficult. Besides, the authority and responsibility imbalance, strict centralization, heavy going bureaucracy and hierarchical structure, inadequacies of technical infrastructure of information that will provide communication are the main factors that affect this process negatively (Aydın, 2008: 18).

Information Management Systems are a kind of management support system that constitute the infrastructure of the decision processes aimed at the prediction of the prospective planning of an enterprise with planning, execution and control of the activities in the functional units of that enterprise. IMS focuses on internal activities, rather than external activities, and supports planning, control and decision-making functions at management and manager level. In general, IMS works in the way of network management via the electronic data processing systems that provides information flow for the data needed (Tekin, Güles & Öğüt, 2003: 189).

4.3. Corporate Performance Management of IMS in Digital Transformation

In order to obtain sustainable competitive advantage, enterprises should move all their processes to an “information management” based structure. Therefore, it is seen that enterprises are in a struggle for improving their excellence continuously in information management, and their competence in producing, using and sharing the information. The continuous development in hardware and software issues makes a visible contribution to the improvement

of the processes of the enterprises, and at the same time affects the competitive capacity. Along with the powerful information management systems that would increase the effectiveness of the corporate performances, managers should develop effective strategies that would add value to the competitive capacity such as integrated innovation efforts, professional experience and talent (Iraz, 2005).

There are studies in which Information Technology tools are ranked from the most routine to the most complex and where the change of the effects of these systems by sectors are evaluated. For example, in the service industry where the relation between Information Technologies and organizational performance criteria is analyzed, in a research conducted at the hotel managements, the performance criteria that were observed to be affected most in the enterprises are: productivity, financial resources, reputation and customer loyalty, cost reduction, differentiation, new product and quality service (Turunç, 2016:245).

In a study conducted by Saydam, Mesci & Kılınç (2014) with the hotel managers, when the effect of the information technologies on the performance of the enterprise is examined via performance prism, it was observed that managers participated positively and give value to the shareholder contribution, shareholder satisfaction, strategy, process and competence aspects that constitute the performance prism, and that these aspects have a major contribution on the information technologies. It is stated that information technologies provide important advantages to the managers in the decision-making stage; about velocity, productivity and making new decisions.

As the usage area and users of the information systems gradually broaden, a structural complexity may arise. Thereby, Information Systems have unlimited areas in the sense of its objective and the definition of its stakeholders. This broad area makes it difficult to measure the Information Systems Management's performance over the system. However, a consistent measurement technique can be developed over the main parameters that will be determined in consideration of the information quality, system quality, usage and results. Even though the information systems and the success criteria of these systems have become more and more complex, it will be possible to evaluate the system performance and the success of Information Systems with the parameters stated (DeLone & McLean, 1992: 5).

Nowadays, in the gradually digitalized supply chains, physical papers and documents leave their places to electronic data; and algorithms, software and smart cognitive systems become widespread in decision processes. The digitali-

zation in the industry leaves the way clear for decisions to be made in the supply and value chain more accurately, much faster and based on more data and information. This ensures the establishment of a more transparent and integrated ecosystem. In the near future, the adaptation of the companies to the ever-increasing and changing requests of their customers in either national or global trade networks quickly and effectively will only be possible with the digitalization of their supply chains. In the digitalization process, smart contracts, electronic orders, electronic invoicing, public-domain software, digital signature, corporate resource planning and customer relations management systems, radio frequency tags, sensors, images and voice recognition technologies, Internet of things and cloud computing technologies come into prominence in the supply chains as applications. Accordingly, ensuring electronic data exchange among all stakeholders in a healthy and secure way for the effective use of digitalization gains importance (Ulusoy et al., 2002: 14).

Evaluating the digital transformation in the industry only as setting up a technological substructure which will provide a complete automation of the supply and value chain processes, developing new business models for setting up an integrated supply chain, or ensuring the more effective use of large data compiled from the Internet of things and other applications in the decision processes by using various tools such as artificial intelligence, machine learning, optimization, and ignoring the human factor will result in the failure of the companies to sufficiently evaluate the transformation process. Therefore, it is necessary to transform the human capital as required by the digital transformation (Ulusoy et al., 2002: 19).

The success of digital transformation projects depends on many factors. These factors can be legal and political as well as economic, sociological, and technological. McKinsey (2018) gathered up these factors briefly in five basic categories such as leadership, education, human, technology, and communication. Lacking of one or more of these might cause the digital transformation fail. Today, the effective use of these five factors only depends on a successful information management system substructure. In an insufficient information technologies substructure, a digital transformation success cannot be expected (Dündar, 2020).

In parallel with the changes in the global scale, the alteration of the way of doing business of the functional units during the digital transformation processes to a large extent made it necessary to define a new business culture in the enterprises. Therefore, for the leadership support to digital transformation with-

in the organization not to cause in-house disagreements and conflicts, a strong management support is mandatory. Hence, for the success of the processes, it is important for the human resources to be ready for this transformation. Therefore, the need for the business models that will respond to the ever-changing request comforts of the customers and that will operate the algorithms of these processes productively and effectively; and the need for a qualified, digital competence based human resources that will operate an information systems substructure and policy which is open to the sustainable digital inclination are inevitable (Evren, 2020).

CONCLUSION

At the present time where digitalization affects all processes in business and social life, it is obvious that enterprises should have a powerful system substructure to ensure competitive advantage and to achieve their corporate sustainability objectives. With the rapid development of the technology, it is seen that management, control and coordination of the business resources and processes evolved rapidly from human-centered management models to the cybernetic systems where systems control systems.

Together with this rapid development which may be defined as the proliferation effect of digitalization, today, all supply chain applications, production, distribution, marketing and financial processes tend to rapidly transform into new business models defined by digitalization. The new type Coronavirus health crisis declared by the World Health Organization as a pandemic (a global outbreak) on March 12, 2020 caused major changes and developments in a very short period of time. This outbreak showed that physical mobility which is called human mobility will decrease day by day and digital communication will become more intense either in professional or social life.

The e-commerce experience of relations between enterprises and customers at global scale has already begun to transform digitalization in enterprises as a way of doing business methodology and a substructure at a conceptual extent has already started to distinguish itself. Thus, these new ways of doing business in business processes made it obligatory to develop and strengthen the technical substructures, integrated corporate programs, and software and hardware substructures in the information management systems of the enterprises, and to transform them into a format which is correlated to global development. Enterprises must consider and define these technical substructures not only for im-

proving their processes, but also as a way to survive and continue to exist in global competition. Because, the ability to do business in the new world order will be as much as the digitalization capabilities of the enterprises. In order for the enterprises to ensure this, they have to raise their digital attitudes, make digital inclination and digital intelligence parameters a part of their processes in their human resources preferences, especially in the selection of executive teams, in short, each enterprise have to train their own digital leaders and re-define the human resource competencies. The digitalization that started at the global scale with the industry 4.0 which is the industrial aspect of digitalization, has turned into the brand strength of the companies rather than being just an expression. Today, where the digital skills of the brands have started to be used as a marketing tool in the industry, it has become inevitable for the enterprises to transform their vision, mission and objectives into a process they re-defined.

In parallel with all these developments, it is obvious that for the enterprises to be able to increase their corporate performances depends on investments in information systems that can manage these systems. It is very important for sustainable business life to consider the information systems management as the follow-up and control center of the vital functions of the enterprises with regard to measuring and controlling the corporate skills of the enterprises and preparing a substructure for decision-making processes. Nowadays, in order for companies to obtain a successful and sustainable competitive advantage, transforming the development journey of digitalization processes into an enterprise policy by the top management, generating the management systems procedural substructures convenient to these processes, making data processing technical substructures suitable for the conditions that can manage this technology and being inclined to form an all-out digitalization culture with the team members and managers who have digital competence that have the ability to manage all these processes are considered as an inevitable obligation, rather than a suggestion.

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CHAPTER 16

CORPORATE MEMORY IN INFORMATION MANAGEMENT

Nuran Varışlı

INTRODUCTION

Understanding knowledge and institutional memory as a basic resource is a must for society's survival. If this does not happen, the waste and inadequacy of technological resources, the accumulation of information stored in inadequate and incompatible media, ignorance of information gathering and consequently inadequate use are inevitable. The concept of knowledge, if related to the phenomenon of corporate memory, can be understood as impressions that are part of the more general picture of memories that make up the collection of individuals' experiences.

In this context, the phenomenon of institutional memory is nothing more than the results of dynamic organizational systems, both in biological and psychological aspects and exists only to the extent that the organization maintains or reconstructs them. In this way, various possibilities of preserving memory and history should be created in institutions. When the role of organizational individuals in the cumulative transformation process is noticed, the socially transmitted message gains memory status.

This paradigm has been replaced by a cognitive paradigm to evaluate the search for information as a cognitive process and to meet the needs of the subject. In this context, the aim of information science is to examine the relationships between discourses, knowledge fields and documents regarding possible perspectives or access points of different user communities. When the role of the subjects in the cumulative transformation process is noticed, the socially transmitted message gains memory status.

Institutional memory knowledge debate is nothing new, but information management brings an innovative approach to how it can be perceived as an

institutional entity that needs to be managed to promote corporate development. Therefore, one of the most important challenges facing information society organizations is to develop systematic practices to manage self-transformation. Institutional memory information management is the subject of analysis and implementation in organizations, given the complexity of the competitive and changing external environment. Knowledge management optimizes efforts and reduces rework, and also prevents loss of information from dedicated teams at the end of a project.

It also uses the concept of lessons learned as "learning achieved in the process of running the project". Accordingly, corporate memory is the process of recording and storing the knowledge, procedures and skills of the employees. The purpose of this work is to present an Information Management application that is used to organize, protect and make the corporate memory information collection available. As such, our study was designed with the source scanning method, which is one of the qualitative research methods.

Mankind has always been interested and endeavored since the beginning of humanity to preserve their knowledge and memories so that future generations can access this information. The first people represented their daily lives on the walls of the caves, then with the development of language and the invention of writing, this information can be said to be mostly preserved on paper in works of art or information supports.

Libraries and archives played a decisive role in the preservation of these works. In this way, information units were created to protect the memory of society at first. The preservation of these works is important for future generations to understand and contextualize them and for the culture of their people.

In this context, museums, libraries and archives play a decisive role that is responsible for the conservation and longevity of these works. This is the main function in which organizations determine the importance and legitimacy in the social context. The main function of this strategy is to protect the information content; so, it updates the content for more used digital objects that are different from other types of strategy that aim to crystallize the digital object in its original form.

In this sense, it aims to ensure that the integrity of information is always transferred from an earlier technology to a more modern technology between the information medium. Such a strategy can be an alternative to migration, which can become very expensive for the organization over time. The digitization process then requires copying, which also targets access that will be beyond the act of propagation.

1. CONCEPTUAL FRAMEWORK

1.1. Information and Information Management

We live in a society that is bombarded with more and more information. Therefore, organizations need to produce reliable and high-quality information for employees to use. In doing so, organizations begin information management appropriately. We can define information management as the process of producing wealth based on the knowledge or intellectual capital of the organization.

This wealth occurs when an organization uses the information to create value for the customer through more efficient and effective processes. This has an impact on financial results because it reduces costs by not reinventing or reducing cycle time; getting what you need faster and delivering it faster to the customer improves the cash flow.

As a result of changes in the transition to an information society, as well as changes in management, customers, competition, market structures and organizational sense, the classic paradigms of the concept of governance have changed, and IC has become a highly valued aspect of business (Özer, Ergun & Yılmaz, 2015:143). We can see information management more broadly as the deliberate and systematic coordination of people, technology, processes and organizational structure to add value through reuse and innovation. This coordination is achieved through the creation, sharing and implementation of knowledge, nurturing valuable lessons learned and best practices for corporate memory, and promoting continuous organizational learning.

Information management can be done on paper or digital media, in pictures, videos, etc. It is the management of the information that is clearly revealed in the documents. In this management, documents are used for strategic support in decision making, to guide their operations, meet legal issues, protect corporate memory, etc.; these are selected and classified by considering those which are useful for the company. By using appropriate tools and methodologies, it is possible to create an appropriate environment for managing and targeting intangible assets, creating, sharing and distributing them, and making management and decision making processes effective.

The current economic context is characterized by high competitiveness, consumer complexity, and the rate at which changes occur. For this reason, operational efficiency based on cost reduction increased productivity and prod-

uct improvement is essential for companies to compete in their markets. At the same time, such companies should be flexible enough to offer their customers quality products and adapt to their individual needs and characteristics.

In this turbulent environment, the company has no sustainable competitive advantage, except what it knows, how it manages to use it and how quickly it learns something new. This forces managers to look for new ways to lead an organization to ensure growth and gain a competitive advantage in the market. To achieve these goals, companies need to constantly review their production processes, products, and relationships with customers and suppliers. Besides, it is always necessary to innovate at the speed with which changes in the organizational management style occur.

In this sense, information management, which is a much more managerial concept than a technological tool, can be seen as a tool for companies to gain competitiveness. In order to reach the information needed in management decisions, the information system must be used effectively (Lucey, 2004: 2). Thus, information management means organizing and systematizing the ability of capturing, producing, creating, analyzing, translating, transforming, modeling, storing, disseminating, distributing and managing both internal and external information at all contact points of the company.

Information can be viewed as a set of information that is recognized and integrated by the person within a pre-existing plan. This means that information is transformed into information through the intervention of people by recognizing or integrating this information. Information is closer to action and is about the wise use of information. Knowing is transforming the object and transforming itself. The education process that changes nothing denies itself. Knowledge is born neither by the individual nor by the social environment. It improves subject knowledge in interaction with both the physical and social environment (Tonta, 2004).

The origin of knowledge is human work, because mankind is socially constructed. After all, it faces some kind of problem in its daily activities. There is learning only when a man overcomes difficulties in interacting with the world and transforms this fact. Information is obtained through the interpretation, consolidation and integration of various information leading to an understanding of the situation under examination (Tonta, 2004). This means that information is connected to the past. Consequently, it is essential to use methods and processes to obtain the necessary information for the decision-making agent. The main

purpose of the information is to help the company achieve its goals. It provides a dynamic process that enables the manager to position themselves in any situation, focusing on the efficient use of existing resources which consist of people, materials, equipment, technology, funds and information. Information Management is a series of processes used by an organization and controlled by its managers (Gümüştekin, 2004: 3-4):

- ➢ Collecting and storing data about its operation;
- ➢ To transform this data into strategic information through analysis mechanisms and
- ➢ Using this data in decision making and behavior change.

Data represents the smallest recordable unit of an organization. The data is understood as a series of elements that express an isolated truth produced by a controllable activity, that is, everything produced in the company's daily activities. Isolated data are characterized by the fact that they have no meaning or objective meaning. In order to make any assessment of the company and to know if it is good or bad, various data available in an analysis process must be organized, classified and cross-checked. As such, information is the result of analysis with the available data. These analyzes are already logical and allow an accurate assessment of an organization's reality (Özdemirci, 2001: 19-20).

For example, when we have a few quarters of a company billing (and no longer isolated data), we can already understand what happened to it. This type of information can already be used by administrators to decide what to do next. When the company systematically changes some aspects of its behavior according to the information it produces, we can say that it acquires new information (Chaffey, 2010).

1.2. Definition of Memory and Corporate Memory

The corporate memory emerged as a new movement within universities. In the following years, in the corporate world, it started to gain a place in the production of corporate works. However, in order for corporate memory to cease to be a special theme of the celebratory moments, it can be said that organizations must also include management of information heritage. Since the 2000s, as a "historical responsibility" that gives a new meaning to the corporate memory and sustainability principles, it has reinforced itself as a tool that supports communication and relationship management with stakeholders.

Corporate memory projects should be understood in the premise that the history of a company reflects the construction of information by a group of people and the community, underpinning corporate values and emphasizing the reputation of companies and brand characteristics. To this end, corporate memory projects should be supported by systematic analysis and organizational work that covers the most relevant, concrete and intangible aspects of the trajectory to be described, disseminated and distributed. Organizational memory products which are the finest ones such as publications, films and web sites can change to complete document and information management programs like documentation and application of memory sciences. It is necessary to understand that corporate memory is a working concept in which the raw material is extracted for various applications. Organizational memory products which are the finest ones such as publications, films and web sites can change to complete document and information management programs like documentation and application of memory sciences

Corporate memory is, in the broadest sense, an information community created by recording activities and transactions in a company. Corporate memory can be divided into 2 stages according to the level of development of the management systems of companies (Yereli, 2017).

1.3. Account Management

Management accounting includes the process of preparing the information the manager needs to plan and control the activities of production and commerce. Management accounting links the management process to the accounting process (Çelik, Aslım & Yılmaz, 2013). Management accounting prepares databases to make various management decisions (operational, tactical and strategic) based on transaction accounting. It provides full information to managers to make operational and tactical decisions.

In addition to accounting data, the data obtained as a result of special research should be also used to make strategic decisions.

Management accounting is often perceived by people as accounting only. However, according to the process management approach, the concept of management accounting is a broad concept. Process standards, accounting, corporate reporting and document flow accounting are also very important foundations for decisions to be taken (Alagöz & Ortakarpuz, 2018).

It is not enough to remember past activities for making a decision. Accessing the data in memory quickly, coordinating the data and getting all kinds of

reports is as important as memory itself. The brain is considered a large memory store in humans. However, when there are problems with the nervous system collecting and processing information from the brain, people cannot remember the past, even if the information is stored in the brain. Or they experience short-term memory loss and memory impairment.

1.4. Corporate Learning

Applying the concept of corporate learning with effective learning methods in order to develop human capital that adds value to the company and its business provides sustainable development and competitive advantage for companies by directly affecting corporate culture and company performance. A company learning faster than its competitors can be one step ahead in the competition. In this study, the first topic addressed in the corporate learning system is the business process, the legal framework, and the system for reviewing these regulations. Competence in regulations is essential to a corporate system (Bayraktaroğlu & Özen, 2002).

Of course, this problem stems from the fact that the employees performing these processes do not have the necessary process skills and do not know how the process works or how to solve the problems that may arise. The database of all the regulations developed by the company and the training system designed to provide technical information about these regulations will largely eliminate the problems related to the insufficiency of the employees. However, it is not enough to learn this technical information alone and the company's support for other subsystems within the Human Resources System is very important (Tekbaş, 2019).

Another issue related to the corporate learning system is the Corporate Database. The concept of corporate database saves the company from being dependent on individual experts, increases the learning speed by sharing a successful experience with all employees, and promotes the development of the company by increasing its innovative and creative power. The corporate database is a registration in a database that offers successful solutions to problems that arise in any process and whose solution has not been previously determined. The information in this database also acts as a corrective and preventive proposal, leading to the development of regulations for the relevant process (Ozan, 2008).

1.5. Processes of Corporate Memory

In the information society, information is the riches that produce wealth. Therefore, information and knowledge-related competencies are essential to ensure the employability of professionals and ensure the survival of institutions. Productive capacity is no longer entirely dependent on capital and equipment. Information and information assets are becoming increasingly more important. Success in the knowledge economy is the result of mobilizing a community's information and information assets and supporting companies to face a new business environment (Lahaie, 2005).

In this way, information cannot be confessed, and the problem of choosing the one that fits a particular job is becoming increasingly problematic as the attention of each individual is limited for accessibility. The issue is not the lack of information, but the correct establishment of the process of collecting, processing, correct and widespread processing of correct and relevant information for the solution of organizational problems. In this context, the organizations should also improve their applications regarding the use and reuse of information. Corporate memory makes it possible to define, save, use and reuse information and information created from the application (Gandon, Poggi, Rimassa & Turci, 2002: 699-720).

For example, universities are knowledge-intensive organizations. Therefore, every university should consider the importance of institutional memory as it allows capitalization, distribution, use and change of information and resources. Under this focus, information plays an important role and becomes one of the resources for an organization to survive and develop. In this perspective, Corporate Memory is a clear and permanent representation of information and critical information for an organization whose purpose is to facilitate access, sharing and reuse information among members of the organization.

Generally, corporate memory is a map of an organization with a great history of memories. Researchers argue that organizational knowledge is essential for organizational learning and adaptation. Therefore, the stored information should be useful and meet its important needs in the organization, and facilitate the acquisition of relevant information that adds value to its strategic goals (Simon, 1996: 41).

All processes, collaborations or conversions include information that may be evident or confidential. The experience accumulated over time is embedded in individual processes and procedures, but when individuals work together, the system used by the group to store and process information is more complex than

the individual prep. Therefore, it requires a unified memory system that allows access from group members at all times.

Structure - affects individuals' behavior and relationships with the environment. Individual roles provide the link between individual memories and organizational memory: these roles apply to the warehouse organization that stores individual roles as they standardize over time, define differentiation of tasks (Perez, Karp, Dieng, Corby, Giboin, Gandon & Mueller, 2000).

The physical structure and ecology of the workplace encode and explains the information. Physical configuration helps shape and strengthen behavioral prescriptions within the organization. In this way, it keeps information about the organization and its members.

The importance of external archives is that the organization is not the only store of its history. These resources contain information about the organization's history and can be obtained. In many cases, after comprehensive training in comparing best practices, it is recommended applications that facilitate the transfer of information, where their applications are identified, which suggest another benefit for characterizing and understanding the extent of these factors.

1.6. Types of Corporate Memory

Understanding information as a basic resource is a must for society's survival. If this does not happen, the waste and inadequacy of technological resources, the accumulation of information stored in inadequate and incompatible media, ignorance of information collections and consequently inadequate use are inevitable. The concept of knowledge, if related to the phenomenon of memory, can be understood as impressions, impressions that are part of a more general picture of memories that make up the collection of the individual's experiences (Megill, 2005).

In this context, the phenomenon of memory is nothing more than the consequences of dynamic organizational systems, both in biological and psychological aspects and exists only to the extent that the organization maintains or restructures them.

In this way, the various possibilities of preserving memory and history become knowledge created by several people. Knowledge is created and built socially. Socially transmitted message gains memory status when the role of subjects in the cumulative transformation process is recognized (Demian & Fruchter, 2006: 377-389).

1.7. Corporate Memory Losses

The Protection of information consists of techniques that guarantee the continuity/survival of the information represented in a particular environment. Concerns about protecting information are a feature of mankind, as it emerged with the first modern society. Given this practice, when questioning the reasons for this type of importance, we can say that it wishes to preserve the memory of man, wish it to be maintained over time, to be accessible by new generations. Such information has been protected by institutions created for this particular purpose, including libraries and archives, since ancient times.

In another context, given the importance of protecting information in modern society, institutional memory losses take an important place. Institutional memory in knowledge is a resource for the political action of the social subject transforming mental and social structures. In this way, potential value is given as a transformative tool of society, especially in the current social context where there is access to the Internet, as well as a large flow of information in information and communication technologies. As information and communication technologies became more and more popular and the population's demand for access to information increased, institutions felt the need to create stronger links with their people and the most effective way to achieve this. The goal of this is to protect and distribute memory (Gandon, Dieng-Kuntz, Corby & Giboin, 2002: 103-115).

The importance of using digital protection techniques basically consists of the advantages of organizing, disseminating and accessing information quickly and accurately. The dissemination of information can be shared within seconds, various forms of information can take, as well as solving problems related to the physical field, and some of the features of this technique that commonly occur in an analogue supported collection.

The institution is characterized by the formatting function that limits the basic rules of an organization. It is a structure that expresses similar behaviors, can be defined by the values of the rules of conduct, and that originates from basic social needs with a relative persistence character. At this point, institutions begin to have a superficial understanding of the importance of protecting the memory of the institution (Verma & Tiwari, 2009: 5311-5342).

It can be said that this scenario is reflected in the organizational environment, which is beginning to be more pressured by the masses, and because of the increasing circulation of information, its rights are more diverse and aware

of its rights. Thus, they started to contribute to the new consciousness of the society regarding their right to access information, communication technologies and information sharing. In this context, society has begun to demand a closer and more transparent relationship from companies and even the government in the same way within the scope of corporate communication with the community through the criteria and quality parameters of products and services.

Therefore, with the weakening of traditional forms of communication and the considerable loss of citizens' trust in the companies, institutions started to invest in protecting and spreading corporate memory by using them as a strategy to instill participants and listeners.

1.8. Managing Information and Corporate Memory

Today's society is characterized by a high degree of competitiveness. Contemporary organizations are placed in this environment; however, differentiation becomes a key factor in the development of products and services. The purpose of differentiation is in developing strategies. Differentiation consists of distinguishing the product from customers and creating something that is considered special to it. The business environment now requires effort to investigate the quality of its products or services, which is an important factor for an organization that aims to uniquely characterize its products or services. In this competitive scenario, there is information supporting the actions needed to create and maintain differentiation. During the interaction of the company and the customer, the information allows the necessary actions to provide a personalized service to the customer.

This customization is evolving to create more niche markets possible by getting more accurate information about these customers or niche groups: the limit of this trend is personalized so that every customer is considered a niche market.

Consumer information comes from information that determines differentiation. In the post-industrial society, organizations systematically seek a personalized treatment in the relationship with the client. In this context, the information enables "to provide individual service to the customer in the manufacture of highly personalized products, in removing or eliminating the barriers to entry to the market, in the regulation of value chains".

In this context, data are records that become information when they become meaningful and have no meaning in nature. These include facts, texts,

graphics, images, sounds, records that have not yet been processed, associated, evaluated or interpreted. Information is data that concerns, aims and affects the individual's judgment or behavior. They are already somewhat processed data and can be understood clearly by users who depend on information to make their decisions. The process of transforming data into information includes classification under some criteria.

Knowledge of the company is gained through learning. The more information a company has, the better its performance in the market. It is information that makes one company different from another. The company, which records more data, analyzes better and finds better information, develops more information. It learns better how to take advantage of the business model, which makes it better than its competitors (Brooking, 1999).

The biggest challenge for organization managers in regard of information is to ensure that they are truly used by the entire company. Knowledge is the same as learning and people or business units stop learning at different times. In other words, it is not always possible to guarantee that the information developed by the organization can be easily applied by anyone who is part of it (El-Diraby & Zhang, 2006: 504-521).

The most common is that this knowledge or learning occurs first in a unit, a department, or a single employee of the company that benefits immediately. A management effort is required for the rest of the company to access this information. This effort will aim to find this learning or new information where it appears and spread it throughout the organization and persuade everyone concerned about its importance. When the company can propagate this information throughout the operation, it means that it now holds it (Megill, 2005).

It can be said that the conversion of implicit knowledge into explicit information represents a process of change dependent on persuading people. Corporate memory in Information Management is, therefore, an effort involving at least four processes:

- ➢ Removing and storing data
- ➢ Analyzing and transforming data;
- ➢ Getting information from this information that produces new information;
- ➢ Spreading new information across the organization.

Globalization, the market's high competitiveness, the exploration of new technologies, the accelerated growth of the society and the speed of the organizations created a certain inattention to record and maintain the previous actions, events and results of the business. This data is important for planning final consultations, studies and actions, and reviewing strategies and prevents managers from repeating the same mistakes.

In this context, the concept of corporate memory is about storing and sharing an organization's information, gathering all the processes that are already underway, and being useful in future operations. These files are fed by the company's employees and managers and range from databases to technical and social aspects and experiences (Snyder, McManus & Wilson, 2000: 752-764).

Knowledge management means the ability of the manager or employee to solve a particular problem. This concerns the understanding of the processes taking place in the company, in addition to the ability of individuals to work in accordance with the set goals and objectives. When executed as desired, organizational memory prevents loss of information if an employee leaves the company, investigates the experiences of previous activities, prevents repetition of errors, improves the communication of information in the organization and integrates the processes of different sectors (Gray, 2002: 32-37).

Therefore, the need for companies to apply the concept of organizational memory to their routines is notorious because this method enables management of the information available in the company, thereby improving processes and expanding the competitive advantages of the business. Within the scope of corporate memory, information that produced inside and outside of the institution is used (Rajak, 2014: 259-280).

In addition to reducing the uncertainty of information for decision making, creation, selection and retention processes ensure that information is properly recorded, located and used, and therefore more information is produced by those who use it. In this context, the retention process is directly linked to the establishment of organizational knowledge bases, which will be presented and discussed later, and corporate memory between them. Corporate memory in this way includes all areas where an organization's human resources are structured, from the structure of intellectual capital to the technological structure.

CONCLUSION

Having knowledge of institutional memory, it is essential for the development of the organization to make a decision about the use of the manager, because the organization can achieve any benefit only by the effective selection of information. Decision making is based on available information on an issue considered to provide the user with a reasonable number of alternatives that are chosen as the best or most appropriate. It is common for the decision-maker to be bombarded with large amounts of information. In this environment, it is essential for the decision maker to identify relevant information and develop the ability to discard unrelated ones. Decision-making process includes a cycle of control, decision and execution. According to the researchers, the decision-making process can take place at an individual or collective level and five stages are commonly assumed:

- First time recognition of the problem or opportunity when a new position arises as a need or possibility;
- The search of alternatives when various possibilities and possible solutions are presented;
- Analysis of alternatives, which is a stage that determines an evaluation criterion in the context determined by the first stage;
- To choose the best alternative, solutions must be ordered by selecting the most acceptable or grouping the best ones for later evaluation;
- Implementing the chosen alternative, which is the use of selected information in the implementation of organizational action.

Decision-making involves multiple interests, which can cause tension among the participants in this process. Therefore, it requires the decision-maker to develop the ability to deal with political issues and often confront personal interests with the interests of others. It is therefore worth emphasizing the importance of systematically seeking common points, collaboration and team collaboration at all stages of the decision process.

As a result of corporate memory, information is separated according to the decision process and is divided into administrative and operational. The prominent information and knowledge in the collected data help to identify the needs and challenges of the company's various management levels (operational, tactical and strategic). The quality of information is another important factor for effective decision making, which must be reliable and accurate for every level

of management and produced at the right time. Otherwise, the value of the information will be lost without contributing to the intended value. The value that information provides for a company is directly linked to how decision-makers help their organizations achieve their goals.

The current information flow is another factor for the effectiveness of the decision. Large amounts of information can be time consuming and make it difficult for the manager to distinguish which ones are related to the decision making process.

Knowledge is known to play a key role in defining and implementing the strategy. Performance evaluation systems need to establish senior managers and managers of the organization, control processes, infrastructure and information systems that state that the required activities are actually carried out according to the strategy adopted. Performance evaluation tools and related information systems are available in all organizations. However, it is rare to develop various efforts for evaluation in an organizational environment, and systems that can link the established strategy and implementation.

Knowledge is a key strategic resource for decision making and business strategy development. The effective use of this resource allows sustainability to create a strong organizational difference as information allows the decision-maker to recognize its establishment, business and the environment in which it is located. Ignoring one or more of this situation could seriously harm an organization's survival, given that this could lead to a series of wrong decisions. Examples of main organizations in the industry that suffer significant losses are known, as they have failed to notice that their environment has changed significantly.

It is also important to emphasize that sufficient information management will be facilitating to obtain, distribute and use the resource in question. In this scenario, people play an essential role in an increasingly complex environment, as they can see the most relevant information in the context of the organization's activities. Finally, in a constantly changing environment, the use of information becomes essential for the process of evaluating the performance and suitability of the strategy carried out in relation to the planning carried out.

Few specific definitions of institutional memory were found in the researches conducted to elaborate on this study. Its meaning always relates to corporate memory terms. Institutions have built social control mechanisms that set rules and standards of behavior that will enable them to function and reproduce. From this perspective, it is understood why institutions struggle to main-

tain their regularity. Therefore, corporate memory will include, but not be limited to, organizational memory. Power relations will determine the institutional plan and define the organization based on its legitimacy.

Corporate memory is another factor to be considered within the framework of conceptualization. Organizational memory should be complemented by corporate memory, emphasizing the reflection between economic, ideological and structural aspects. In this respect, the main difference between corporate memory and corporate memory will be the focus of each activity. The term of organizational memory leads to the idea of effectiveness that accepts changes in its path, while the term corporate memory refers to the ideas of legitimacy, creation and identity.

Another decisive difference between organizational memory and information management is established with the idea that an organization has the means by which knowledge of the past is recovered in today's activities, determining greater or less organizational effectiveness. These activities are related to different management styles of such organizations. On the other hand, it is important to define an institution, its norms and rules, defined by a series of completed applications.

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CHAPTER 17

KNOWLEDGE MANAGEMENT AND ORGANIZATIONAL CULTURE

Kübra Mert

INTRODUCTION

Organizations emerge as formal structures. In other words, organizations are a procedural structure in which all kinds of situations and relations related to the position and duty to which the appointed managers and employees are assigned are defined and become standard. However, besides all these, there is also an informal structuring within the organizations. The most visible factor of this informal structure is organizational culture. Whether they are aware or not, large/small, national/international, mechanical/organic, institutional/non-institutionalized, central/centrifugal, every organization has a culture. It should be noted that cultures are founded and built over the years in an organization (Handy, 1986).

With the changing world order, knowledge is now easier to obtain for organizations. Organizations that manage knowledge correctly have gained an important competitive advantage. However, obtaining knowledge alone is not enough in this age. Knowledge for organizations should also be ready to be used and shared when necessary. In this regard, knowledge management is an important factor for every organization. Knowledge expansion and learning are possible only if the organization's culture supports open knowledge distribution (Valkokari & Helander, 2007: 602). For this reason, in this chapter an outline of organizational culture will be given and after that the connection of knowledge management and organizational culture will be explained by Handy's culture model.

1. ORGANIZATIONAL CULTURE-DEFINITIONS AND BACKGROUND

Culture has a been defined in different ways by many scholars for years. However, in general, it is possible to define culture as an element shared by a society, carried from past to present and symbolizing the lifestyle of society. Values, attitudes, norms, symbols, stories, customs and traditions, and language are among the cultural elements shared by society. Culture covers everything related to people and their environment. Since the cultural elements owned differ, culture's meaning is not the same in every society.

Organizational culture has also been classified in particular ways by many researchers from different disciplines for years. It is generally treated by authors in one of two ways: something the organization is, or something the organization has (Cameron & Ettington, 1988: 15). Schein (1988) states that concepts such as "group norms" and "climate" are used in studies instead of culture for a long time. However, the norms can be formal in nature. Organizational climate is less rooted in organizational structure (Denison, 1996). Therefore, as the studies on the concept increased over time, the need to find a new name and definition emerged. According to Hofstede (1984), organizational culture is the collective programming of the mind which distinguishes the members of one human group from another. Organizational culture also refers to the pattern of beliefs, values, and learned ways of coping with the experience that have developed during an organization's history (Brown, 1998). Schein (2010:111) defines organizational culture as:

> "a pattern of basic assumptions, invented, discovered, or developed by a given group, as it learns to cope with its problems of external adaptation and internal integration that has worked well enough to be considered valid and is to be taught to new members as the correct way to perceive, think, and feel in relation to those."

Studies on organizational culture started in the 1970s and gained speed in the 1980s. One of the reasons for this is that awareness of the human dimension started to increase in organizations in the 1950-60s because of the existence of especially qualified, educated, and expert employees in organizations. At the same time, these people have different cultural codes, and their success depends on their harmonious work together and creating a common organizational culture. These studies are mostly of the US origin and they refer to the success of the US businesses. Prior to these, it is seen that the general field of culture was dominated by anthropologists and sociologists (MacQueen, 2020: 10). Man-

agement scientists' interest in organizational culture started in the 1980s and accelerated. Although the first studies are of anthropological and sociological origin, today, organizational culture is an important subject of organizational studies.

Organizational culture includes basic group values, messages, and presents organizational thoughts/emotions shared with group members. It has an abstract meaning, which is not easily understood by anyone outside the organization. Therefore, it can be stated that in an organization, culture forms language, customs, norms, material objects, stories, legends, ceremonies, behaviour styles, organizational rules, beliefs, organizational identity, historical background of the organization, and symbols.

Therefore, the characteristics of organizational culture are as follows:

- Organizational culture distinguishes the organization from other organizations.
- Organizational culture improves human interaction.
- Organizational culture affects the way of doing business in the organization.
- Organizational culture is a complex structure consisting of many different factors. These factors are either learned or later added to the organization.
- Organizational culture is a pattern of behaviour that is constantly repeated by individuals in the organization.
- Just like social culture, organizational culture is not written. It takes place in the minds and consciousness of the individuals in the organization.
- Organizational culture gives continuity to the activities.
- Organizational culture can change.
- Organizational culture can be learned and taught.

Organizational culture is a very important concept in terms of organizational success since it plays a binding role with the consciousness of each other and the goals of the organization. The most important trump card in dealing with the uncertainty that the organization is surrounded by its internal and external environment is the knowledge that the organization has. In the formation and subsequent development of the culture in an organization, the environment that the organization affects and is affected by is briefly important because organizations are also open systems. The environment is among the most im-

portant factors that determine what kind of culture an organization should have. This environment is divided into two as internal and external environment. The internal environment factors affecting the organizational culture are the owner, managers, employees, strategies, and policies of the organization, the mission of the organization, the organizational structure, the units of the organization, the subcultures in the organization, the production structure of the enterprise, and the formal and informal relations between individuals and groups in the organization. On the other hand, external factors affecting organizational culture are legal regulations, society and social culture, customers, labour market, the intensity of competition with other organizations, economic conditions, technology, international and global developments, and changes. All these environmental factors listed have different effects on organizations.

Organizational culture forms the basis of many behaviours, individually and collectively in organizations because organizational culture teaches those involved in what, when and how, and ensures that these behaviours become a pattern over time. By understanding and analysing the culture of an organization, it becomes easier to predict behaviour in different situations (Hofstede et al., 1990). While organizations with more flexible, creative, open, and strong cultural values are more open to growth and innovation, relatively more consistent and systematic organizations tend to be more productive (Denison & Mishra, 1995).

There are many organizational culture models in the literature (e.g. Cameron & Quinn, 1999; Denison, 1997; Harrison, 1972; Handy, 1986). Handy's model (1986) is a comprehensive model that tries to understand organizations both structurally and culturally. Within this scope, the cultural model of Handy (1986) will be defined by considering organizational structures and knowledge management perspectives. Knowledge dimensions to be used in this context are the point of view of knowledge, the level of knowledge sharing, the openness of intra-organizational cognitive channels in knowledge sharing and the situations that prevent knowledge sharing in organizations (Özen Kutanis & Mercan, 2015: 148).

1.1. Charles B. Handy's Cultural Typology

Unlike Harrison (1972), Handy (1986)[1] prefers to call his model "culture" and according to him, it affects a wide range from organizational culture to the degree of formalization in the organization to planning, from working hours to

[1] The first version of this study was published in 1976. The third edition, cited here, was published in 1986.

clothing to be worn at work. Handy (1986) examines four varieties of organizational cultures and he matches every culture with the characteristics of a Greek god/goddess. In organizations dominated by a central authority, power is the most visible factor. The role is in the first place in organizations where bureaucracy is dominant. In organizations where organizational goals are prioritized, the task is at the forefront. Finally, where individual goals are prioritized, individual culture is effective.

- Power culture: According to Handy (1986: 188), if this culture had a patron god it would be Zeus, the all-powerful head of the Gods of Ancient Greece. This type of culture is generally found in small entrepreneurial organizations, occasionally in today's trade unions, trading, and finance companies (Handy, 1986).

In power culture power, control, and status are gathered at the centre. Therefore, the power is concentrated in the top management, and all decisions are made by the top management. However, the degree of formalization in this structure is low. Employees only fulfil their orders. They do not have any discretionary rights. There is a constant conflict of interest and power in the organization because those who hold power try to establish domination over other members of the organization. It is a strong organizational structure and culture. In this type of culture, trust is more in individuals rather than committees. According to Handy (1986), who likens the structure to a spider web, this culture can be as effective as it is bad. The stagnation experienced in British family businesses after World War II also connects to this culture.

- The role culture: This culture's patron god is Apollo, the god of reason. For this culture work is done by logic and rationality (Handy, 1986). Bureaucratic principles, features, and work are at the forefront in this culture. Although rationality, rules, roles, status, and hierarchy are important factors in this type of culture. In this culture, both the degree of centralization and the degree of formalization are high. For this reason, the source of power is the position in this type of culture. In this culture the role, or job description, is more important than the individual who fills it (Handy, 1986: 190). The roles in the organization are all important. The control mechanism is gathered in senior management. Organizations with this type of culture become more effective and productive in stable environments. The structure to this culture can be pictured as a Greek temple (Handy, 1986: 190).

- The task culture: It has the characteristics of the goddess Athena. This culture is job or project-oriented, and its structure can be represented as a net (Handy, 1986: 192). The structure of the organization is a result-oriented struc-

ture aimed at performing jobs and tasks in the best way. Everyone in the organization works to achieve the goals of the organization. In this culture, the formalization degree of the structure is high, but the degree of centralization is low. Therefore, it is a more flexible and dynamic cultural structure compared to other types of culture. The task culture would be found where the market is competitive, where the product life is short, and where the speed of reaction is important. But the task culture finds it hard to produce economies of scale or great depth of expertise (Handy, 1986: 193). It is also a customer-oriented organizational culture type.

- The person culture: Handy (1986: 195) defines this type of culture as "unusual". The structure of this culture is as minimal as possible, a cluster or perhaps a galaxy of individual stars (Handy, 1986: 195). In this structure, which is defined based on the comfortable and individualistic features of God Dionysius, the needs, expectations, goals, and interests of the employees in the organization come first. For this reason, the organization serves the individual. Individuals with this orientation are not easy to manage (Handy, 1986: 196). Every employee does their job at their own discretion. Employees are encouraged to participate in decisions. Authority is not important; therefore, both the degree of centralization and formalization are low in this culture. Since there is no hierarchy in the person culture, control cannot be performed in these structures. In fact, employees who do whatever they need to do in order not to lose their position within the organization see the organization as a structure they can use for their careers and special requests.

2. ORGANIZATIONAL CULTURE AND KNOWLEDGE MANAGEMENT-HOW CAN WE RELATE THEM?

In our age, knowledge is the most significant power available to organizations. Therefore, organizations use knowledge to influence others. At the same time, they use knowledge as a competitive advantage and avoid their competitors. However, the important thing is not to obtain the knowledge, but to manage it correctly and spread the knowledge to the whole organization. Whoever is more successful in this management will take the lead in the competition because with the Industrial Revolution, the knowledge that organizations try to capture and use in their activities has turned into a strategic capital for organizations. Since the information and the knowledge revolution have caused prob-

lems for mankind and organizations (Smith, 2001), knowledge management is important for all businesses in the modern economy and can help businesses' for improving their performance, productivity, and quality of their services.

Knowledge is a broad concept that includes both information and data. Therefore, this width is also reflected in the definitions. Bolinger and Smith (2001: 9) define knowledge as the understanding, awareness, or familiarity acquired through study, investigation, or experience over the course of time. According to Grayson and O'Dell (1998), knowledge is what people know about customers, products, processes, mistakes, and successes. Knowledge enables organizations to learn. Permanent learning, on the other hand, helps the formation and development of organizational memory and therefore, an organizational culture.

Knowledge management is a mix of strategies, tools, and techniques (Dalkir, 2005: 6) within the framework of their own dynamics of both types of information. Organizations can use different methods to gain, codify, and manage knowledge. These actions -especially in a turbulent environment- can help organizations to find their ways and be successful. Knowledge management is not only about managing knowledge but also using it as a tool to reduce environmental uncertainty and gain competitive advantage. While knowledge assets are grounded in the experience of individuals, firms provide the physical and social structure so that knowledge can be shaped into competences (Teece, 2003: 137).

The knowledge in the organization (whether it has existed since the establishment of the organization or acquired later) loses its meaning unless it is shared with all members of the organization. An important tool that enables sharing is the culture of the organization because organizational culture includes not only shared values, rules, customs, language but also information. The organization is dynamic and vibrant. This dynamism and vitality depend on the identification of human beings, a social entity of the organization, with culture. The fact that the knowledge management in the organization can achieve its goals depends on the organizational culture's allowing it. An organizational culture appropriate for knowledge management should be created and maintained (Tiwana, 2000: 6).

For organizations in the 21st century, knowledge is also a strategic asset they must have. As a strategic asset, knowledge can be disseminated both within and outside the organization at an organizational and individual level. Intra-organizational knowledge dissemination takes place with the paths, technolo-

gies, communication channels, dress codes, norms, and language previously determined by the organization. The reach of this spread to the desired level depends on the participation of individuals and/or groups within the organization. This brings us back to the importance of organizational culture. The organization's mission, vision, goals, objectives, strategies, and policies, that is, those who make the organization an organization should support information management in this sense. However, this may not be as easy as it seems. Various organizational and individual interests, and the conflicts and human behaviours associated with them can make it difficult or even eliminate the acquisition, distribution, and management of knowledge to members of the organization. For this reason, it is essential that organizational culture does not create suitable environments for actions that can create such chaos. If organizational knowledge is a strategic asset, then the method used to implement a knowledge management system is critical for organizations (Bollinger & Smith, 2001: 13).

A strong organizational culture is also critical to promote learning, development and the sharing of skills, resources, and knowledge (Bollinger & Smith, 2001: 10). Organizational culture is also frequently mentioned in knowledge management studies (e.g. Alavi et al., 2005; Dalkir, 2005; Donate & Guadamillas, 2010; Rai, 2011, Ratna et al., 2020; Standing & Benson, 2000). This situation even revealed the concept of knowledge culture. Therefore, it is imperative that managers determine the organizational goals thoroughly and place the feeling of achieving those goals in the employees.

According to De Long and Fahey (2000: 116-123), four frameworks could affect knowledge management with the perspectives of organizational culture which could affect knowledge management:

- Culture shapes assumptions about which knowledge is important.
- Culture mediates the relationships between levels of knowledge.
- Culture creates a context for social interaction.
- Culture shapes the creation and adoption of new knowledge.

When the influence of culture on knowledge management is this much, it is the question of whether there is a mechanism that controls the acquisition, transformation, and sharing of knowledge in organizations. Another question is to what extent we need this mechanism. Considering the assumptions of the organizational culture models described above, answers to these questions will be sought.

2.1. Handy's Organizational Culture Typology on Organizational Knowledge Management

Many organizational culture models have been developed in the literature because of examining different social and organizational cultures. Culture can affect knowledge management in different ways. Therefore, since the organizational culture models selected for this study also emphasize organizational structures, it is possible to make the following implications.

The acquisition of knowledge and its presence in a single employee/manager is an understanding that hinders knowledge management. In organizations, knowledge becomes meaningful as it is shared, so knowledge should be spread throughout the organization. Contexts that support this spread are the point of view of knowledge, the level of knowledge sharing, the openness of intra-organizational cognitive channels in knowledge sharing, and the situations that prevent knowledge sharing (Özen Kutanis & Mercan, 2015: 148). Perspective on knowledge includes the techniques and inventions that facilitate or improve the work they do and share their work-related knowledge with colleagues and managers. Knowledge sharing level includes management's methods to increase the level of knowledge sharing in the organization. In this perspective managers are primarily concerned with ideas, suggestions, and inventions from employees. According to the openness of the cognitive channels within the organization, it is very important whether the environment is suitable for sharing knowledge. The thing what will ensure this is the organizational culture and the integrity levels of the members of the organization. The situations that prevent knowledge sharing are observed as not taking lessons from mistakes, especially in managing their mistakes and not explaining their failures as much as their success.

Handy (1986) revealed four organizational culture models in his study. According to Handy (1986), who associates the organizational culture features of these models with the characteristics of the ancient Greek gods/goddesses, in the culture of power where centralization is very high, knowledge is collected only in the top management. It is the type of organizational culture where the vertical hierarchy is the priority, and power in the organization is concentrated in certain people or one person. In the light of this information, the decision mechanism is also the top management. Therefore, employees have limited access to job related knowledge. The knowledge is shared with the employees when needed, together with the vertical hierarchy. Since formalization is low, there are no rules regarding the collection, internalization, and sharing of

knowledge, or it is constantly changed at the discretion of senior management. Knowledge sharing among top management members takes place via informal means. The level of knowledge sharing is low in a power culture. Since the centralization is high, the opinions and suggestions of the employees are negligible. Therefore, cognitive channels within the organization are closed in knowledge sharing. There are many situations that prevent knowledge sharing and, in this culture, those who are in the centre and who have knowledge, if they leave the organization for any reason, the organization will collapse.

In the role culture, both centralization and formalization are high. Therefore, in this culture, knowledge cannot be conveyed freely because there are official and strict rules that make information inaccessible. When it is necessary to convey, official ways (official correspondence, petitions, petition attachments, petition responses, corporate communication channels) are established. In this type of culture, roles are more important than individuals, so the interests of the organization are in the first place. All attention is directed to the talents and the right people are working in the right places to perform the given tasks in the best way. Knowledge sharing is limited to these, as roles and associated job descriptions are predetermined. Relationships between individuals and groups are formal in role culture. Therefore, it is difficult for employees and managers to establish informal connections, and accordingly, the level of knowledge sharing is low. As in power culture, cognitive channels within the organization are closed in sharing knowledge in role culture. The most serious situation that prevents knowledge sharing is high formalization.

Creativity and competition are the most important factors in task culture, which is a result-oriented culture. Daily checks in the organization are determined by procedures and working methods, without violating cultural norms. Accordingly, knowledge sharing is high. In task culture, centralization is low, but formalization is high. Therefore, decisions are spread across the entire organization and it is more possible to reach information and share it with other members to make quick decisions. The task culture is a project-oriented structure, so the main emphasis is on work in the organization. Management and employees work in coordination to get the job done right and on time. Since specialization in this type of culture is also high, knowledge about the correct work and duties are shared with the members of the organization. At the same time, employees can easily communicate with management about their ideas and suggestions, so cognitive channels are open. The situation that prevents the sharing of information is the organizational culture.

In the person culture, where both centralization and formalization are low, the formation and sharing of organizational knowledge are free. But knowledge sharing between individuals and groups is very low or even absent, especially where the interests of individuals are at the forefront. However, when the interests of the organization and the individual interests are in the same direction, knowledge sharing increases. Sharing takes place in informal ways. In this culture, because the interests of the members of the organization are more important, the way of storing knowledge is also used. In fact, employees who do whatever they need to do in order not to lose their position within the organization in such organizations see the organization as a structure they can use for their careers and special requests. In this organizational culture structure where intra-organizational cognitive channels are open in knowledge sharing, the most serious situation that prevents knowledge sharing is personal interests.

CONCLUSION

One goal of organizations that want to keep up with the ever-changing economic system is to be unique to them. In this way, they are separated from their competitors and positioned in the market. It is the organizational culture that makes an organization unique. Even though organizations have the same size, operate in the same industry, or produce the same goods/services, they are not exactly alike. It is the organizational culture created by human beings, which is a social entity that creates this difference.

In addition to this, another important issue for today's organizations is knowledge management. Knowledge, more precisely, the knowledge that the organization can use in its activities is defined as a golden key in our age. Organizations now face a wide variety of knowledge types and besides knowledge pollution. Organizations that want to deal with this and obtain the right knowledge for them should pay attention to knowledge management and adapt knowledge management to organizational culture. Knowledge management includes not only the correct management of knowledge, but also functions such as gaining, using, and sharing the correct knowledge by the members of the organization. For this reason, in an organization investment in knowledge might be more profitable than materials, but it has not been sufficient for basically at the information age. At this stage, the factor that will help the organization emerges as an organizational culture.

The task of organizations here is to create and manage an organizational culture that makes it possible to create a strategic asset, rather than managing

knowledge, and that encourages and facilitates the creation, sharing and utilization of knowledge in the most suitable direction. In a culture like this, it depends very much on the organizational structure because, as in the power and role culture of Handy, the acquisition and circulation of knowledge in organizations with high hierarchy are only under the control of certain members of the organization. On the other hand, in organizations where the task and personnel are dominant, it is freer to own and share knowledge. However, what is important here is that every organization must try to create and maintain its own organizational culture based on its structural features to manage knowledge more effectively.

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CHAPTER 18

ANALYZING THE RELATIONSHIP BETWEEN KNOWLEDGE MANAGEMENT & LEARNING ORGANIZATION

Esra G. Kaygısız

INTRODUCTION

The conditions of the 21st century have continuously changed. Such conditions, hence, force organizations to understand past information technology; measure their effectiveness, adapt to processes, & continually improve. Organizations should, therefore, adopt to complex technology, become corporate world citizens, & be able to face strategic challenges. For this purpose, organizations should integrate innovations to goods & services, processes, & management styles; they must motivate employees throughout every process, as well as constantly look at things from new perspectives. All of these changes & necessities require organizations to ask themselves 'why & how' so that they must make learning essential to their existence.

Today's organizations also have to create knowledge & wisdom by using data & information. Learning is the key factor in this transformation process. So the learning ability of an organization affects knowledge management. However, the outputs of knowledge management affect the organizational learning at the same time. In other words organization needs knowledge management to learn & it also needs learning for managing knowledge. So it can be said that this relationship looks like chicken or egg relation.

The main purpose of this study was to review the relationship between knowledge management & learning organization in a theoretical framework. For this aim, the current & comprehensive literature review were scrutinized. With the light of literature, we also tried to answer the question of what is the connection between them & which one is dependent to others.

1. LEARNING & ORGANIZATIONAL LEARNING

Human is a being who continues its life with a focus on learning since the day she was born. Everything such as the discovery of the fire, the invention of writing & steam engine, the use of computers in all areas of life, the journeys to space, atomic fission, or production of yogurt has happened by the motivation to learn in human. In other words most of the knowledge, ability, attitudes, & behaviours that we need to survive our lives are gained by learning.

Learning is a central topic in different disciplines & studies. So it has many different definitions. For the Oxford dictionary (Oxford Dictionary, Learning, May 2020 "learning is the process of learning something that you learn, especially from your experience of working on something & also the knowledge that you get from reading & studying". Learning is the changes in behaviour that result from experience or mechanistically as changes in the organism that result from experience (Houwer et al., 2013: 631).

Learning is a process in which knowledge is created through the transformation of experience (Kolb, 1976: 21). Learning is a process that determines how persons & organizations create, acquire, store, protect, interpret, transfer, & retain knowledge.

On the other side knowledge is one of the outputs of this process. The knowledge obtained by learning can open up new horizons, arouses new curiosity, & starts the discovery of new studies. So it can be said that knowledge is undoubtedly one of the most important facts that stimulate, support, sustain, & mediate the learning process (Yılmaz, 2009: 176). The distinctive feature of organizational learning is to suggest new ways of thinking to solve complex problems (Öneren, 2008: 166).

Organizations must learn to organizationally compete & adapt to changing conditions just like individuals. The term "organizational learning" is used for defining the capacity or processes within an organization maintaining & improving performance based on experience (Nevis et al., 1995: 15). It can be defined as a learning process through social interactions between individuals & the groups (Bratianu, 2015: 4). For Fisher & White, organizational learning is a reflective process; it is played out by employees at all levels of the organization & this includes the knowledge collection from all sources & it is also played out a shared sense-making process, which results in common clarifications that can be used to instigate actions resulting in enduring changes to the organization's behaviour & theories-in-use' (Fisher & White, 2000: 245). It is the increase of knowledge held by members of

organization that is recognized as knowledge & applicable activities in an organization, hence implying a potential change at them (Berends et al., 2003: 1042). But organizations cannot learn on their own, they need knowledge, opinion, feeling, idea, criticism, & expertise of its members. Organizations learn only by individuals but individual learning does not guarantee organizational learning. So individual learning & team learning have to be important in an organization to become a learning organization. There is a correlation between individual learning & organizational learning, in addition to this, team learning is a mediator of the aforementioned relationship (Stelmaszczyk, 2016: 109). The team learning leads to organizational learning that changes organizational behaviour & employees' attitudes (Tanyaovalaksna & Li, 2013: 4). Organizational learning is the last stage of learning. Indeed it is the notion that organizations, through their members, acquire new insights & acting on them; thereby renewing the context from future learning will bud (Scott, 2011: 12).

Milway & Saxton (2011: 47) say organizational learning has four elements that are seen in Figure-1. While the success of individual & team learning depends on the learning of individuals, working in organizational learning enters the participation of factors; following factors are effective in organizational learning.

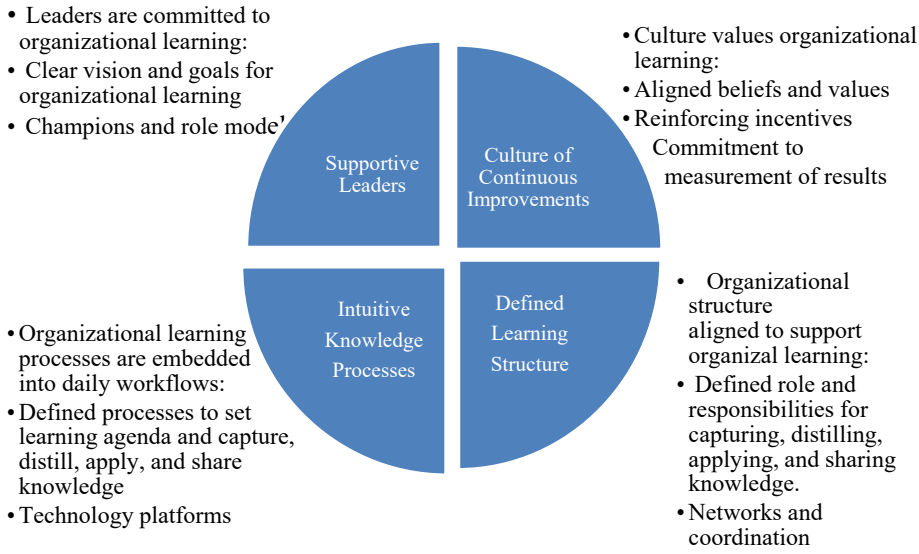

Figure 1 Elements of Organizational Learning

Source: Milway & Saxton, 2011: 47

As is seen from Figure-1, organizational learning needs leadership firstly. The role of a leader is the basis of creating the learning & knowledge is to share ambience & supply the sources for learning, promote individual & team learning & creating a learning organizational culture. Culture that is supported by leadership is effective at sharing knowledge, accessing & using the knowledge sources & developing the learning behaviours. If organizational culture does not supply the individual & team learning, the organizational learning will not occur.

Becoming learning organization is likely to be costly for organizations in numerous ways, mainly because change always contains risks & organizational cultures tend to be conservative, especially in long-lived or successful organizations (Gilson et al., 2009: 14). Therewithal, the development of a learning culture in an organization contains the nonstop education of its members (Gagnon et al., 2015: 637). Organization needs a structure for realizing these activities. The organization structure supplies the organizational learning & knowledge management processes. The intuitive knowledge processes have to design. These have to be aligned for employee's mind works & helps to employees about how they learn from the internal & external sources, haw they use technology for exchanging knowledge. Tolgay says (2010: 40) strategy, environmental factors, organizational structure, technology & organizational memory are the factors that will ensure the development & permanence of organizational learning.

For Finger & Brand (1999), organizational learning has four important learning activities as education & training, the active self-use of learning sources inside the organization, the active use of learning sources outside of the organization & the creation of an environment conducive learning & there are also six important learning capacities as individual learning capacities activities, collective learning capacities, structural learning capacities, cultural learning capacities, capacities resulting from the organization of work & the capacity of the leadership to learn & promote learning (Gilson et al., 2009: 13). Learning activities are non-reactive indices so they could be much more easily measured than learning capacities. Because generally, it is difficult to see how the learning capacities could be assessed.

2. LEARNING ORGANIZATION

The goal & ideal of the processes are to create a learning organizations. Much as organizational learning & learning organization are perceived as the same concepts, there are differences between them. Organizational learning

refers to particular systematic learning processes within an organization. But the learning organization is a form of organization that makes an environment for employees to learn & facilitates the learning of all its members & constantly renews itself, improves own knowledge, understanding & environment by making use of the knowledge of its employees. Despite this, organizational learning & learning organizations are linked concepts & they complement each other.

The "learning organization" term was introduced in Peter Senge's "The Fifth Discipline: The Art & Practice of the Learning Organization" at first (Senge, 1990). According to Senge, a learning organization challenge all members to tap into their inner resources & potential; in hopes that they can generate their personal community based on principles of authorization, civilization, & a collective will to learn (Senge, 1990). Learning organization is a further recommendation concerning how organizations learn to concern the systematization of knowledge into practices, procedures & processes (West, 1996: 16). It is a concept that is used to describe certain types of activity that take place in an organization (Tsang, 1997: 74-75). Essentially, learning organization helps to promote organizational learning by structures & strategies & with regard to this means learning organizational is a dimension or elements of a learning organization (Gilaninia et al., 2013: 47). According to Marsick & Watkins (1993), the sculptor of the learning organization has to see in her mind's eye, & shape structures toward, that which nurtures learning; & then create, sustain, or alter existing approaches to foster this capacity (1994: 136). It is a group of people who have wicker a constant, enhanced ability to learn into the corporate culture, an organization in which learning processes are analyzed, screened, build up, & united with set aims & goals (Dawoood et al., 2015: 93).

A learning organization is an environment that employees develop their own capacities for generating results they want; that new & large models of thinking are promoted in; collective aspiration is set free, & people are continually learning how to learn together" (Senge, 1990: 3). Learning organizations are skilled at solving problems; try with new ways; learn from their own history, practices & experiences; learn from the others & transmit knowledge fast throughout the organization (Garvin, 1993). A learning organization is a form of organization that enables the learning of its members in such a way that it creates positively valued outcomes, such as innovation, efficiency, better alignment with the environment & competitive advantage (Huysman, 1999: 61).

The members of learning organizations have critical roles as identifying the organization's stages of development; gathering, processing & acting above

knowledge in ways best suited to organization's aims; having an organizational knowledge root & processes for creating new ideas; exchanging knowledge often with relevant external sources; getting feedback on products & services & becoming "open systems" sensitive to the external environment, including social, political, & economic conditions (Brandt, 2003: 11-16). It is a proactive organization with importance of being able to predict changes, it is essential to gather information from all stakeholders & in the course of gathering & processing information, the generation of new knowledge & learning take place (Ahonen & Kaseorg, 2007: 14). It is a model of organization enabling to ensure the ability to flexibility & efficiently respond to changes in environment, & develop individuals capable of consistent participation in the process of learning (Skuncikiene et al., 2009: 66).

Learning organization is a concept that is started to be used at the 80's & 90's. However, new things are learned about the structure & features of the learning organization. So, many studies are mentioned different properties, building blocks & components of learning organization. The most comprehensive dimensions of learning organization are listed by Marquardt (1996). These are summarized by Kasvi as follow;

- Learning is become by the organizational system as a whole.
- Organizational members recognize the importance of ongoing organization extensive learning.
- Learning is a strategically used process, integrated with continuity; it is parallel to work.
- There is a focus on creativity & reproductive learning.
- System thinking is essential.
- People have access to information & data resources without interruption.
- A corporate climate should support, prizes, & accelerates individual & group learning (Kasvi, 2007: 4).

According to Tohidi & Jabbari (2012: 547), the learning organization has five aspects. They are; experience, risk, connection to the real world, dialogue & community cooperation. Bordeianu explains the characteristics of the learning organization are: continuous offering new opportunities to learn; using the learning process to reach its goals; finding the link between the individual performance & organizational performance; encouraging the dialogue & creating the specific

environment where people to express their opinion & assume risks; using creative tensions as energetic renewable source; being aware by the relationship with the environment where the activity takes place (Bordeianu, 2015: 147).

Learning organization studied with different theoretical frameworks covering into five perspectives given as Figure-1. Related systems are the perspective, learning perspective, strategic perspective, learning organization building blocks & integrative perspective. These build support to explain & lay the ground to form a theoretical framework for evaluation.

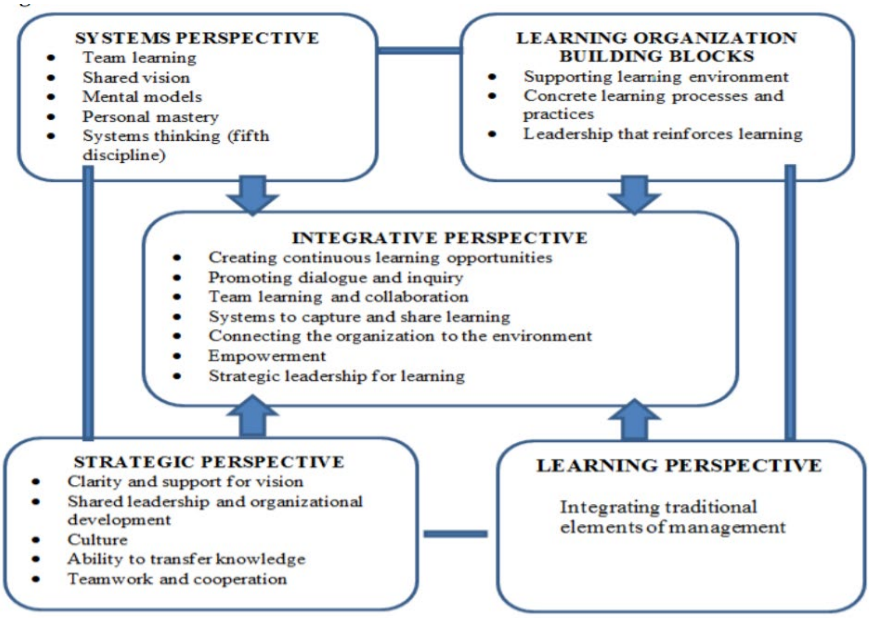

Figure 2. Theoretical Frameworks of Learning Organization

Source: Lim-Lagura, 2019: 169

Systems perspective is the most known framework that was developed by Senge (1990). He identifies a learning organization with the shared vision, mental models, team learning, personal mastery & system thinking. Senge (1990: 7-9) explains;

Personal mastery is the process of self-evaluation that is progress, making clear of personal vision, training objectivity in order to reach a "special level of proficiency", & is a self-commitment for life time learning & life form a part of a learning organization. Each member tries to be the most excellent person &

struggle for assurance & excitement & have to be more realistic for the future (Dawoood et al., 2015: 95).

Mental models are the internal images & "ingrained assumptions" of how the world works which advise action.

Shared vision includes the "pictures of the future" that cause "commitment rather than compliance".

Team learning includes the spirit of collaboration, as well as the collaborative use of skills, for the production of effective teams because the team is the major learning unit in modern organizations;

System thinking encourages a complete method & integrates the other four of Senge's 'disciplines' to generate a whole system. It deals with the ability to examine the underlying interrelationships between systems; allows people to understand interdependency, interactions & changes in a system & stresses the need for a paradigm shift from isolated systems that are interconnected to whole systems (Edosio, 2014: 8).

Strategic Perspective explains the role & importance of strategic internal drivers to build the learning ability of the organization. For Goh, organization needs the strategic building blocks as shared leadership & participation, a culture that encourages investigation, clarity & support, the ability for transmission knowledge across organizational boundaries, teamwork & cooperation to be a learning organization (Goh, 1998: 16). The Strategic Perspective posits that certain managerial practices or can serve as practical guidelines for operational & managerial practice that is called strategic building blocks; & they can also ensure guidance for management & organizational consultants that are the basics for becoming a learning organization along with the two supporting bases (Singh & Sahi, 2012: 177-178).

Learning Perspective says that a learning organization is an organization that continuously changes itself to meet organization's strategic aims & eases the learning of all of its members (Pedler et al., 1989: 91). Pedler, Burgoyne & Boydell (1991) identified eleven characteristics for learning perspective: Participative policymaking, informating, a learning approach to strategy, formative accounting & control, internal exchange, reward flexibility, enabling structures, boundary workers as environmental scanners, intercompany learning, learning climate & self-development for all (Villiers, 2008: 16).

Integrative Perspective says that an organization uninterruptedly learns & changes itself. Watkins & Marsick claim that learning is a continuous, strategi-

cally used process & it is integrated with this perspective (Watkins & Marsick, 1996: 4). It has three aspects: (1) systems-level; continuous learning, (2) that is formed for creating & managing knowledge; outcomes (3) which is led to progress in the organization's performance, & value, as measured through financial assets & nonfinancial intellectual resources. According to Calvert & his friends (1994), Watkins & Marsick (1993) the characteristic of the learning organization are to foster questioning & dialogue; provide learning opportunities, link between individual performance & organizational performance, use learning for reaching organizational goals, create a safe organization for people & knowledge to share openly & take risks, to interact with its environment & include creative tension as a source of energy & renovation (Kerka, 1995: 3).

Learning Organization Building Blocks, addresses critical works that have to be done. Garvin & his friends (Garvin, et al., 2008: 3-4) say that there are three broad blocks for creating a learning organization. Related blocks are aligned below;

A supportive learning environment: It is an ambiance that supports learning with discretion of differences, psychological safety, objectivity to new ideas & time for reflection.

Concrete learning processes & practices: The learning arises from a series of tangible steps & they have spread activities as investigation, knowledge collection, analysis, knowledge transfer, education & training.

Leadership that reinforces learning: Behaviour of leaders strongly influence organizational learning.

The organizations enhance their abilities in learning & learning organizations often perform the learning action by obtaining information in line with its needs.

3. LEARNING ORGANIZATION & KNOWLEDGE MANAGEMENT

Today knowledge management & learning organizations are absolutely essential concepts for organizations. In other words they are necessary for the organizations that want to survive against competition & change. Knowledge is the key factor & the most effective fact of both concepts. So it can be said that organizational learning & knowledge management need each other & they are interdependent. Because the success of one of them depends on the others, the

input of one is the result of the other. Also, this relation is like the chicken & the egg. It is hard to answer the first question. Creating a learning organization can be possible by managing the knowledge systematically managing in the organization. Learning organizations are the places where people constantly improve their creative capacity; new & different thinking styles are fed; collective consciousness & learning have occurred & people are known how to learn together. For creating this ideal, organizations need knowledge management.

This assertion is based on academic literature. Some authors think that organizational learning is a knowledge management strategy as just Wiig & his colleagues think that. Because according to Wiig, knowledge management includes all activities & perspectives that are necessary to gain an overview of, creating, dealing with, & benefiting from the organization's knowledge assets & their particular role in support of the organization's business & operations (Wiig, 1995: 3). Knowledge management has facilitated learning as well as being effective on achieving both individual & organizational goals & the objectives. Because if an organization can be able to share its own knowledge & improve its learning, it should become more actual, effective & competitive.

The others claim that knowledge management is a critical strategy for organizational learning. For example Huber (1991: 90) considers that there are four concepts as 1) knowledge acquisition; 2) information distribution; 3) information interpretation; & 4) organizational memory of knowledge management & they are essential for organizational learning. It is defined as learning that results from the organization intentionally developing, moving, acting upon, & analyzing knowledge (Dixon, 1991: 25). Garvin agrees with him & says (1993) that "A learning organization is an organization skilled at creating, acquiring, & transferring knowledge, & also modifying its behaviour to reflect new knowledge & insights." To the Fiol's (1994: 406) perspective, organizational learning is involves knowledge acquisition, knowledge dissemination, knowledge creation & refinement; & knowledge implementation.

Chen & Liu (2011: 78) developed a model to confirm this argument as seen in Figure-3. According to this model, a learning organization is a process that contains sense, innovation, selecting, feedback, diffusing, implementing & selecting.

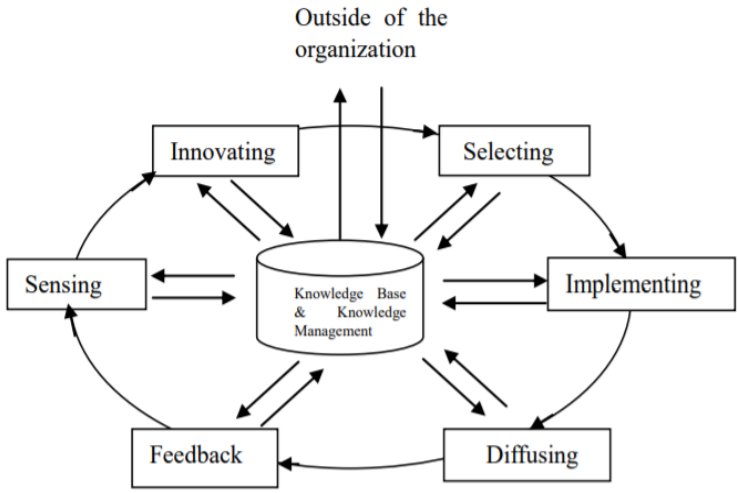

Figure 3. Model of Learning Organization

Source: Chen & Liu, 2011: 78

The figure-3 explain the relationship between knowledge management & learning organization. Sensing is the process that is affected by shared vision, analytical ability, listening ability. Innovating is related to creative thinking, team working, freedom of employees & team learning. Selecting process is affected by the policy of human resource management, level of participation in decisions, open organization structure, diversities & differences. Implementing process is related to communication, commitment, systematic planning & using of experts. So it can be expressed that knowledge management is one of the elementary ways to become learning organizations. Knowledge management is one of the elementary ways to become learning organizations

Knowledge management gives a direct positive & meaningful impact on the learning organization in which the stronger knowledge management is the better learning organization (Al Ahmar et al, 2014: 41). The study of Jerez-Gomez et al. (2005), confirm that & they state that knowledge and, more specifically, its acquisition or creation, along with its dissemination & integration within the organization, become a key strategic resource to create a learning organization (Karasneh, 2019: 238). Also knowledge creation is a key element of learning organizations (Nodehi, et al., 2013: 1306). Another study expresses that there is a significant relationship between knowledge management & learning organization (Jamalzadeh, 2012: 1167). For that reason, the knowledge

management system has to coordinate learning activities & processes & it should contain enough stimuli or encouragements to attract all members to get involved in learning activities in a learning organization (Hong & Kuo, 1999: 214). For Alrefaai & Khalil (2019: 781), knowledge management has a significant impact on the learning organization shows that knowledge management plays an important & essential role in reaching the organization to the level of a learning organization.

Figure 4 shows the model that was developed by Chinowsky & Carrillo. It explains the relationship between knowledge management & learning organization. & it is also the most comprehensive study about of subject.

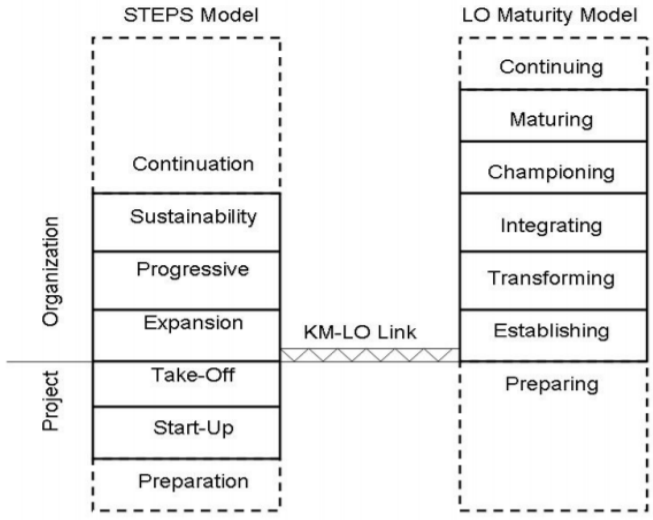

Figure 4. The Model of Knowledge Management & Learning Organizations

Source: Chinowsky & Carrillo, 2009: 36.

With reference to Figure-4, STEPS Model represents the knowledge management & LO Maturity model that are for learning organization as the name suggests. For the success of organization & project, the link between the two concepts is essential. STEPS Model has five main levels that begin with start-up step & through the sustainability step. The Preparation step symbolizes beginning of knowledge management & the continuation step is for defining the continuing knowledge management applications. The LO Maturity model defines the steps for development of a learning organization. There are five steps for it.

The preparing & continuing steps help to define preparation & permanency of learning organization. The preparation & Start-up steps of STEPS model are the launching points for a learning initiative. Expansion step executes a transformation from a project-focused knowledge management initiative to an organization-based initiative. This step is critical because organization is ready for advanced knowledge management & creation of learning. The organization can start an initiation for a learning organization or continue managing to knowledge. Exactly, the presence of a knowledge management structure & understanding of the need to share knowledge are the needed predecessors for creating a learning organization. It can be said that a learning organization needs dynamic leadership & an organizational structure built on knowledge management practices to manage the intellectual wealth of its organization (Dobbins et al., 2005: 4).

Organizations have to retain learning for maintaining their competitiveness & organizational learning will develop well base on well-structured knowledge in organizations for facing the current uncertainty environment (Liao & Wu, 2009: 66). Learning organization & knowledge management use knowledge for improving the knowledge level of the organization & the ability to explain problems. Knowledge management is a mixed platform that has formed with advanced technology & sharing of knowledge. It decreases the distance between employees to gain knowledge through management mechanism but, learning organization is through the development of the building to encourage institutional culture, to launch good communication channels, promote the knowledge sharing among the members & promote the flow of knowledge within the organization which is through individual learning & organizational learning (Minghui, 2016: 41). The factors like better information, application of knowledge, KM process, & shared vision contributes greatly to the properties of learning organization & knowledge management in the organization smoothens the progress of learning, it augments the continuous transformation of individual learning, & makes every effort for learning & re-learning through training modules in the organization (Aktharsha & Anisa, 2011: 38).

Both knowledge management & learning organization demand key factors. These factors are shown at Table-1.

Table 1. Keywords of Learning Organization & Knowledge Management

Keyword	**Learning Organization (LO)**	**Knowledge Management (KM)**
Culture	A LO has a learning culture as personal mastery, team learning, mental models	Culture constraints the efficient use, because KM is carried out by individuals
Leadership/ management	Leadership fosters the culture	Management has a central role, but acts within a culture
Vision	A shared vision is necessary	KM must have a vision
Work processes	A LO integrates attention to every aspect of knowledge	KM must be integrated
Organizational Learning	A LO is good at OL, OL is a collective cognitive process	Knowledge is the result of OL
External factors	Must meet these demands	---
Internal factors	Must meet these demands	Constraints the efficient use, e.g. culture and IT
System´s thinking	How a LO thinks about the world	---
Organizational Memory	---	E.g. data repository
Technical	---	Is a prerequisite

Source: Aggestam, 2006: 297.

As is seen from Table-1, both of them have essentially the same objectives as culture, leadership & management, vision, work processes, organizational learning & internal factors. A learning organization is “an entity” & it requires knowledge management & knowledge management that is “a process”, which assumes a learning organization (Aggestam, 2006: 298). Any knowledge management strategy is adopted by organizations to facilitate learning across an organization, it needs to be associated with these keywords if it is to be successful (Talbot et.al. 2014: 22).

Learning organizations facilitate knowledge creation & transfer within organization by facilitating learning in organizations, generating new knowledge, converting tacit knowledge to explicit knowledge, double-loop learning in learning organization, managing knowledge & creating the applicable knowledge (Alipour et al., 2011: 63-64). Besides that, there are various knowledge sources around the organization & there also are several tools to reach these resources. In order to achieve & maintain a learning organization ideal, the organization must identify these sources & use them effectively.

CONCLUSION

We have witnessed a period in which technology has changed or forced many things for the past 30 years. This change has pushed all kinds of organizations in every sector, regardless of public or private. Undoubtedly, information technologies marked this change. These systems have also led to different effects, including organizational structures, ways of doing business, & relationships among individuals involved in the organization. In addition, the speed of the organization producing & accessing knowledge has increased, & the sources of information & knowledge have increased. Although all this is perceived as an opportunity, it can be posed a risk when it is not managed well. So knowledge management has become a very important concept.

Learning, organizations' learning capability & capacity are among the most important issues for a business in this global period. So organizational learning is a concept used in a wide range of literature covering organizational theory, industrial economy, business, management, quality & innovation, & is rapidly the focus of many different disciplines. Organizations that learn continually from their environment, stakeholders & experience, can develop the abilities to manage knowledge. Learning organization should be dealt with differently from acquiring knowledge, & it should be managed as a process whereby individual & shared experiences are shared, & whereby new knowledge is created & transformed into behaviours; moreover, strategies should be developed in relation to how all elements of the organization will collectively learn together.

A well-managed knowledge management system is critical for an effective learning organization to meet the challenges that organizations face in our current business global environment. Because if an organization learns from its competitor & stakeholders, it will be doomed no matter what sector is. Organizations which understand the significance of knowledge & learning all organizational levels will spend their time to integrating knowledge management & learning organization concepts. This will strengthen the organization & help to meet the demands of collecting & managing the huge amounts of knowledge from all stakeholders. If an organization integrate organizational knowledge & use this knowledge for learning activities, knowledge can be a powerful tool for increasing the organization’s impact. For these motivate the employees, enhance communication among the members & utilize new & efficient technology in workplace.

Besides, the Covid-19 epidemic of organizations, which now affects the whole world, has revealed how necessary to manage information & be a learn-

ing organization. Pandemic differentiated all changes & made it necessary for the organizations learn lessons from previous learnings, obtain information from different sources, learn the information constantly updated, & learn the lessons learned from the crisis. Certainly, it will show that the organizations that can manage knowledge, learn from past pandemics, crises, changing customer expectations & environmental conditions; in short, the knowledge that they gained, will manage this crisis more successfully.

In conclusion, if there is a change in the organization, knowledge management will be affected by organization & will be effective organizational learning. & to be a learning organization, organizations have to manage changes & knowledge because nothing will be the same now.

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CHAPTER 19

KNOWLEDGE MANAGEMENT AND LEARNING ORGANIZATIONS

Serhat Erat

INTRODUCTION

The importance of the knowledge-based economy for organizations has gradually increased in parallel to changes and uncertainties arising from technological development, innovations, and globalization in a fierce competition environment. It is possible for a company to gain a competitive advantage and keep it in the long term by effective use of knowledge and faster learning.

Learning skills at the organizational level means sharing and disseminating new knowledge, ability, and experience so as to cover the whole of the organization. Being integrated this ability into business life and activities by the organization is accepted as the prior condition of protecting the existence of the organization and providing sustainable competition

This is because organizations have focused on the necessity of a new structure that can adapt itself to a changeable environment. There is a learning process that supports the production and sharing of information and spreads from the individual to the whole organization in this knowledge and learning-based structure in parallel with the continuous learning and self-improvement demand of employees. First of all, individuals need to learn for a company to become a learning organization. Moreover, we can see when it is considered the knowledge is easily reachable and competition is severe that organizations are pushed for improving knowledge management and learning processes by being shared information by the competitors as well.

It has become a necessity for learning organizations to have an open and unlimited continuous learning policy; adjust organizational structures based on the related policy in this information society with strong competition. Societies

that have information and can use information rule the world now. Continuous education and learning that is a necessity of life long learning philosophy are the basis of all the organizations; thus, organizations have gone into the effort of reaching this change. This situation necessitates organizations to include individuals who react changes in an instant; create new learning opportunities; have learned to learn and created this process by themselves when the occasion arises. Organizations can provide this process to spread to the organization level by giving learning opportunities to employees; accordingly, organizational learning becomes a continuous activity within the organization (Yıldız, 2015).

It is seen when the literature is reviewed that organizational learning is a concept closely associated with knowledge management. Knowledge management system contributes to organizational learning by obtaining inner knowledge and bringing it into the use of the personnel. Knowledge management that consists of five stages (knowledge acquisition, storage, distribution, interpretation, and using) generate organizational learning. Learning organizations and knowledge management complement each other in this respect (Akgün et al., 2013).

Knowledge management and organizational learning both enrich organizations and ease them to reach the goals. Thus, institutions which use knowledge more effectively and thus learn faster are liable to be a leader.

1. KNOWLEDGE AND KNOWLEDGE MANAGEMENT

1.1. Knowledge Concept

Organizations need to develop unique and hard to imitate goods to create competitive advantage; knowledge is one of these sources (Çetindamar et al., 2013). There are many definitions related to knowledge as well as it does not only come into being (Davenport and Prusak, 2001) in different documents but also ordinary studies, processes, applications and norms whose reality is accepted; which guide opinion, behavior, and communication of people (Van der Spek & Spijkervet, 1997); establish framework (Liebowitz & Megbolugbe, 2003) towards evaluating purposeful information and expert opinion on flexibility, order, and a purpose.

Accordingly, knowledge is the belief and dependencies including meaningful messages with proven accuracy that can be obtained from both objective

data and experiences gained through practice (Earl, 2001); include action capacity and understanding (Çetindamar et al., 2013), besides comprehension or recognition in the mind (Nonaka & Takeuchi, 1995); it is also defined as the capacity that people and organizations need to have for performing activities more effectively (Argyris, 1993). Similarly, knowledge is characterized as the fact that includes values in minds arising from learnings and experiences (Barutçugil, 2002); establishes activities of individuals as the result of the interaction of people and also qualifies individual or organization for a more effective and different action (Celep & Çetin, 2003).

Researches on knowledge and knowledge management in literature points out that knowledge, information, and data have different meanings. As is seen in Figure 1, (for Shin et al.2001), the process runs from the data to knowledge; there is a hierarchical structuring between data, information, and knowledge. Data transforms into information within a specific frame and information means putting the facts into a certain structure and changing them for a purpose if the data is defined as raw facts (Celep & Çetin, 2003). Accordingly, information results from raw data and transforms into knowledge at the final stage (Bennet & Gabriel, 1999). Data and information are externally transferred and recorded to mind while knowledge develops in mind. When viewed from this aspect, knowledge is a meaning that is created by the human brain (Marakas, 1999).

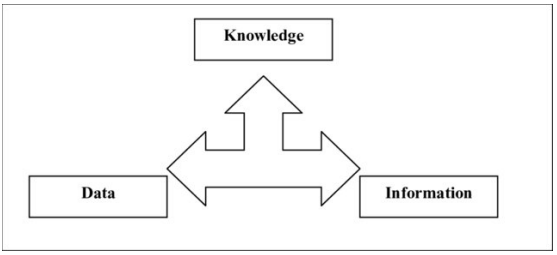

Figure 1. Data, information and knowledge stages (Bhatt, 2001)

1.2 Types of Knowledge

Knowledge has two types; explicit knowledge that is completely classified, visualized, and structured; it can be expressed by words and numbers. Or the implicit knowledge that is difficult to be formal, highly personal, nonclassified, and unstructured (Nonaka & Takeeuchi, 1995; Herrgard, 2000). Explicit knowledge, in general, means the knowledge that is rational, observable, easy to obtain, and document while the implicit knowledge is the one that is complex,

undocumented, and based on experience. Intensive use of information and communication technology is the point in question for sharing explicit knowledge while implicit information disclosure and sharing are based on the social communication networks that support the communication between employees mostly rely on organizational culture (Kaygısız, 2019). Explicit knowledge can be called described or written knowledge; it is stuffy and typically seen in books, company files, databases, and computer programs. Implicit knowledge is highly private; hard to express and initially obtained by experiences (Small & Sage, 2005).

Implicit and explicit knowledge are different from each other in many aspects. Table 1 shows related differences (Nonaka & Takeuchi, 1995; Tang, 2008).

Table 1. Difference between Explicit and Implicit Knowledge (Nonaka & Takeuchi, 1995; Tang, 2008)

Explicit Knowledge (Objective)	Implicit Knowledge (Subjective)
Experience-based knowledge	Rational knowledge
Digital knowledge	Analog knowledge
Ensuing knowledge	Knowledge independent of each other
Documented	Undocumented
Observable	Non-observable
Simple	Complex

1.3 Knowledge Creation Process

An organization needs to have all both explicit and implicit raw material and sources to be strong in the knowledge economy; possession must be operationalized; corporate culture needs to be developed. This process has a critical role in knowledge management (Barutçugil, 2002). One of the goals of knowledge management is to reveal the implicit knowledge and convert knowledge to value via processes. Moreover, there should be developed strategies that provide implicit knowledge to stay in the organization even if the persons leave there (Easterby-Smith & Liyles, 2003).

The knowledge creation process explains both completing the interaction between explicit and implicit knowledge and also how they cause to emerge new information by transforming implicit knowledge into explicit knowledge. Explicit knowledge, in this model, is defined as a process in which implicit knowledge changes hands by a transformation (Nonaka & Takeuchi, 1995).

Besides, this process is realized by people; knowledge is created by dynamic interactions among persons or between person and environment (Nonaka et al., 2000b). Therefore, stages of knowledge transformation that are expressed by the SECI Model are also accepted as the stages of producing knowledge in an organization (King, 2009). The basic assumption here is that improving the knowledge store of organizations is encouraged to provide both implicit and explicit knowledge flow both individually and between groups. There is created a synergy for the value of knowledge in this way (Rice & Rice, 2005). This learning spiral needs to be sustained for organizational learning to become reality (Rumizen, 1998). Figure 2 shows the model that is for this purpose.

An interesting view of the SECI model;

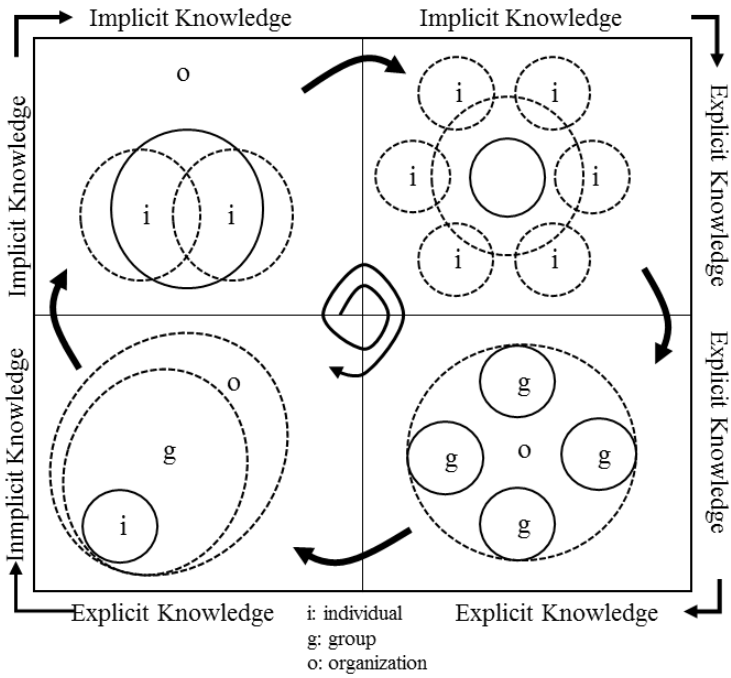

Figure 2: SECI Knowledge Spiral.

Socialization: This is a process in which implicit knowledge is shared amongst people (Nonaka & Takeuchi, 1995); this also is a stage in which knowledge is derived from knowledge arising from creating and sharing mental models in natural environments with mutual trust (Gökçe, 2006). Socialization is based on the principle in which learning comes true by master-apprentice

relationships and also implicit knowledge is shared amongst people without verbally expressing amongst persons (Akgün & Keskin, 2003).

Externalization: This is the process that implicit knowledge becomes explicit knowledge by turning into concrete, understandable concepts through transferring the implicit information to other individuals with whom the individual communicates (Nonaka & Takeuchi, 1995). For this process to become a reality, individuals need to make concrete what they know. Accordingly, the principle here is transforming implicit knowledge to the implicit one and sharing this with other individuals (Barutçugil, 2002). Risks that may occur in the case of the individual who has the implicit knowledge leaves the organization is minimized as the result of storing implicit knowledge after transforming into explicit form (Melbye, 2008).

Combination: This is the process in which new knowledge is transferred to other personnel by transforming explicit knowledge inside and outside the company into more complex knowledge processes and creating synthesis (Nonaka & Konno, 1998; Nonaka, et al., 2000). Related process happens by creating new knowledge and concepts and displays itself by becoming systematizing concepts within knowledge system (Akgün & Keskin, 2003). New and open knowledge is obtained classifying, aligning as the result of processes such as reclassifying, aligning and adding knowledge (Gökçe, 2006).

Internalization: This is the process that explicit knowledge transforms into implicit knowledge (Nonaka & Konno, 1998). A newly obtained knowledge needs to be internalized at the end of assimilation, evaluation, and reflection (Barutçugil, 2002). In this method, individuals convert explicit knowledge that is shared by mutual interaction and trial-and-error including a guidebook, process, order related to the product, and manufacturing processes to implicit knowledge step by step (Nonaka et al., 2000).

Individuals internalize the available explicit knowledge to transform it into an implicit form when they use actual data, information, and written procedures in practice (Akgün & Keskin, 2003).

Directors should be conscious of this process when they create a knowledge-sharing environment within an organization. It is a condition that organization leaders need to assimilate the knowledge creation dynamism and encourage employees in this direction (Çetindamar et al., 2013).

1.3 Knowledge Management and Knowledge Management Process

Much as there are different definitions of knowledge management in literature, almost all of them come to the same thing in terms of purpose.

Knowledge management includes establishing a learning culture by information gathering systematically for better performance and sharing it with other members of the organization. The fact of organizations that can manage and structure knowledge will have the most important competition instrument obliges the management of organizational knowledge. In this sense, knowledge management is a strategical concept that modern organizations need to focus on and gain the ability (Atak, 2011). Knowledge management is not a new fact as well as emerging knowledge as a parallel discipline to the development of information technologies and defining it as an organizational process in an organization can only come true today (Kalkan & Keskin, 2005)

Knowledge management consists of processes and applications that provide personal, obtaining and developing collective knowledge (Davenport & Prusak, 1998) within the organization to encourage innovativeness through transferring knowledge and continuous learning (Hussinki et al., 2017).

Knowledge Management Process

The knowledge management process includes the process from obtaining to using knowledge for the organization is over by applying the knowledge; all these processes need to be implemented without any delay for optimum performance (Bhatt, 2001). At the same time, this process incorporates determining and analyzing the proper and required knowledge to achieve the organizational goals; planning, and controlling the activities that improve knowledge assets. Knowledge asset is the knowledge on markets, products, technologies, and organizations that ease processes of companies to gain profit. Knowledge management process is a process that covers developing, protecting, using, and sharing knowledge (Çivi, 2000). Organizations need to convert knowledge to the valuable and organizational asset by evaluating the opportunities of knowledge management very well to have a sustainable competitive advantage; they also need to make their experience and expertness formal; sharing and distributing experience and expertness is another necessity at the same time (Çetinkaya, 2012). Since knowledge management is a process that necessitates sustainability and also there is added and managed more knowledge in time, it becomes a spiral (Lawson, 2003). Table 2 shows knowledge management processes that are shown by many authors.

Table 2: Knowledge Management Processes that are Defined by Different Authors

Author	**Knowledge Management Processes**
Wiig (1997)	Collecting, producing, transforming, disseminating, using and appreciating knowledge
De Long (1997)	Defining, transferring and utilizing knowledge
Liebowitz and Beckman (1998)	Acquiring, protecting, storing, coordinating, distributing and managing knowledge
Teece (1998)	Creating, transferring, combining and using knowledge
Beijerse (1999)	Determining the lack of knowledge, developing/buying, sharing and evaluating knowledge
Filius et al., (2000)	Acquiring, documenting, transferring, creating and applying knowledge
Gupta et al., (2000)	Creating, discovering, sharing and learning knowledge
Alavi and Leidner (2001)	Creating, storing, transferring and applying knowledge
Tseng and Huang (2011)	Revealing, storing, sharing and transforming knowledge
O'Dell et al.,(2003)	Determining, collecting, adapting, organizing, applying, sharing and creating knowledge
Bergeron (2003)	Acquiring, changing, instantly using, archiving, transferring, transforming, aiming, accessing and destroying
Darroch (2005)	Acquiring, spreading knowledge; reaction/response
Bharadwaj and Saxena, (2005)	Acquiring, sharing and evaluating knowledge
Becerra-Fernandez and Sabherwal(2006)	Discovering, acquiring, sharing and applying knowledge
Lin and Kuo (2007)	Creating, acquiring, sharing, learning and developing knowledge

This study reviewed knowledge management as a system that consists of acquiring, storing, interpreting, and applying knowledge (Akgün & Keskin, 2003, Huber, 1991, Dixon, 1992). Figure 3 shows the knowledge management processes. This process occurs as a cycle and becomes reality when each step

affects another step (Akgün et al., 2009). These five stages in knowledge management become the engine of organizations for learning; they also generate the main parts of an effective learning process in social sharing as the rings of the learning chain. It is impossible to talk about knowledge management in case one of the rings of the related chain is missing. In the circumstances, the social and interwoven structure of organizational knowledge and distributing it are accepted as a crucial factor (Akgün & Keskin, 2003).

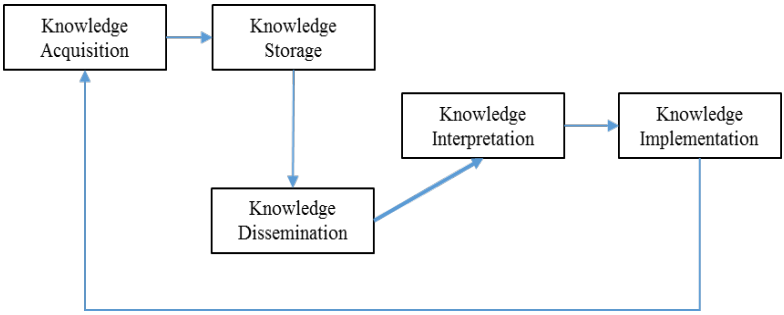

Figure 3. Knowledge Management Process (Akgün & Keskin, 2003)

Knowledge Acquisition

Knowledge acquisition discusses the question of how the required knowledge and technology for the effectiveness of an organization can be obtained (Çetindamar et al., 2013). Knowledge acquisition is accepted as a critical factor for organizational knowledge and knowledge management; it also includes using some techniques about this process and also acquiring data and information related to environmental changes by internal and external studies. The need for new knowledge generates the basis for organizations to organize and carry on the activities (Akgün & Keskin, 2003). Organizations either acquire information from themselves or external sources (Dixon, 1992; Santoro and Gopalakrishnan, 2000). Organizations transform required information to knowledge during their relationships with these internal and external environments. They start to move by combining this knowledge with their experiences, values, and rules (Selvi, 2012). Process of knowledge acquisition from the internal sources is defined as using raw materials that are available but have not been used as of yet (Klimecki, 1999); it occurs by learning with experience, continuous process improvement, experimenting, and a critical approach (Argris, 1990). Knowledge acquisition from the external sources includes participating in organizations (i.e conference, fair, training program), collaborations,

monitoring stakeholders, informing experts, social and technological trends and alliances (Pucik, 1998).

Storing Knowledge

Organizations need to store knowledge by specific methods and processes and also by internal or external sources. This storing procedure provides protecting knowledge; it should also ensure knowledge to be easily accessible and usable when needed.

The chief goal of knowledge management is to add value to organizations. In other words, the goal of knowledge management is to provide an organization to benefit from its sources and/or potential of the highest order to ensure increasing the skills and accommodating (Kim, 2002). First of all, internal and external information sources need to be stored in organizational information repository; they also ought to be brought into use. Qualification of organizational service is measured by being accessed exact information at the proper time by the personnel. A knowledge management approach is a paradigm that is developed for performing the function in the best way. In other words, storing organizational knowledge sources on a systematic structure and properly accessing knowledge in terms of time, labor and cost are the remarkable functions of the goals of knowledge management (Odabaş, 2009).

Knowledge, at this stage, is stored by organizing so as to comprehending again by storing methods (Martensson, 2000); knowledge makes reuse and reevaluation of itself by passing to the ownership of organization (Nemati, 2002). Storing includes processes such as transferring and recording documents to electronic media like computers (Arklan & Taşdemir, 2008).

Dissemination of Knowledge

The process of dissemination of knowledge that means disseminating knowledge arising from internal and external sources within the company is one of the most important and critical processes in the knowledge management process. Applications, methods, and processes to that purpose mean the dissemination of knowledge throughout the company as soon as possible (Nonaka & Takeuchi, 1995). This issue is a remarkable topic in terms of sharing knowledge that is stored in different places between both employees and executives and all the units of the organization (Beijerse, 2000). Establishing an organizational structure and culture that support knowledge sharing during this process is

closely associated with the wishfulness of information provider and informed (Davenport and Prusak, 2001). However, knowledge is power and the ones who have this power may not be disposed to disseminate information. Available explicit knowledge and organizational culture become involved at this stage (Akgün et al., 2009).

Interpretation of Knowledge

Regarding this item, individuals show their experiences, thoughts, and creativity of implicit knowledge by discussions; they also compare and share with other group members at the same time (Zollo & Winter, 2002). Interpretation of knowledge is interpreting the knowledge so as to be understood by the general run of the team; this related item can be realized at the team level by dialogues (Huber, 1991). Being developed a common comment by all the departments of the organization provides knowledge to be managed effectively (Akgün & Keskin, 2003). Moreover, this stage displays a creative process rather than being inventional. Different knowledge is created in the interpretation process. Since the presence of different interpretations will enhance the potential behaviors of the organization, it contributes to organizational learning (Akgün et al., 2009).

Application of Knowledge

This stage that is the last phase of knowledge management is an indicator for showing how and where the knowledge will be used within the frame of organizational purposes and procedures. Organizational knowledge that is acquired in the application process and also the main treatment that makes organization effective is utilized in personal and collective learning; creating new dynamic information; problem-solving and decision-making processes. Therefore, organizational knowledge, in a way, is a stage that shapes the success of other processes (Kaygısız, 2013). Putting knowledge into practice means increasing internalized knowledge at a personal level to the organizational level (Friedman & Prusak, 2008). Putting knowledge into practice and reflecting it to the decisions of organization ensure the knowledge management to increase the performance and be beneficial (Akgün & Keskin, 2003).

2. LEARNING ORGANIZATIONS

2.1. Learning Concept and Organizational Learning

Learning necessitates (Liu et al., 2002) a continuous effort towards sharing the knowledge and developing a new approach to acquire, use the new knowledge, and improve the economic performance (Boerner et al., 2001). Moreover, learning is a dynamic process and it also provides applications to be performed by repetition and experimentation (Korhohen & Niemela, 2005). For Senge (1993), learning is the first change in the behaviors of a person (Senge, 1993). Learning is defined as the transforming process of experiences for creating knowledge besides increasing conceptual capacities and potential for the activity effectiveness of individuals.

Learning can actualize at the personal, group, and organizational levels (Koçel, 2003). Learning at a personal level is about improving thinking and questioning skills (Tang, 2008); these thinking and questioning phases are made real by people on behalf of the organization (Crossan et al., 1999). When viewed from these aspects, individual learning is a process in which implicit and explicit knowledge is created by interpreting feelings. Interpreting, beyond a skill, necessitates motivation, too, while feelings are based on implicit knowledge and experiences of the person (Ruiz-Mercader et al., 2006). Accordingly, interpretation and feelings are at a personal level. Organizations cannot make interpretations based on feelings. This is because interpretation is made by persons on behalf of the organization (Kocel, 2003). Much as learning at a personal level does not guarantee the learning at the organizational level, learning at the organizational level cannot come true without overcoming the learning at the personal level (Argris & Shön, 1978).

Learning at the group or team level is characterized as being shared and interpreted by individuals who have learned at a personal level for individuals to reach the group mentality (Koçel, 2003). Learning at a group level means a group that renews itself by considering changing conditions (Tang, 2008); there is built a bridge between this learning level with personal learning and organizational learning (Senge, 1993). The vital point here is the communication process that is utilized by individuals (Kocel, 2003).

Organizations, just as individuals, improve skills by learning culture and continue their existence (Atak & Atik, 2007). Learning at the organizational level consists of knowledge acquisition, dissemination of knowledge, interpreting

knowledge, and reuse of knowledge by storing (Liu at al., 2002). In this respect, learning at the organizational level means transforming the shared value and common understanding into the method, process, system, expected behavior patterns, and database that organization members can reach at will so as to include the whole of the organization. Organizations move on while individuals there constantly change in the way that leaves of employment and start a job; what matters is that organizations have learned (Koçel, 2003). Much as learning shows itself as a personal process in itself, the learning process that occurs at organizational provides organizations to survive in the global business world with increasing competition and constantly changing technology (Akgün et al., 2009).

Organizational learning that is accepted as the core competence of the learning organization is shortly defined as the process to create, acquire, share, and use knowledge for change (Atak & Atik, 2009). The prior condition of organizational learning is the individual's learning. Thus, learning for individuals, groups or teams ensures the gained knowledge to belong to the organization. Accordingly, organizational learning is formed by transferring learning at a personal level to the working environment (Çam, 2002); it also contributes to the future shaping of organizations in a proactive manner (Malone, 2002). In addition to all these, organizational learning means the learning process in an organization and deals with how the individuals learn within an organization. This process advantages for the future of organizations in terms of developing new behaviors (Sun and Scott, 2003). Behavioral change that is based on this learning is defined as improving organizational learning processes by knowledge and understanding (Fiol & Lyles, 1985). However, organizational learning becomes different because of providing a common interpretation arising from individual learning and dissemination of knowledge. Organizational knowledge occurs when the results of individual learning are shared with other employees of the organization so as to cover the whole of the organization (Milton, 2008).

Presence of the knowledge management process in organizations is important for organization learning (Sağsan, 2008), as well as these processes, are also accepted as the main characteristic and trigger of the organizational learning (Akgün et al., 2009).

2.2. Learning Organizations

For allegations, the best-fit approach in a rapidly changing, globalized competition environment is the learning organization approach. Such organizations are skilled in finding, creating, absorbing, and transferring knowledge;

they also skilled at reflecting this new knowledge and inspiration to products, decisions, and behaviors (Garvin, 1993). Learning organization is an organization that provides harmony with the environment; researches required things to improve itself; gains experience; learns from mistakes; easily adapts itself; organizes and optimizes the contribution of organization employees (Wilkinson et al.,2004)

Learning organization concept started to attract attention by Senge's (1990) book called 'Five Disciplines'. This interest still continues today. Related disciplines are systems thinking and approach; group learning; mental models; vision sharing and personal mastery (Senge, 1990). Organizations that apply disciplines that are offered by Senge will have a system that always encourages continuous learning and development in organizations by communing with the environment (Estrada, 2009). In conclusion, one of the goals of learning organizations is to provide learning to become the culture of the organization (Tsai, 2014). For Senge (2006), Table 3 shows the fundamental principles of learning organizations.

Table 3: Five Disciplines (Senge, 1990).

5 Disciplines	**Explanation**
Mental Models	To see the effects of our beliefs and view of life on decisions and actions; talk about these issues and understand the perspective of the other person.
Personal Mastery	To have a personal vision and improve ourselves to reach it.
Shared Vision	To interlock around a common vision and goal.
Learning by Group	To have much more results than personal results by using team enrichment power of personal differences; developing the ability to create common goals; recognizing the whole picture and talking by considering the social relationship networks.
Systems Thinking and Approach	To see the whole picture and focus on root causes and actions with high leverage instead of quick solutions with high side effects.

Learning organization means learning from experiences and using it for environmental changes; establishing a system for personnel to improve themselves; transforming the organization into a dynamic institution that updates itself (Pedler et al., 1991). The core elements of the learning organization concept are creating knowledge; learning; motivation of employees; transforming

results into the knowledge of the organization and using this knowledge to solve problems (Koçel, 2003). Therefore, learning organization is an organizational structure that aims to improve its continuous learning, adaptation, and changing capacity (Robbins et al., 2016). Learning organization is much more than the sum of assimilation capacity of employees; it also is the backbone of communication between external environment and organization with sub-units of the organizations (Çetindamar et al., 2013). In other words, a learning organization is a structure that continuously learns and converts by learnings. Table 4 shows the characteristics of learning organizations (Garvin, 1993; Baiyin et al., 2004).

Table 4. Characteristics of Learning Organizations (Baiyin et al., 2004; Garvin, 1993)

Characteristics of learning organizations
It shows the changing capacity of the organization; tries new approaches.
It does not only consist of the sum of learning individuals.
It redescribes organizational structure, culture, business design, and assumptions while enhances the learning capacity of individuals.
It provides effectively and rapidly use of knowledge by the wide participation of employees to decision making and knowledge sharing processes.
It promotes to think systematically and establish an organizational memory; develops systematic problem-solving skills.
It learns from past experiences, others, and the experiences of the best ones.

Culture is the basis of the learning organization; organizations need to have a management style that efforts for removing borders, encouraging ideas to be freely shared between persons, supporting learning to create this culture (Çetindamar, 2013). However, an organization's learning means being an organization that creates an environment for new knowledge; uses new knowledge in production; encourages employees to create new knowledge by accepting experiences as a learning opportunity (Nonaka, 1991).

Accumulation of knowledge in management science has an important role in the establishment of learning organizations (McGill & Slocum,1993). Every organization has a learning process, even at different levels. However, learning takes shape at the organizational level in line with cultural patterns and norms. Organizational culture displays an attitude that supports or avoids the learning process at this stage (Harvey et al., 1998). When viewed from this aspect, an

organization's learning is about the approach and communication of the organization with both employees and the circle (Koçel, 2013). As is seen in Table 5, we can observe when the development of an organization in terms of organizational learning is analyzed that there are four different learning categories as a knowing organization, conceptual organization, thinking organization, and learning organization (Harvey et al., 1998).

Table 5: Development of organization in terms of organizational learning

Knowing organization	They have paid more attention to rationality and efficiency than anything else; they can be successful to the extent that they do not need learning (McGill and Slocum, 1993). It is thought that a single best way can be found anywhere and under any circumstances; this best way can only be found by the executive (İmamoğlu and Mutlu, 2012) It is based on the classical management approach. It is the culture that focuses on determining the best way to perform the functions (Harvey et al., 1998). Rationality and recognizing the best approach are the characteristics of this organization (Koçel, 2013).
Conceptual organization	There is a dominant belief that there may be different rights from different situations and persons (İmamoğlu and Mutlu, 2012). It is based on a neoclassical management approach. It is emphasized that there may be different 'good's that do not evaluate in terms of 'best' and are based on value judgments, personal understanding, and conditions (Koçel, 2013). The fundamental philosophy is understanding and applying organizational values by all the employees (Yazıcı, 2001).
Thinking organization	It is an organizational culture that defines the company as a series of problems; it equates company with the sum of knowledge and information that provide determining and solving problems (Harvey et al.,1998) Thinking organizations focus on rapidly determining and analyzing business problems and also coming into action and training directors in this way (Çam, 2002). Management techniques are accepted as the instruments to correct the failing aspects of the business. It develops a system for corrector and preventive actions to avoid the same mistake if there is a delay in organizational activities (Koçel, 2013).
Learning organization	The fundamental philosophy is to learn the most that stakeholders can learn (McGill and Slocum, 1993). It is an organization that supports trials and constructive discussions; toleration and open communication are dominant (Harvey et al., 1998). It is also an organization that promotes learning; adapts positive dialogue; pushes on open communication and prioritizes the continuous development of employees (Koçel, 2013).

As is understood by all definitions above, learning organization, in general, is the organizations that benefit from the result of learnings of employees and groups by giving them opportunities to learn; change knowledge, mentality, environment, and behaviors in time; drive forward collaboration and communi-

cation; know to learn from experiences; develop problem-solving skills; adapt innovations and are continuous.

It is argued that learning organization is the best approach in today's global, competitive, and changing environment. Such organizations are skillful at finding, creating, assimilating, and transferring knowledge; they also skillful in reflecting this new knowledge and vision to behaviors, decisions, and products (Garvin, 1993). Each of the firms needs to learn to adapt to changes in the external environment and manage the internal processes, structures, and systems to be competitive in a fierce competition environment (Kırım, 1998). Learning organization concept means a management application as well as it is not a new organization model. The principle of this application is based on enhancing the competitive capacity of the organization by developing new products and procedures for doing business; creating new ideas via research, past experiences, and circles (Koçel, 2013). Learning is one of the factors that ensure competitive advantages; it means that you have a guide that can transform your company into a learning organization if your goal is to establish a learning organization and you have reached this goal (Braham, 1998).

CONCLUSION

Learning organization concept in which training and development are accepted as the facts that are continuous in the age of information and technology has become a must-have for companies to manage the knowledge by banding together with the human technology. Successful companies, today, encourage employees for self-improvement and pave the way for providing continuous learning. They, as an organization and its employees, need to act as a whole for revealing, acquiring, and using knowledge. In this connection, we can say that learning at the organizational level and learning organization approach are the necessities for modern companies.

Organizations that are in search of developing dynamic skills have to establish unique sources to create a competitive advantage. Knowledge and learning process is one of the important sources for organizations. Learning helps organizations to strengthen their skills; develop new understandings and reach new concepts; they can adapt constantly changing and transforming the environment at the end of this process. Organizations that want to improve their

learning ability should establish a system in which individual learning can be shared amongst all the members of the organization (Çetindamar, 2013).

In conclusion, sharing the knowledge with all the members of the organization can only be possible through a learning organization approach. Keeping the existence and providing a competitive advantage come true, all and only, by learning and effective use of knowledge. Organizations that establish a continuous leaning-oriented structure and whose all processes are based on learning, using, protecting and sharing knowledge will come into prominence and preserve their existence.

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CHAPTER 20

KNOWLEDGE IN THE CONTEXT OF INTELLECTUAL CAPITAL

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INTRODUCTION

Social, cultural, and economic changes throughout the world have affected the structure of society. As time progressed, the fundamental values of societies also changed. In the Agricultural Society, power is in the landowners; in the Industrial Revolution, power is in the capital holders, while in today's Information Society, power is in the knowledge workers. Knowledge also drives economies due to its strategic importance. Knowledge is a critical and essential source ofcompetition for businesses. Because knowledge is the essential skill that is difficult to imitate, in this context, "knowledge" is also given a special place in the production factors consisting of labor, capital, naturalresources, and entrepreneurship. Peter Drucker, in his book Managing for the Future: The 1992 and Beyond, writes,' From now on, the key is knowledge. The world is not becoming labor-intensive, not energy-intensive, but knowledge-intensive. "An investment in knowledge pays the best interest," said Benjamin Franklin.

1. INFORMATION SOCIETY TRANSFORMATION

Due to socio-economic developments, the agricultural period of human history is referred to as the "first wave", the industrial revolution as the "second wave", and the developments in the information society as the "third wave" (Toffler, 1981). The most important input of the information society is "information". The economic strength of society is the production and use of knowledge. In this context, economists also considered knowledge within the factors of production (Drucker, 1994). However, knowledge is also seen as a

driving value that drives social life in multidimensional terms as capital and power (Bulurman, 2002).

Fritz Machlup first described the concept of information society by using the concept of knowledge economy in his book in 1962. Machlup, explained that developed industrial societies are oriented towards a new economy, namely the knowledge economy (Godin, 2008; Mattelart, 2004: 52; Irzik, 2002: 53).

In 1980, Japanese Yoneji Masuda used the concept of information society to describe the future society and predicted that intellectual creativity will be more dominant than today's self-discipline, the consumer society, and integration with the society in the future where people live in harmony with nature, in his book titled "Post-industrial Society as Information Society" (Masuda, 1980; Geray, 2003).

Drucker has used the term "information society" to advocate that information workers will have to change their requirements and adapt to them. The employees of this new society are also called "knowledge workers". Due to the rapid change in the information society, people with information will be considered obsolete if they do not obtain new information every 4 or 5 years (Drucker, 1969; 1994).

Advancements in IT and communication technologies have been influential for a new social development in human history (Çelik, 1998: 54). Information society is a social structure aimed at using information and communication technologies effectively, together with explaining a new social order (Lytras, 2007) within the framework of correctly defined information, based on developing technologies (Medeni & Aktaş, 2010:3). The technological developments in the Information Society, information becomes a commodity and a strategic resource of business information systems to be based on the operation information ecology emerged (Vlev et al., 2016). After the 2000s, modern society and business life experienced an explosion of information due to the developments in computer and communication technologies (Randall, 1982:5).

2. EMERGENCE OF INTELLECTUAL CAPITAL

The increase in the use of IT, the transfer of economic activities to the international level, the introduction to the knowledge-based economy has made it necessary for enterprises to exist in a difficult competitive world. In order to

manage this competition on a global scale, businesses need to make their existing capacities and resources a sustainable competitive advantage with a business spirit that will generate new ideas. One of the areas where businesses invest in order to develop this competitive spirit is intellectual capital and it has been emerged with the transformation of the information society and as the share of information among the factors of production increased, it began to be considered as a more important type of capital (Dumay, 2016).

Intellectual capital has gained enough value to overshadow physical capital due to the results of rapid change in IT and communication technologies. On the other hand, it is possible to evaluate the investments made by individuals, institutions or countries within this framework. Investments have mostly transformed from tangible assets to intangible assets. According to Quinn, with some exceptions, soil and production of all enterprises' economic strength come from, rather than tangible assets including all the equipment, and service components and creating all business enterprises, and it becomes the router to the stocks of knowledge (Quinn, 1992). Therefore, intellectual assets have become an important concept in the knowledge economy, whose main source is abstract assets, regardless of the field in which it operates (Kujansivu & Lönnqvist, 2007). The importance of intellectual capital for businesses, seen as the only and unique factor to give businesses a competitive advantage in the new economy, has been strikingly expressed as: "in the modern business world, businesses that cannot manage intellectual assets are doomed to die" (Roos et al., 1997). It should give great importance to intellectual capital assets that have innovative knowledge and have strong links to the environment.

3. THE CONCEPT OF INTELLECTUAL CAPITAL

John Kenneth Galbraith (1969) used the concept of intellectual capital that was described as, "a whole of intellectual activities, not just an element arising from human intelligence" (Pena, 2002: 180).

The intellectual capital issue was brought to the agenda by Stewart (1991) in his article "Brain Power". Stewart has described intellectual capital as "everything that employees own and will give the business a competitive edge." In later years, Stewart (1994) covered the concept of intellectual capital more broadly, describing it as "information, data, technology, intellectual property rights, experience, the capacity of the organization to learn and compete, customer relations team communication systems, and brands". Stewart (1997) de-

scribed the concept as "the intellectual material used to create wealth, that is, knowledge, experience, and intellectual property", adding a new dimension to intellectual capital.

In today's knowledge economy, the most effective competitive element of enterprises and the key to success is "intellectual capital" (Marr et al., 2003). Intellectual capital generally means that all business activities focus on the future, strengthening business capabilities, launching an action plan to address weaknesses, and thus continuous improvement of business operation (Jelcic, 2007). There are various definitions of the concept of intellectual capital in the literature.

OECD described intellectual capital concept as "the economic value of the intangible assets as two components as human capital and organizational capital" (Petty & Guthrie, 2000: 158); "intellectual capital-the intangible assets that enable them to carry out all of their business activities" Brooking (1996); "the information that can be transformed into cash" (Harrison & Sullivan, 2000); "invisible values created by the internal and external structures" (Sveiby, 2001); and "the stock of hidden assets, knowledge and skills providing competitive advantage and creating value for achieving a business's goals" (Chen, 2008).

The development stages of intellectual capital from the past to the present are included in Table 1.

Table 1: Milestones-a chronological review of Intellectual Capital literature

Period	Progress
Early 1980s	General conceptualization of intangible value
Mid-1980s	The “information age” starts with the realization of the difference between market and book values of the business by some companies
Late 1980s	Early attempts for measuring intellectual capital by consultants (Sveiby, 1988)
Early 1990s	Attempts for measuring and reporting on intellectual capital in terms of company stocks In 1990, for the first time, Edvinsson is appointed as the "Director of Intellectual Capital"'. Kaplan & Norton introduced “balanced scorecard” concept (1992) that is summarized as "you can get if you can measure”
Mid-1990s	Nonaka & Takeuchi (1995) introduced the work titled "the knowledge creating company" '. Tango has been the first produced product for the market to be used for importance of intangibles on executive education. Skandia company supplemented their annual report including their intellectual capital stocks in 1994

	"Visualizing intellectual capital" becomes popular in other companies following Skandia's report (Edvinsson, 1997) Celemi used a "knowledge audit" as an attempt of a detailed assessment of intellectual capital. Some early researchers published their well-known studies on the topic (Kaplan & Norton, 1996; Edvinsson & Malone, 1997; Sveiby 1997).
Late 1990s	Intellectual capital becomes quite popular with scholars and their studies. Some large-scale projects were introduced for academic developments. The OECD organizes an international intellectual capital symposium in Amsterdam in 1999.
Early 2000s	The intellectual capital has become popular in a global sense. Studies on the management, measurement, and reporting of intellectual capital are carried out in many countries.

Source: Adapted from Petty, R. & Guthirine, J. (2000).

4. ELEMENTS OF INTELLECTUAL CAPITAL

There is no universal classification for the elements defining intellectual capital concept. The harmonious interaction of the intellectual capital elements within the business increases the ability of the business to compete and perform. Today, when the information economy is increasing its share with each passing day, the investment in intellectual capital will return with positive results for the enterprises. Table 1 contains classifications created by various authors.

Table 2: Intellectual Capital Classification Schemes

Developed by (Time)	Framework (Country)	Classification
Edvinsson & Malone (1997)	Skandia Value Scheme (Sweden)	Structural capital Human capital
Bontis (1998)	Canada	Structural capital Human capital Customer capital
Stewart (1997)	America	Structural capital Human capital Customer capital
Saint-Onge (1996)	Canadian Imperial Bank of Commerce (Canada)	Structural capital Human capital Relationship capital
Sveiby (1997)	Intangible Assets Monitor (Australia)	Internal structure Employee competence External structure

Van Buren (1999)	ASTD (USA)	Process capital Human capital Customer capital Innovation capital
Roos et al. (1998)	England	Structural capital Human capital Relationship capital
O'Donnell & O'Regan (2000)	Ireland	Internal Structure People External structure

Source: Adapted from Tseng, C. & Goo, Y.J. (2005).

The generally accepted classification regarding the intellectual capital elements has been considered "structural capital," "human capital," and "relational capital" (Bontis, 2002: 24). Relational capital (customer capital) is described as the value attributed to the customer and customer relationship it has. Table 2 contains information about the elements of intellectual capital.

Table 3: Components of Intellectual Capital

	Intellectual Capital		
	Structural Capital	**Human Capital**	**Customer Capital**
Basics	Organizational Routines	Human Mind	Market Relations
Scope	Internal Organizational Affiliations	Internal Employee Network	External Organizational Affiliations
Parameters	Employees' Eligibility for work	Efficiency Accessibility	Longevity Relationships
Coding Degree	High	Medium	Very High

Source: Adopted from Bontis, N. (1996).

4.1. Human Capital

Human capital is the use of the information, skills, abilities and knowledge, possessed by people in the interests of the enterprise (Johannessen et al., 2005). Human capital has been one of the fundamental elements of capital in enterprises that it is a source of invention and strategic innovation (Pablos, 2002). It also has privileged importance in terms of managing and evaluating intellectual capital (Bozbura, 2004).

The knowledge of employees becomes an element of intellectual capital when knowledge is utilized and shared for value creation from an organizational

perspective (Lynn, 1998: 18). The components of human capital that are important to businesses are as follows (Guthrie, 2001: 35):

- Technical Knowledge (Know-How),
- Education,
- Professional qualification,
- Information production studies,
- Ability/skill creation studies,
- Entrepreneurial spirit, innovation, changerism.

Human capital is the most important dimension of intellectual capital. It attracts customers to business, in the form of the competencies, skills, and attitude of an employee, refers to factors that result in increased performance and profit. The skills and knowledge are carried by the minds of employees. If thoughtful human resources are not used effectively by the business, the knowledge and skills in their minds will not be activated, used, or converted into the market value (Chen et al., 2004).

4.2. Structural Capital

Structural capital constitutes the embodied, strengthened, by the human capital infrastructure. It ensures that the context and conditions are prepared encouraging individuals to utilize their human capital to develop their knowledge (Cohen & Kaimenakis, 2007).

Structural capital is the corporate capabilities of enterprises to meet marketing requirements. It includes the routines of the enterprise supporting employees' results for optimal intellectual performance, thus overall business performance (Bontis, 1996). Stewart (1997) refers to structural capital that cannot be taken home at night.

According to Stewart (1997), structural capital has two aims. The first aim is to regulate the sharing of information within the enterprise and to take the necessary measures to prevent loss of information. The other aim is to make sure that human resources may access to information on time.

4.3. Relational Capital

Relational capital (customer capital) acts as an intermediary of intellectual capital. Customer capital has a certain feature in transforming intellectual capital

into market value and organizational performance. Thus, the development of relational capital depends on human capital and structural capital (Chen et al., 2004). Relational capital is the skills and attitudes of interacting with members of the business community positively motivating the potential of value-created by increasing the structural capital and human capital of a business (Marti, 2001).

Relational capital describes the relationship between the business and the customer. It covers processes and practices for increasing the number of customers (Rudes & Mihalic, 2007). However, customer capital is not only limited to customer relations but also includes the values provided to the business by non-business entities such as the state and suppliers (Bontis, 1998: 67).

The elements of relational capital are as follows (Guthrie, 2001: 35) :

- Customers, Brands,
- Customer loyalty,
- Business name,
- Distribution channels,
- Work-related cooperation,
- Licensing agreements,
- Contracts of requested nature,
- Franchising agreements.

Relational capital is recognized as a market-based asset derived from a brand. It provides insights into marketing, customer attractiveness, and distribution channels, along with dealing with the external environment (Baker, 1990).

5. MEASUREMENT OF INTELLECTUAL CAPITAL

Intellectual capital does include not only tangible items but also intellectual capital including licenses and patents that is measured with the number of patents obtained, or published reports as well as using different ratios of employee output (Kannan & Aulbur, 2004; Choong, 2008). Although intellectual capital components, including licenses, are shown in the balance sheet under R&D expenses, there was no specific accounting method for the valuation of intangible assets. Neil's (1988) study proposed using the discounted cash flow method in order to measure the intangible assets instead of using accumulated profit. Human capital components, including know-how, decision making,

learning, and problem solving, may be measured indirectly using indicators of such skills. Human capital may also be measured by aggregating performance results of all the HR over the years. There are different techniques to measure intangible capital in general.

The measurement of intangible assets of the intellectual capital is a challenging task as the concepts of information and knowledge are the abstract and complex in nature (Asiaei et al., 2018) and it is related to the organizational performance (Schiuma et al. 2008). The measurement is also related to the 'stocks' of knowledge accumulated in organizations that are important for value-creation (Bontis, 1999). There are three main techniques are used for measuring intellectual capital: firstly, financial approach; secondly, balanced scorecard approach; and lastly performance-based approach.

5.1. The Financial Technique

There are various models using a financial approach based on different financial models for measuring the intellectual capital value, and they use data from company financial statements. Some selected financial methods will be summarized.

Tobin's Q (Quotient) method, proposed by James Tobin in 1969, is a useful technique for evaluating investment decisions based on company's book/market ratio to calculate physical assets based on their substitution costs rather than book values. Tobin's Q model suggests that the value of Q is higher than 1, as well as higher than its competitors, which could create an 'intangible advantage' in which the company outperforms its competitors. However, this method has some weaknesses including the fact that it associates intellectual capital with rising and falling stock prices because of the changing values due to various factors.

Economic Value Added (EVA) is another financial measurement tool initially presented to show the shareholder value involving the application of more than 160 adjustments for intangible assets in the traditional balance sheet (Stern et al. 1995). Today, EVA ratio creates residual income that is calculated by the net operating profit after the cost of capital. EVA is different from other traditional methods using cost of capital as EVA is the measurement of the company's actual operating profit (Daengs et al., 2017). Therefore, EVA is an indication that an increase in EVA ratio proves that intellectual capital is managed successfully.

Value Creation Intellectual Coefficient (VAIC) is proposed by Pulic in 2000 as a value-added evaluation method. It measures the efficiency of IC and financial management in terms of value creation of the company. However, Pulic (2000) recommended that the VAIC methodology should be used with more specific evaluation methods.

Human Resource Accounting Technique (HRA) was proposed to use the value of human capital with financial figures with three different techniques: market techniques, cost techniques, and income techniques (Hermanson, 1964). Market techniques consider human value with the average market standard. Cost models consider the cost of recruitment process of HR to evaluate and train the human assets as well as the reduced value of the employee compensation. Income models measure human asset values as the present value of the income that is possible to be earned by an employee lifetime. Although HRA proves to be useful with its indicators, it is criticized for having some controversial assumptions.

5.2. The Scorecard Technique

The second technique for IC evaluation considers IC with various elements and employs a scorecard framework to assess each component of intellectual capital. *The Balanced Scorecard Approach of* Robert Kaplan and Graham Norton (1996) follows on the classification proposed by Stewart under three headings; structural capital, human capital, and relational capital. Structural capital encompasses all infrastructure for the business, including physical resources, organizational processes, and information systems, owned by the company. Human Capital is a combination of knowledge, skills, and experiences of individuals, as well as their motivational factors utilizing these traits for value creation (Baron, 2011; Carson et al. 2004). The company does not possess it. Relational Capital (Customer Capital) includes the company's network of the external environment, including customers, suppliers, and other stakeholders. Balanced scorecard technique employs financial and non-financial metrics to measure each IC components aggregating the scores as averages, financial valuations, or weighted averages.

Skandia Navigator is another intellectual capital measurement methodology proposed by Skandia, which is a Swedish insurance firm (Edvinsson & Malone, 1997). Skandia published for the first time their annual report with supplement of intellectual capital in which they developed 112 metrics under five main groups.

They collected metric data and consolidated an IC model combining all financial metrics as value C, and converting other metrics as ratios of I. Then the financial value of intellectual capital calculated as C multiplied by I. Although it is the first attempt to evaluate IC, some researchers claimed that such methodology has some limitations as it is tailored to fit a specific insurance company and hence we cannot generalize it to other sectors (Bontis, 2001).

Technology Broker (IC Audit) method includes an in-depth audit of organizational intellectual capital (Brooking, 1996). IC audit covers a variety of data collection methods, including market research, questionnaires, and interviews, as well as financial data analysis. As a result of the IC audit, all the criteria are compared against the optimal standard and an index score is placed from one to five. Results are then illustrated by pie charts showing the weight of each dimension.

IC Index is another method to evaluate IC as transforming IC into a numerical value (Roos et al. 1997). Organizational key success factors are derived from the company's statements of the mission and vision. Key Success Factors are utilized to create specific intellectual capital indicators for the company, indicators are weighted for their relative values, and then they are combined into an IC index figure using the weighted average method. Roos et al. (1997) proposed that the indicators should be selected and weighed according to the strategy and characteristics of the company as well as market conditions.

Intangible Asset Monitor (IAM) is an IC evaluation method offering internal measurement tools to provide information for the strategic decision-making processes (Sveiby, 1997). IAM is solely designed for the internal evaluation of IC components for the stakeholders. This model has three IC components; human competence, internal structure, and external structure measuring their present status under three groups, namely efficiency, growth/renewal, and stability. It is a kind of SWOT analysis as an effective internal reporting methodology. However, it has some drawbacks that it does not generate any quantitative figures.

IC Rating is derived from the Skandia Navigator model; however, in order to include the company strategy and external factors into the analysis, a tool called Business Recipe is added to the three actual components of IC model (Jacobsen et al. 2005). IC is computed with more than 200 parameters, including dimensions of risk, effectiveness, and renewal, and data is collected from views of the stakeholders interviewed. Results are given as using grading system with letters changing

from AAA (best grade) to D (the worst grade). The results are reported to the management team. The method is considered as a generic process as no further steps are taken for transforming into monetary terms.

The Value Chain Scoreboard is a method proposed to use the company's business model or value chain to pursue more strategic decisions (Lev, 2000). The value chain process consists of three phases, including discovery and learning, implementation, and commercialization of products and services. According to the model, there are three types of indicators proposed for each different phases of the value chain. The value scoreboard indicators should be quantitative, standardized, and also the validity of the model should be evidenced by empirical data.

Human Capital Monitor Technique (HCM) is proposed to recognize the contribution of HR to value creation' (Mayo, 2001).

The Technique of Intellectual Capital Statements is proposed by some researchers (Mouritsen et al., 2001), adopting a holistic view of IC evaluation. It also prescribes an agenda for management corrective actions. The model uses knowledge narratives that are defined as 'a plan showing the time sequence of the steps, identifying strengths and weaknesses as a management narrative' (Mouritsen et al. 2002).

H.C. Hierarchy of Measures Technique (HCHM) is based on a case study on human capital by the British Civil Aviation Authority (CAA) (Dilys, 2009). They defined H.C. technique as evaluation the value produced (created) by their HR, their company policy and applications. There are four components of the model; workforce data, operational data, outcome measures, and performance measures (Dilys, 2009).

5.3. The Performance Approach

The third evaluation method includes analyzing the effects of IC on performance outcomes (Goldoni and Oliveira, 2010). Some authors asserted that information and knowledge are not measurable as they are intangible assets. Thus, they attempted to evaluate the performance results rather than evaluating the knowledge itself. There has been some evidences of the outcomes of the knowledge management through enhanced performance. However, the correlation should be proved in order to explore the real contribution of IC to the organizations (Wu & Chen, 2014). Performance evaluation systems are also used for monitoring the real-time performance of IC. Although such performance

evaluation systems are quite useful, clear link between IC and corporate performance cannot be established yet (Khalifa et al., 2008). There are different performance evaluation methods. These methods include; financial performance measures, operational performance measures and survey-based methods. Performance evaluation of IC is based on respondents' perceptions of the IC usage and its positive outcomes on the organizational level (Petra & Annelies, 2012).

6. RELATIONSHIP BETWEEN INTELLECTUAL CAPITAL, INNOVATION AND KNOWLEDGE

Companies having unique intangibles can enjoy opportunities in order to improve their business performance (Edvinsson & Malone, 1997; Mention & Bontis, 2013) as well as sustaining competitive advantage and enhancing their innovation capacity (Leitner, 2011; Chahal & Bakshi, 2015).

Innovation has become a critical component of competitive advantage as well as being a matter of survival and growth in today's business environment (Miller, 2001; Cohen & Soto, 2007; Ahlstrom, 2010; Kianto, 2011; Sáenz & Aramburu, 2011; Dost et al., 2016; Kianto et al., 2017). In this respect, companies should find new and innovative ways to maintain survival and renewal as well as developing their competitive capabilities. Innovation may be defined as a new commercialized idea transforming into products and services. The innovation processes are the fundamental ingredients of the economic growth processes on the regional, national, and organizational levels (Teece, 2010). Innovation is also considered from the individual perspective, as talent acquisition and talent management.

The present literature demonstrates the connection between IC and innovation, mostly on the theoretical level (Hsu & Fang, 2009; Leitner, 2011; Buenechea-Elberdin, 2017). IC and especially human capital has been the triggering force behind innovation and augmenting economic growth (Schultz, 1961; Dakhli & De Clercq, 2004; Popescu & Diaconu, 2008; Becker, 2009). The stock of human capital determines economic growth and it is also dependent upon the human capital investments that are also essential tools for realizing innovations. However, there are different perspectives on the IC and innovation relationship. As both IC and innovation are essential ingredients for company survival and growth, more empirical evidence related to IC and innovation should be generated (Buenechea-Elberdin et al., 2018).

The connection between IC and innovation is seen more clearly in the HC dimension as being the most significant ingredient of IC (Subramaniam &

Youndt, 2005). Innovation needs more knowledge and experience, as they are also components of IC and knowledgeable and experienced workers will more likely to create innovative ideas (Anand et al., 2007; Al-Jinini et al., 2019).

Also, structural capital encompasses the whole knowledge created and also disseminated through organizational structures, processes and systems (Youndt & Snell, 2004). The intellectual capital is kept within a company even though employee leaves the company (Roos et al., 1997; Subramaniam & Youndt, 2005), and it is a capacity to create innovation as a means of existing knowledge and "organizational memory" (Fleming & Sorenson, 2004). Knowledge systems support the innovation capacity by enhancing the creation and dissemination of the knowledge needed for innovation (Alavi & Leidner, 2001).

Relational capital also contributes to innovation by knowledge creation processes with customers, suppliers, and various external agents (Sveiby, 1997; Bontis, 1998). Relational capital enables innovation through benchmarking with external sources. Relation capital is also associated with inter-organizational collaborations to facilitate knowledge sharing that also supports the innovation process (Pérez-Luño et al., 2011).

Conjunction of IC and innovation is the term of innovative human capital encompasses tangible and intangible competencies such as formal education and training, as well as being open to innovation or willingness to change (McGuirk et al., 2015). Another issue is the measurement of innovative human capital with intangible components, including earned diplomas, duration of the training, and uniquely innovative behaviors (Wang & Ahmed, 2004).

7. THE FUTURE OF INTELLECTUAL CAPITAL

In this chapter, we stressed the difficulties encountered for IC creation as well as its components when it comes to measurement. Although there have been measurement methods and strategies, they are not found to be reliable and verifiable. There should be more intellectual capital components developed internally that may be used for further recognition of intellectual capital (Pedro et al., 2018).

A literature review of the IC characteristics as well as factors affecting intellectual capital asserts that intangible assets are essential that are going to be more meaningful for the researchers, employees, managers, and experts in the future. As the speed of the growth of technology increases, the more complex organizational competition will be. The importance of innovation and IC relationships will be higher in order to help organizations to achieve their goals.

According to the research reports published in recent years by the OECD, investing in intellectual capital will provide many benefits to all organizations. These benefits include motivated workers, competent employees, competitive advantage, and enhanced customer loyalty for better outcomes. Companies should invest in intellectual capital after identifying their intangible assets to maintain a sustainable competitive advantage (Daum, 2003). Joia (2007) claims that successful organizations of today and tomorrow recognize the strategic issues related to intellectual capital in the value creation process. In order to survive and compete in the marketplace, organizations need to be more competitive, focusing on continuous improvement. Mahoney and Kor (2015), propose that organizations will understand how intellectual capital is going to be an important issue in the future. The future of IC and knowledge management looks bright.

The chapter has outlined some of the complex questions regarding IC and its evaluation techniques and its relation to innovation. The future of knowledge management and IC requires a transformation of paradigm and more applications are required on the subject. The intellectual capital research agenda will move towards the issues of intangibles' measurement to the investigation of how intellectual capital enhances corporate value creation processes.

CONCLUSION

Global competition has been rising, especially with the current knowledge economy as to achieve sustainable competitive advantage as well as maximizing value creation. In this chapter, various models of intellectual capital measurement have been addressed, aiming to enhance the productivity of the organizations. The evaluation and management of IC have been crucial for organizations for adequate HC planning in order to enhance the innovative HC. The issues related to the evaluation of intellectual capital proposed visualizing and locating organizational knowledge stocks as well as enhancing the intellectual capital capabilities.

This chapter summarized the various issues related to IC as a contribution to the knowledge management, the operationalization of IC evaluation involves the analysis of influential factors of IC in organizations as well as focusing on individual capacities. This chapter addressed to propose a research framework for intellectual capital studies in the future, setting a foundation for empirical research.

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CHAPTER 21

KNOWLEDGE MANAGEMENT AND STRUCTURALIZATION OF INFORMATION

Osman Yılmaz

INTRODUCTION

The knowledge that is applied to works as labor in agricultural society and workstream in industrial society is now applied to itself in a knowledge-based society that is the final milestone of the humanity (Drucker, 1993). Knowledge provides investment efficiency to be the most important competitive factor and higher and more valuable compared to other factors by being 'main production input'. The advantage that is taken by production and use of knowledge needs to be made constant.

Knowledge concept that has started to improve by Socrates's questioning on the limits of knowledge is the basis of the development of humanity. However, knowledge can rapidly lose its value and quality so as to cause to be lost related advantages.

Firms gain a sustainable competitive advantage against competitors in the long run if they can process data on suppliers, customers, competitors, other environmental players and conditions of competition; related firms should also use processed data in their activities at the same time. Persistency of competitive advantage can be ensured by noticing what the information that a company and its stakeholders know; combining, updating, enhancing, keeping, and sharing related information. The company also needs to have organizational skills and know how related information is used to ensure the persistence of competitive advantage (Yılmaz, 2020a). Because the competitive advantage of the ability to use information is constant; this situation only comes true by an efficient knowledge management.

1. INFORMATION CONCEPT

The information concept is evaluated by several stages.

Classification/definition that Buckland evaluated by three stages is important. Related stages are as follow:

1. Information-as-thing: Information concept here is used for objects (book, magazine, film, document, etc.) which carry information and are informative. It is possible to talk about information as a thing.
2. Information-as-process: This concept means the whole of meaningful data that is constituted by evaluating different data together. Knowing action, expressing and teaching information is called 'information as process'.
3. Information-as-knowledge: This concept means fixed information (Buckland, 1991).

For another evaluation pattern, information is called as data, information, and knowledge. Data is raw information while information is processed data. Just as data creates information, information created knowledge. Knowledge is meaningful data that organize and guide life as a result of the evaluation of data and information (Akgün et al., 2010).

Information portfolio consists of specific environments (i.e., hard copies, electronic media, and microchips) or formats (i.e., Word or Excel records, drawings, and HTML), independently coded data, published manifest and implicit content (Evans & Price, 2012). Information by this definition is a fact that is easily accessible, rapidly copiable; this is because it is rapidly getting old and worthless (Yılmaz, 2020a).

Information age includes management, acquisition, sharing, storing, using, and evaluating information; not producing new information or technology. Managing these processes has become a 'prior condition' to increase the value of the information portfolio (Prajogo, et al, 2018). Developed organizations establish, organize, store, and use the information portfolio by the most effective way to reach information management goals (Eroğlu & Çakmak, 2020).

For the Basic Knowledge Management model that was suggested by Skyrme (2002) and is established on basic knowledge management functions, information needs to be organized and stored to determine, collect, classify and easily use the knowledge. Moreover, to the same end, database and stores

should be opened to share; easy access mechanisms should be developed and new information is obtained by using accessed data.

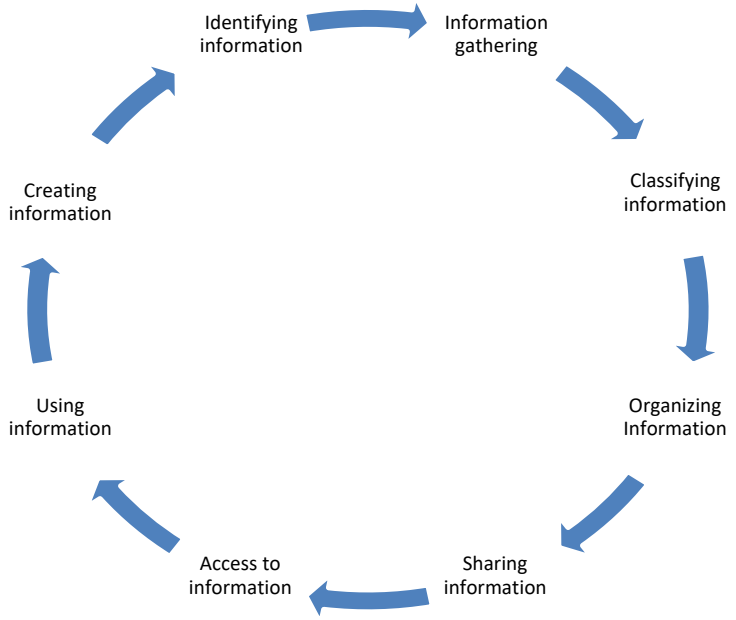

Figure 2. Basic Knowledge Management Model (Skyrme, 2002)

Creating, obtaining, purifying, storing, spreading, and using information are components of the KM process that was developed by King (2009). The related model aims to improve organizational performance by determining situations related to KM processes.

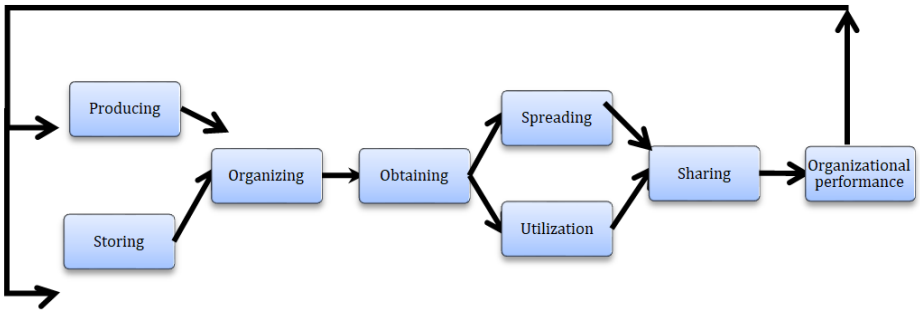

Figure 2. King's Knowledge Management Process Model (King, 2009)

Much as there are many researchers who allege that learning is a personal process, there also are some intellectuals who support the learning ability of organizations. For related researchers, information about an organization is far beyond the information that people have or will have. Persons come and go-to organization. However, the organization has organizational memory, history, and information equipment compared to persons; it makes this equipment sharable (Geyik & Barca, 2004). Knowledge management is based on the thought that organizations cannot effectively use the information and there is a need for organizational learning as strategical learning in modern management areas to stabilize corporate success and obtain a competitive advantage. Companies endeavor to provide the use of information via knowledge management applications to increase organizational performance (King, 2009). Learning does not only enhance the knowledge and skills of workers but also establish a flexible and dynamic learning organization (Saadat & Saadat, 2016).

Organizational learning is defined as 'being organized daily routine around effectiveness, information, and culture by developing the ways of using the organization's workforce skills' (Easterby-Smith& Lyles, 200). Learning includes how organizations learn from experiences and routines and others' experiences through their sources and also how theoretical frameworks or paradigms are developed by the organization to interpret this experience (Levitt, & March, 1988). Organizations reach information via their routines and sources. Effective management of knowledge including collecting, transferring, processing, storing, and producing information significantly contributes to learning organizations. Learning organization concept means an ideal organization that deduces from experiences; uses experiences to be in line with changing environmental conditions; creates a system develops workers (Erigüç & Balçık, 2007); becomes an innovative institution that structure information.

2. FROM IMPLICIT TO EXPLICIT INFORMATION

One of the most effective methods for the structuralization of knowledge is transforming implicit information into the explicit form. Organizations can be compared with an iceberg in terms of information portfolio that includes both implicit and explicit information. The tip of the iceberg represents open-ended information while the secret part of the iceberg consists of implicit information (Eroğlu & Çakmak, 2020).

Implicit information that is not symbolized or shared information consists of know-how, understanding, and evaluation procedures that are obtained by foresight, skills, experiences, or environments of people or organizations (Howells, 1996). It develops through successful experiences and transforms into expertness (Güçlü & Sotirofski, 2006). Implicit information can be in the brain of workers; a run of the organization or internal and external organizations. Since the implicit information is the personal information arising from discernment, it is hard to formulate and transfer it (Nonaka & Krogh, 2009).

Implicit information is an irrevocable factor for companies to continue their existence and keep competitive advantage (Smith, 2001). Sharing and processing the implicit information within an organization increases the capacity for surviving (Alwis & Hartmann, 2008). It needs to transform into explicit form, namely the information of the organization to be consistent and valuable. Explicit information is defined, recorded, and shared information that is in a specific format (Nonaka et al., 2000).

The development of explicit information is directly proportional to the development of implicit information. As it is, explicit information is the extension of implicit information that reflects the external environment (Barutçugil, 2002). Information of internal and external organizations (workers, suppliers, customers, and other stakeholders in general) becomes the information of the company by spreading within the company via fluent communication, dialogue, and discussions (Akgün, Keskin & Günsel, 2009).

There is a need for producing information and supporting the development of information at each of the stages of the information process for this flow to be made real. Leadership, technology, corporate culture, human capital, and organizational structure that are infrastructure elements of knowledge management are important in this regard (Davenport & Prusak, 1998). A common language should be developed by these factors via metaphors initialize information.

The most known model in transforming implicit information to explicit form is Nonaka's SECI model

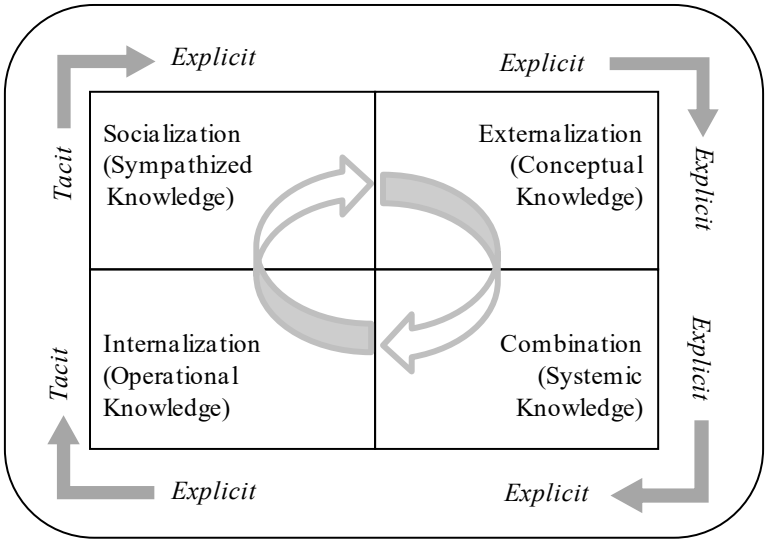

Figure 3. SECI Model in Nonaka's Information Production Spiral (Nonaka & Takeuchi, 1995)

The transformation between implicit and explicit information becomes a reality in four different modes in this model; modes are as follow:

➢ Socialization: From implicit to explicit information

➢ Externalization: From implicit to explicit information

➢ Combination: From explicit information to explicit information

➢ Internalization: From explicit information to implicit information

Socialization is the process in which there is produced implicit information by implicit information by expressly transferring implicit information in the human brain in social surroundings via dialogs. Formal or informal socialization, in this process, can be shared between persons by using activity and methods without expressing mental and technical skills (Akgün et al., 2009). Socialization can also be accepted as a 'job training' process (Karlsen et al., 2003).

Regarding the externalization stage, it is the process in which information is transformed into an open concept and models via metaphor concepts, hypotheses, and models (Keskin, Şentürk& Beydoğan 2018). Information is stored in

company's memory by means of transforming implicit information to explicit form by standard activity procedures; accordingly, information loss risk will be minimized by keeping the information within the company even if key workers leave the company (Melbye, 2008).

Documents and meetings are combined by discussing explicit information about different units by the person and persons via instant messaging. The combination means the process in which explicit information is increased from the personal level to the organization level.

Internalization, the final stage provides information to be embodied by putting it into practice in mind and business processes. Learning by doing sets a good example of this process. This stage in which information becomes experience is the stage including implicit information characteristics (Nonaka & Takeuchi, 1995). Implicit information that arises at the organizational level is more different from implicit information that arises at a personal level. It is argued that the most strategically remarkable value resource of an organization is the implicit information (Ambrosini & Billsberry, 2007). For Goffin and Koners (2011), organizational implicit information is the crucial component of creating a new product. For Ambrosini & Billsberry (2007), relaying and sharing personal implicit information is harder compared to relaying and sharing implicit information at the organizational level.

Ownership of information crosses into the company management from stakeholders such as workers, suppliers, and dealers by transforming implicit information into explicit form 'for the company'. Implicit information, by nature, is shared by unexpected and situation-specific conversations in general. To this respect, environments that provide implicit information to be shared by creative ways within the organization should be established (Bolinger & Smith, 2001).

Regarding implicit information sharing, organization management ought to create a working environment in which different thoughts are respected and delays are not punished. Moreover, open culture needs to be supported within the organization besides the requirement of establishing a less hierarchical structure.

The organization needs to have both structural and managerial skills to use implicit information as an effective and strategical meta. Otherwise, nobody will know about the presence of implicit information in the organization; it will not be used at the same time (Fayganoğlu, 2019).

Experiences arising from socialization, externalization, and combination become the implicit information of people in the form of mental models or technical information; thus, information creation cycle is completed (Karlsen et al., 2003)

Since implicit information is in association with both competitive advantage, strategical approach, learning, innovation, and product development, it is vital for organizations (Bolinger & Smith, 2001).

The current and future success of institutions is based on the determination and use of implicit information that is one of the corporate internal information resources. Information technologies enable institutions to reach and make much more benefit of unexplored and strategically significant implicit information (Yıldırım & Özdemirci, 2019). Because the implicit information avoids information to abandon organization by leaving or replacing key personnel (Ambrosini & Billsberry, 2007).

3. STRUCTURALIZATION OF KNOWLEDGE

Institutions collect much information when they apply the corporate business process; so there can be crowded information in different contexts. Being information findable within an organization does not mean that related information can be used. Stocking information is good-for-nothing alone; the most sensitive spot is not to stock up information, it is to provide information flow. Knowledge/information management, in this sense, is to create a unique value and operationalize information for organizations to reach a high competitive advantage in the market; besides, knowledge/information management also is spreading, producing, and evaluating organized and systematized information (Buckman, 2004).

The structure is the skeleton of a company and also a concept that is created for a company to do more effective and successful jobs (Nordström & Ridderstrale 2000). Structural capital is the organizational architecture, management philosophy, organizational culture, procedures, and routines that support the company when it does its duties. It also is an institutionalized form of the skills that provide you to do effective and successful jobs (Yılmaz, & Çömez, 2016). It provider persistency and competitiveness of the company. For Stewart (1997), structural capital collects, organizes, and makes accessible the information that the company can band together.

These values are the factors that guarantee an operation to succeed; make human relations more effective and valuable. There cannot be provided a required and sustainable performance from qualified human relations and/or valuable relations if there is a poor structural status (Yılmaz & Özer, 2019).

Structrialization is making assets that drifted apart the company along with persons or organizations (partners, workers, customers, suppliers, network, and other stakeholders) within or around the company permanent. With Stewart's (1997) words, keeping the values belong to workers in the company when workers get back home in the evenings. Within this scope, structuralization is accepted by becoming values and information below the permanent values of the company.

There are three main categorical classifications as the provider of knowledge sharing:

- Information format
- Organizational workplace culture
- Motivation to share. (Sun et al., 2018).)

Factors that support success are based on award, prestige, mutuality, sense of self-worth, and the pleasure of helping others.

Moreover, network organizations as the collaboration-based work environments have become workplaces that allied to network more than ever. Related networks provide proper conditions for knowledge sharing and information structrialization (Sveiby, 2001). Information sharing of stakeholders is accepted as the main competitive advantage for a company (Hwang, Kettinger & Yi, 2015).

Since information -as an asset includes adaptation to the environment and learning for organizations- shapes the economy and is the most important agent of production, companies head for being structures that consonant with field and produces and interiorizes knowledge. Information management is a critical part of the management function of an institution. Key performance indicators of information management are as follow: producing knowledge by continuous learning in the whole network; transforming produced information to structural information; providing information to stay in the company even if the information owners leave from the network.

Leaders are the role models to ensure organization to use required information by the most efficient way to reach the goals; they have important duties.

Playing the role of information producer by providing expert knowledge and general information for their followers; playing a reintegrative role in business processes by informal communication and culture sharing; Encouraging the use of knowledge within an organization can be aligned as the most important duties of them (Zorlu, Baytok & Avan, 2016). Regular informing by keeping the social prestige of the company without harming the learning environment and philosophy is the responsibility of business executives.

Perhaps the crucial element of effective information management is organizational culture. Especially, collaborationist culture is a tool to enhance information via organizational learning. An organization has to make its culture fit for this item if it wants to manage information effectively and succeed (Özgözgü & Atılgan, 2017). Organizational culture affects the information sharing behavior of employees and all the members of the network and leads the way for those behaviors by the structural capital factors of the organization (Yılmaz, 2020b).

Continuity and permanence of information arouse by structuring and packaging information and experiences of persons within technology, process descriptions, manual and data banks (Töre, 2019). Thus, information within the organization is shared and structured. Information in those relations makes information explicit by the structuralization of knowledge; this proves permanence at the same time (García-Álvarez, Mariz-Pérez & Álvarez, 2011) In conclusion, there can be developed more effective organizational structures, systems, and techniques (Yılmaz, & Özer, 2019).

CONCLUSION

The importance of information management is seen based on the dynamic structure of information and its effect on the results. Increasing value and strategical role of information necessitate the effective management of knowledge in all the companies regardless of sector. Information should be accepted as the factor of a strategical concept that needs to be discussed by companies. Information portfolio can be measured and defined to properly manage information production processes and effectively use the information.

Today, nothing -except very special trade secrets- is hidden. Much as it is possible to have good or new knowledge, it is impossible to keep it for a long time. Securing and use such information and incorporating them in the management process as from the first generation are the leading factors that show

the effectiveness of an organization. Information becomes the open property of the company by information structuring; it can be kept by patent, copyright, and trade secret codes; it can also be a commercial value; there can be sued against misapplication.

Information that is processed into procedures and processes can also be used for arrangements that increase company performance. On the other hand, improving the specialty in network mediates to be produced knowledge in depth in addition to increasing production performance.

All these come true by 'Information Management' to show an approach within the context of 'Structuralization of Information'.

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CHAPTER 22

SUPPLY CHAIN MANAGEMENT APPLICATIONS IN INFORMATION MANAGEMENT

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INTRODUCTION

Supply chain management and information management are research areas which have attracted attention by academicians and managers over the last decades. The concept of SCM first appeared in the literature in the 1985's. However, the assumptions of SCM such as channel research, systems integration, sharing and exchange of information date back to the 1960's (Cooper et al, 1997: 2). In the context of information management, SCM has developed after World War II. Despite competition among companies, the basic structure of them remained stable but it has improved in terms of information management (Govil & Proth, 2002: 1-2).

Supply chain is a network consisting of suppliers, manufacturers, distributors, retailers, and customers. The network supports three types of flows. Material flows represent physical product, services or product returns and recycling flows. Material flows, which represent physical product flows from suppliers to customers as well as the reverse flows for product returns, servicing, and recycling. Information flows represent order transmission and order tracking to manage the chain well. Financial flows represent credit terms, payment plans, tax and other contract arrangements (Yücesan, 2007: 130). SCM is the process based on customers' orders received. Planning, processing, handling, transporting, storing, distributing and managing inventories, coordinating the orders in a systematic are essential to SCM (Kildow, 2011: 61). Based on this definition, SCM is holistic approach to the work in the process. Suppliers, customers, shippers, and competitors are in a supply network for the use of time and resources efficiently (Zuckerman, 2002: 8). Besides, SCM and logistics are usually con-

fused and used as synonym. However, SCM is a more comprehensive concept and it also includes logistics.

SCM is a process of integrating suppliers, manufacturers, warehouses, and retailers, so that products, services, and information are produced and delivered at the right place and time, at the right quantities while minimizing costs as well as satisfying customer's needs and requirements (Bahari et al, 2017: 230). SCM deals with the total flow of materials from suppliers through end users (Jones & Riley, 1985: 16). It is defined as a holistic philosophy to manage the total flow of a distribution channel from suppliers to customers (Cooper et al, 1997: 2). SCM is a set of companies or individuals directly involved in the upstream and downstream flows of products, services, finances, and information from a source to a customer (Mentzer et al, 2001: 4). It is also describing the systemic and strategic coordination of the supply chain, for the purposes of improving the long-term performance of companies or individuals and the supply chain as a whole (Nayak & Dhaigude, 2019: 39).

SCM is required due to the growing importance of information management, rising complexity of supply chains, refining processes, superior outsourcing, creating quality products, ensuring customer satisfaction, growing profits, dealing with competitors and increasing globalization (Habib, 2017: 55). SCM as a discipline is studied in many *scientific* areas such as economy, management, sociology, environment, information, pharmacy and engineering. SCM has become a popular concept in research and educational areas and it is often related to some characteristics. These characteristics are (Skjoett-Larsen, 1999: 41):

- Inventory management and cost efficiency
- Information sharing and monitoring
- Coordination, sharing vision and corporate cultures
- Developing relationship, sharing of risks and rewards

SCM are using in various industries such as clothing, automobile, publishing, furniture. SCM operations are important for companies in all industries. In the context of SCM, companies have operations such as planning, forecasting, procurement, manufacturing, transportation, distribution, warehousing, location selection, employee management, inventory management, facilities management, system management and so on (Crandel et al, 2015: 8). Examples of supply chains for various industries are shown on Table 1.

Table 1. Examples of supply chains for various industries

Mining and Agriculture	Manufacturing		Service		Consumer	Reverse Supply Chain
Origin	Fabrica	Assembly	Retail	Distribution	Customer	Reprocessor
Grow cotton	Weave cloth	Cut and sew	Distribution centers	Clothing store	Recipient, evaluator	Consignment shop
Grow wheat	Make flour	Bake bread	Regional distribution	Grocery	Recipient, evaluator	Animal feed
Iron ore	Make steel and parts	Assemble cars	Ship direct to dealers	Automobile dealer	Recipient, evaluator	Recycling
Grow trees	Make paper	Publish books	RDC	Book store or Internet	Recipient, evaluator	Greeting
Rubber	Rubber compound	Shape	Distribution centers	Tire dealer or Internet	Recipient, evaluator	Recycling center
Grow trees	Cut	Build furniture	RDC or ship direct	Store or Internet	Recipient, evaluator	Recycling center
Bauxite ore	Refine and roll sheets	Make cans and fill	Regional distribution	Grocery or Automat	Recipient, evaluator	Recycling center

Source: Crandel et al, 2015: 8

Information management with systems and technologies are crucial to the development of efficient and effective supply chains. In the context material requirements planning (MRP), enterprise resource planning (ERP), production planning, capacity planning, demand planning, sales planning, transportation planning, distribution requirements planning (DRP), customer relationship management (CRM), barcodes, electronic data interchange (EDI), quick response (QR), cross-docking, radio frequency identification (RFID) and web-services are used in SCM applications (Hilletofth, 2008: 24-25). These systems and technologies with computer based applications benefit to the companies.

Many drivers of information management are effective for individuals or companies in supply chain. Globalization, innovation, extended product design, flexibility, process centered management, collaboration is always needed to adjust to changing conditions. Information management is addressed in terms of managerial issues, technological investments and production of higher value goods (Ayers & Odegaard, 2018: 85). It also allows companies to use it for procuring direct or indirect materials, as well as handling value-added services like transportation, warehousing, customs clearing, payment, quality validation, and documentation (Lee & Whang: 2005: 3). There are some benefits of information management in a complex supply chain. It has the importance because

of competitive strategy, costs and benefits of information sharing, managing product variety, supply contracts, and the economics and logistics of network location and optimization (Boone et al, 2005: 364).

1. SUPPLY CHAIN MANAGEMENT OPERATIONS

Companies have tried to increase their business efficiency and effectiveness by reevaluating their operations such as planning and forecasting, procurement, manufacturing, transportation, warehousing and distribution, location selection (Gupta, 2011: 64). These operations ensure value for both the company and their customers.

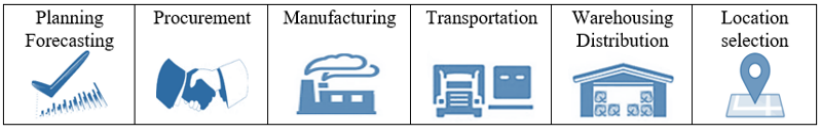

Figure 1. SCM Operations

Source: Gupta, 2011: 64

The innovations and developments in information technologies (IT) have led many companies to recognize the importance of efficient and coordinated SCM operations. IT improves decision making processes across the whole supply chain via instant information sharing among different departments within companies. Therefore, companies carry out the right business processes (Oh, 2008: 54).

1.1. Planning and Forecasting

Planning and forecasting are expected to be very useful for companies, especially before the major strategic decisions such as demand, supply, and product-related phenomena that influence the demand forecast (Chopra & Meindl, 2016: 193). Accurately forecasting product demand is important to measure a company's supply chain operations. For examples, having too much or too little inventory is not reasonable. Companies should gather and use information throughout every department in the supply chain (Blanchard, 2010: 43). Thus, companies able to estimate demands continuously for planning and forecasting decisions (Kemppainen, 2007: 175). These decisions are also based on historical orders and involve some characteristics such as high task complexity, change, uncertainty and inefficient markets.

High task complex means that there is a need for explicit and detailed plans to ensure the production and so on. For example, there are complex structure and are used thousands of different parts in automotive industry. On the other hand, companies, their environments and competitors are constantly changing. Companies can take a decision at times about their managements, employees, products and so on because of their environments. Macro environments of companies are political, economic, social, technological, environmental, and legal. Micro environments of companies are suppliers, buyers, new entry threats, substitutes and rivalry. According to Porter (1985), degree of rivalry affects to companies. Numerous competitors, high fixed costs, slow industry growth, lack of differentiation, high exit barriers affect to companies. Uncertainty can lead to a waste of resources. Environment is determinant in this context. When uncertainty increases, the need for planning and forecasting also increase. Inefficient markets also underlie the need for planning and forecasting. If the companies don't plan and forecast, they can go bankrupt (Armstrong, 1983: 13).

1.2. Procurement

Procurement should be managed as a strategic supply chain center and sharing information with suppliers. Therefore, customer needs and requirements are satisfied efficiently. As a company share transactional information with suppliers, supply chain flow simplify and significant cost saving is provided (Blancard, 2010: 55). Procurement is SCM operations including procurement planning, purchasing, inventory control, traffic, receiving, incoming inspection, and salvage operations. Therefore, procurement plays a major role in the company's success. Companies deal with hundreds or thousands of suppliers for all types of raw materials, components, auxiliary materials and other supplies (Crandall et al, 252-255).

Information technologies reduce transaction and coordination costs and therefore companies make easier procurement and save time, money and energy. For example, e-procurement provide saving cost advantage at around 13% to 28%. Many of these savings relate to vendor search costs, order processing, billing, payment, tracking, and logistics. In this context, companies are getting cost advantage through information management (Yücesan, 2007: 140-141).

1.3. Manufacturing

SCM has changed significantly in the last century. The reason for this is the increasing development of manufacturing and information technologies

rapidly. For instance, automotive manufacturing has come a long way since Henry Ford and today Elon Musk (Tesla) is making innovative, popular, and luxurious cars.

Manufacturing is crucial to create efficient and successful processes in supply chain. There are some applications that companies require to consider in order to manage supply chain effectively (smartsheet.com).

- Customer relationship management (CRM) provides companies to determine future products and services to gather customer information for marketing and market research.

- Customer service management (CSM) collect negative and positive feedbacks to identify customer satisfaction.

- Demand management determines which products are produced and how much. Therefore, customer forecasting is an important task to avoid wastes in manufacturing.

- Product development is carried out with customer's needs and requests. Suppliers should be integrated in this process as they know the cost and quality issues.

- Supplier relationship management (SRM) is necessary to work in harmony with each company which is used as an outsourcing in the supply chain. SRM provides production flow without delay and in the right specification.

- Order fulfilment is regarding to get the product to consumers. Therefore, coordinating should be paid attention with suppliers, 3PL providers and customers in supply chain.

- Returns management is related to products back from the consumption points. It is also known as reverse logistics.

Manufacturing is important in supply chain performance. Besides, time and budget are important in manufacturing as well, in order to manualize market demands. For this reason, time and budget should be managed well and information technologies should be used (Qureshi, 2020: 117).

1.4. Transportation

Transportation management is also being developed through the use of technology. Companies have developed networks with employees, suppliers and customers via intranet, extranet and the internet. RFID systems also support real time tracking of tagged goods. The tags are attached to products or vehicles

and emit signals containing detailed information. This information is regarding what the product is, the size of the product, where and when it was made, when its warranty expires and when it might perish etc. They can also be used to track a product as it passes though the factory floor, the warehouse, the distribution chain, the retailer and then at point of sale (Barlow, 2011: 465-471). In this context, there are many benefits to companies. It is used for supporting SCM within many industries including fast moving consumer goods, retail, automobile, transport, chemicals, electronics and health.

The choice of transportation carriers affects customer satisfaction because of the pricing of products, delivery performance, and the condition of products when they arrive. Companies can choose among main transportation modes when delivering goods to its warehouses, dealers, and customers (Kotler & Armstrong, 2012: 362). Transportation modes are of three basic types; land (road, rail and pipelines), water (shipping), and air. Besides the internet (fiber optic cable networks) and the parcel are alternative modes. The Internet is delivering all digital products today. The parcel is private carrier systems of cargo that stress reliability and speed of their delivering, along with good geographical coverage. This mode will probably continue growth with more innovative approaches such as the use of drones to deliver packages (Crandel et al, 2015: 299). Examples of transportation modes and descriptions are shown on Table 2.

Table 2. Examples of transportation modes and descriptions

	Rail	Road	Water	Air	Pipeline	Descriptions
Speed	3	2	4	1	5	Aircrafts that can exceed thousands of miles are the fastest
Availability	2	1	4	3	5	Trucks are driven from origin to destination point
Capacity	2	3	1	4	5	Container ship can transports more than 20.000 containers (e.g. MSC Gülsün)
Dependability	3	2	4	5	1	Pipeline doesn't have traffic and congestion issues
Frequency	4	2	5	3	1	Pipeline provides continuous flows of gas, oil and water
Cost Advantages	2	3	1	5	4	Ships handle all type and size of transport, and their cost is less than others
Scoring	16	13	19	21	21	Road, rail and water transports are more advantageous, respectively

Source: Crandel et al, 2015: 299

Transportation is not about how fast the products are delivered. Companies spend on the more for the faster transportation. However, the rule is simple in transportation: Get it there on time. Therefore, information technologies such as transport management system (TMS) software enables companies to route and

schedule their vehicles (Blancard, 2010: 79-89). The obtained information through TMS is also used in SCM to benefits companies across the whole supply chain.

1.5. Warehousing and Distribution

Warehousing and distribution traditionally were not one of the most important functions within leading businesses across manufacturing, wholesale and retail industries (Blanchard, 2013). Although warehousing is not used frequently by companies, it can be important in their supply chain. After companies have purchased raw materials, components, auxiliary materials and other supplies, they have to store them somewhere. Besides, when companies have sold products, they have been stored somewhere in delivering process (Blancard, 2010: 91). SCM costs are closely regarding distribution costs and time. While distribution was a simple matter about delivering products in the past, today it has become important due to changes in the quantities, locations, and delivery times. The reliability, flexibility and quality of distribution have further expanded the concept of distribution (Rodrigue, 2020). Most companies don't consider warehousing and distribution to be one of their core competencies and don't want to invest it. Thus, they outsource at least some of their warehousing or distribution to a third party with the flexible solutions. It is useful due to companies aim to cost leadership and efficiency in supply chain.

Third party warehousing and distribution can be the ideal solution to companies looking for an outsourcing that serve as a strategic partner bringing efficiency to supply chain of companies. It provides companies to save the time, money and energy with third party logistics (3PL). 3PL companies provide some services such as warehousing, distribution, transportation, inventory management, pick and pack, final delivery and installation. 3PL services can be scaled and customized to meet each company's needs and requirements. According to Armstrong & Associates is SCM market research and consulting company report that 90% of Domestic Fortune 500 companies rely on 3PL services (Berman, 2017). Nowadays, a new category of providers has emerged called fourth-party logistics providers (4PL; non-asset-based). They offer a wide range of services such as production planning and real-time monitoring (Rodrigue, 2020). SCM provides more opportunities to companies than ever before and Table 3. shows the development of outsourcing.

Table 3. The development of outsourcing

	1PL	2PL	3PL	4PL
Actors	Cargo owners	Carriers	Logistics providers	Lead logistics providers and consultants
Services	Manufacturing, Wholesaling, Retailing	Transportation	Logistics	SCM

Source: Rodrigue, 2020

In the 1070s and 1980s Toyota rejected to mass production thinking and started to adoption of just in time thinking. JIT is an effective in reducing wastes. There are some wastes caused by lack of communication and information management. These are listed below (Cox et al, 2003: 76-77).

- Overproduction is the most serious waste and it interrupts the flawless flow of products through the supply chain

- Waiting is refers to the time when products are standing idle rather than working in the supply chain

- Transportation cause delays due to the distances the product travels. Long distances increase the risk of damaged products

- Inappropriate processing is the application of complex solutions to simple problems (e.g. The adoption and use of a technology that is not necessary)

- Unnecessary inventory is caused by uncertainty. If communication is weak in the supply chain, companies tend to hold inventory. So, high inventories cause high warehouse costs.

- Unnecessary motion is mainly related to the ergonomics of the production process. These motions can affect the productivity and health of the employees.

- Defects lead to additional costs. Therefore, companies need remedial action required and discard defective products.

Lean thinking also determines how companies will succeed in SCM. Companies should be customer-oriented by minimizing product errors and providing affordable and quality products to customers. In this context, the importance of communication, information, information management is understood.

1.6. Location Selection

Customer locations differ from each other and cost of reaching them can be expensive. Therefore, companies should think about their customer's locations. Plants, suppliers and production lines cause difficulty to companies because of locations, costs and capacities. Existing and potential warehouses are also considered. Thus, location make warehousing businesses easier. Transportation costs for each lane are taken into account by the reason of fuel prices, taxes, toll mode fees (Li et al, 2011: 325-326). As a result, location selection is crucial for companies that aim to increase longevity. Models, algorithms and tools are also used for this purpose.

Location selection for plants, distribution center, warehouse or other operation facility is considered a location problem under SCM. The location selection can be classified depending on the basis of objective function of the problem such as transport distance minimization, transport duration minimization, transport cost minimization, and total covered demand maximization (Günay et al, 2019: 2).

Economic and environmental assessments may be required for location selection. In this context, Analytic Hierarchy Process (AHP) and Strategic Environmental Assessment (SEA) are suitable methods economically and ecologically. Companies have a higher level of expertise in economics than in environmental issues. Therefore, information technologies help businesses to make right location decisions including costs, labor and infrastructures (Pajones & Pfoser, 2018: 171-173).

2. DRIVERS OF SUPPLY CHAIN MANAGEMENT

2.1. Globalization

Globalization means dynamic and changing integration and interaction processes between diverse countries, companies, people and institutions. It has changed business environments, governments and people in terms of cultural norms, tradition, attitude, preferences transportation, logistic, production and manufacturing systems, marketing strategies, communication, economy and policy. In short globalization has changed and revolutionized the world. With globalization borders disappeared and facilitation of communication increased. Especially with the information sharing has become easier, faster and wide-

spread information management and storage has become more significant (Green and Keegan, 2015: 100-123). In addition, a different competitive environment and new markets has emerged worldwide for companies with decreasing trade barriers, improving global trade structure and rising countries trade integration. Companies now can reach lots of new markets and new suppliers easily (Leonidou & Hultman, 2019: 1-3).

2.2. Industry 4.0

The first industrial revolution that emerged in England in the 18th century, have affected and changed the world in a short time started with the invention of steam machine and its use in production. The Fordism system put forward by Henry Ford known as the second industrial revolution that started in the 1870s. The third industrial revolution emerged after the mid-20th century with usage electronic and information processing systems in production, was replaced by Industry 4.0, which was first mentioned at the Hannover Fair in Germany in 2011 (Lu, 2017: 1-4). Industry 4.0 has been sparked by global technological trends. These trends are shown in Figure 2.

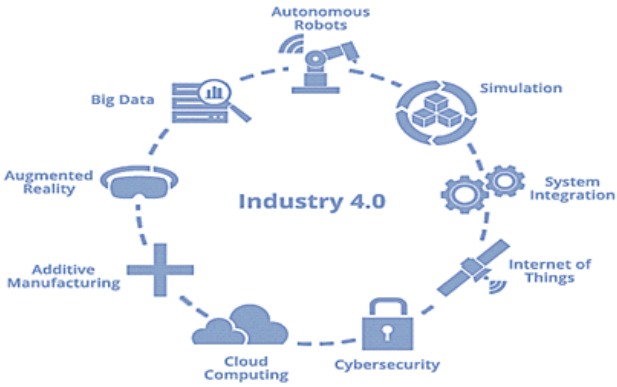

Figure 2. Dimensions of Industry 4.0

Source: https://www.leapaust.com.au, Date of Access: 15.05.2020

Industry 4.0 is a revolution that combines online production systems with the data and information analysis. This revolution aims to integrate not only the production process with the cyber-physical systems and the internet of things, but also the whole process from production to the supplier. industry 4.0 have changed production industry, information management and dependent supply

chains at all. Additionally, with these revolution factories provide maximum efficiency at minimum cost. Industry 4.0 which give a new dimension to production systems consist of nine technological elements including 3D printers, simulation, horizontal and vertical system integration, internet of things, cyber-physical security, augmented reality, smart robots, big data and cloud computing. Especially in information management big data and cloud computing are very important to storage and transfer data (Lu, 2017: 1-4).

2.3. Big Data

Big data identified as a large amount of complex data that is generated in consequences of daily works, which has not been processed yet. Big data makes complex information and meaningless data usable and understandable with analyzing collected from customers, suppliers and machines. After analyzing this data collected by factories, used as the main factor in decision making strategies. In today's competitive condition factories must analyze their data more quickly and accurately compared to their competitors to gain competitive advantage. Big data also consist of four dimensions that are data volume, data variety, data velocity and data value. Data volume (amount) is about technological capacity to manage information and data collected. Data variety means that there are different types of data from lots of sources. Data velocity which is speed of collection and analysis of data and information. Data value aims to organize, and isolate unnecessary data directly affect quality of information management (Witkowski, 2017: 767-768).

2.4. Cloud Computing

Increasing digitization, automation and data sharing in production with industry 4.0, having competitive advantage is more difficult than before. Because of that factories have to reduce their reaction times to milliseconds or even less to gain competitive advantage. Cloud computing is an internet-based technology that enables the storage and sharing of data and information. With cloud computing, every data can be accessed at any time and in any place. This has reduced the burden of computers that have become full of memory. Besides, minimum resources, power and storage are used by factories that using cloud. Also, with cloud computing the concept of big data, which forms the basis of Industry 4.0, has become feasible (Song, 2020: 84).

2.5. Innovation

Innovation is defined as the process of increasing capacity and providing new resources in order to create a new product and value to customer. With the technological developments particularly web 2.0, the competitive environment and customer selectivity have increased. In this context, businesses need more innovation strategies to create new values and develop new products for all stages of from supplying raw materials to selling finished goods. In order to be successful for innovation strategy, it has to be transmissible, understandable and convenient for both companies and customers (Green & Keegan, 2015: 308-309). Innovation is essentially linked to the knowledge and information. To establish a good innovation strategy companies must accurately control and analyze the flow of internal and external information and knowledge. For this reason, abilities of companies for managing and interpreting information flows are substantial phenomenon to achieve goals (Pineiro-Chousa et al, 2019: 2-3).

2.6. Collaboration

Collaboration means close and long-term relationship among suppliers and manufacturers. With a good collaboration design all partners in supply chain gain crucial advantages. The correctly designed relationship between suppliers and manufacturers provides additional benefits to performance of both manufacturers and suppliers. In this context, the overall performance of supply chain also increases (Banchuen et al, 2017: 111). Without well designed collaboration strategies supply chain partners may lack of information and knowledge about transactions. That causes information disruption and delays in knowledge and products flows. So that materials are not produced on time and do not reach customer. In supply chain applications this is the most undesirable thing that can happen (Zhou et al, 2007: 133). In today's marketplace due to the increasing customer demand, selectivity and intense competition, companies cannot succeed on their own. Interaction between supply chain partners is necessary to respond customer desires and requests quickly and accurately. A serious cooperation is required from purchase of raw materials to delivery of the products produced to final customer. This is basis of the idea of collaboration. Basically, companies need each other to reach their goals (Chi et al, 2020: 2).

2.7. Advantages of Drivers of Supply Chain Management

Supply chain drivers which identify performance of supply chain. Drivers must be properly determined and organized for effective and efficient SCM. There should be a balance between responsiveness and efficiency to gain competitive advantage in SCM. The response time and efficiency of the supply chain depends on the relationship between logistics (facilities, inventory, transportation) and functional (information, sourcing, pricing) drivers. If the structure of drivers is at the desired level, it decreases the costs and increases the profit, thereby directly affecting financial performance of companies (Chopra et al, 2016: 56).

- Facilities are the physical places where products are produced and stored in supply chain. The location of production and storage areas, proximity to customers and other warehouses, ease of transportation and capacity are very important for supply chain performance.
- Inventories consist of all raw materials, semi-finished and manufactured products. Too much inventory increases storage costs. Thus, building effective collaboration with supply chain partners, just in time and lean production reduce costs of inventory and storage.
- Transportation means carrying raw materials or products from one point to another. Companies must establish a good transportation system to reach the customer on time and safely.
- Information consists of data and analysis of all elements in the supply chain. With proper and symmetric information flow, uncertainty disappears among parties. It is the biggest factor that affects supply chain performance because it has a direct and crucial impact on other drivers (Shabbir, 2018: 9-10).
- Sourcing is the choice of supply chain elements such as storage, transportation, production and distribution. Selecting a partner in the supply chain is a strategic decision and directly affects the company's collaboration, response and achievement.
- Pricing is the money paid by partners in their transaction with each other. It is determinant of the relations in the supply chain because the prices of products and services affect the behavior of buyers and sellers (Chopra et al, 2016: 57).

In general, companies apply two types of strategies to maximize their profits and gain competitive advantage. These strategies known as cost leadership and differentiation. Which strategy they implement depends on the goals, industries

and competitive environments of the companies (Porter, 1985: 12-14). The cost leadership strategy requires strict policies to avoid waste and minimize costs in many areas such as research and development, advertising, service, raw materials, manufacturing, storage, logistic and labor. With this strategy, companies intend to increase their market share or take over the market by producing and selling cheaper than their rivals. The differentiation strategy is to differentiate the products and services offered by company and to position itself uniquely in the market and perception of customers. The main purpose is to produce and offer better and higher quality than those of its competitors (Cox et al, 2015: 22).

2.8. Importance of The Security, Risk and Quality in Information Management

Usage of information has increased with the impact of technological developments in today's industry. Companies have to deal with a lot of data and information at every stage of their daily works. For this reason, companies appreciate real value on information, especially in the decision-making process, and attribute it as part of their corporate assets. In this context, companies attach more importance and invest to information security. Information security is about protecting information regarding privacy, usability, and integrity. Reliability of companies in information security directly affects many aspects of organization such as competitive advantage, customer satisfaction, complying with regulatory demands, organizational performance and managing risks (Dor & Elovici, 2016: 1-2). The need for companies to protect resources, customer (payment, identity, address), financial information against attackers and hackers. This information has risk of being stolen due to external threats and vulnerabilities in security system. If cyber-attacks are carried out by the hackers and confidential information leakage, the company may losses lots of money and its reputation in customer perception destroyed in a short time, which cause bankruptcy. Therefore, companies make huge investments in security for information risk management (Weishäupl et al, 2018: 807-808).

The information quality that is collected and stored by companies used for many purposes is defined as accuracy, precise, accessible and useful information. Low quality information is complicated and contains unnecessary information, it increases processing cost, analysis time and effort for both companies and customers. However, high quality information saves time, effort and cost. With improving information quality, they contribute positively to their organizational reputation and image. In addition, Companies gain competitive advantages because of higher quality of information enhance perceived trust of

customers and they provide more quality products and services to more customers in less time (Kang & Namkung, 2019: 190-192). In the literature, information quality has been examined with different factors and dimensions. Some significant dimensions are; timeliness, processing speed, reliability, credibility, traceability, interpretability, consistency, level of detail and redundancy. According to these dimensions, quality of information depends on its availability on time, rapid analysis, trustworthiness, observability, interpretability, not contain unnecessary information and consistency (Riesener et al, 2019: 307-308).

3. SUPPLY CHAIN APPLICATIONS IN INFORMATION MANAGEMENT

3.1. Demand Information

Demand information is the most important source of collaboration and partnership between different members in supply chain. Sharing information provides great advantages in business connection. Lack of information such as manufacturing capacity, employee capacity, raw material properties, order quantity, order time, transportation, product quality and cost create demand information uncertainty which generates considerable risks for all parties in supply chain operation. When companies encounter high demand uncertainty, it is difficult to make optimal decisions in production and supply. This problem is solved by providing demand information at proper time. In addition, market trends, expert opinions and forecasts, previous trade figures and information about customers are critical for reducing ambiguity between all partners. Uncertainties are eliminated in supply chain through conveying the whole required demand information. Sharing demand information has become effortless and effective due to the smart factories, cyber systems and internet of things offered by industry 4.0 (Zheng et al, 2019: 248-250).

3.2. Forecast Information

Supply chain operations consists of product and information sharing between customer, retailer, transporter, manufacturer and the raw material supplier. Correctly designed information flow and sharing is needed to provide coordination among all these partners. In this context, companies must share all essential information correctly with supply chain partners in order to be successful. However, in reality some partners in supply chain do not share necessary information on time and accurately that causes serious problems in opera-

tions. For instance, excess inventory, capacity of warehouse, delaying transportation and unsatisfied customers. At this point, forecasting which known basis of plans for effective SCM used by companies. To remain competitive, managers have to use forecasting throughout entire supply chain operation if information flow is not efficient (Byrne & Heavey, 2006: 420-422). Companies using push strategy in procurement produce products and wait for customer demand. On the other hand, using pull strategy start to production after customer demand. Planning and forecasting are also important in push strategy, but especially in pull strategy, managers should plan and forecast current capacity, inventory level and customer demand which are critical for decision making process. Otherwise, customers are not be satisfied with companies (Chopra et al, 2016: 189-192).

Huge global companies additionally forecast new trends, fashion, economic variables, crisis, demands, changing attitudes and changing behaviors of customers with the extensive and costly market research. In this way, they obtain competitive advantages and become big company. These should be noted that forecasts are not always accurate which have error rate and short-term forecasts more precise results than long-term ones. When forecasting, companies can use the following methods; qualitative forecasting (use human judgment and give right results when appropriate data and market information are available.), time series (simplest method and use past data and customer demand), casual forecasting (depends on factors of environment like currency rates, economy, interest rate, policy, etc.) and simulation (based on imitation of customer demand.). It is difficult to decide which one is the most appropriate method for forecasting. However, in literature, it has been demonstrated that it is more effective to combine several forecasting methods and use them together (Chopra et al, 2016: 189-192).

3.3. Inventory Information

With the effect of globalization, competition among companies has improved and they have started to become customer centrists rather than product centrists. With this change, the importance of inventory in warehouses and stores has increased. Inventory level directly affects customer perception and satisfaction. In this context, sharing inventory information between supply chain partners is a key strategy. Because it is costly for companies to have a large amount of inventory in warehouses and stores. However, when customer demand a product, the product must be available. Therefore, companies should inform suppliers when their inventory level is low. It is critical for partners to know amount of each other's inventory. Otherwise companies have a problem

in SCM. The solution for this problem is supply chain visibility which means real-time and proper flow of information between partners. With recent development about information technologies effective and efficient information sharing on demand, inventory, capacity, sales and costs has become easier. This increases customer satisfaction and reduced cost for companies. Besides, especially in e-commerce, companies should inform their customers that inventory levels and finished good levels are low. Otherwise, when customers unconsciously order a product that is not in stock, they perceive deception and loses trust which is negative for the reputation of companies (Srivathsan & Kamath, 2018: 393-396).

3.4. Product Development

Product development is defined as the design, development, manufacturing and marketing of newly created goods and services. The purpose of product development is to increase customer satisfaction and company's market share with gaining competitive advantages. All of newly developed products do not appeal to every customer therefore, the target market should be determined, and a new product should be developed according to their desires and needs. New product development is critical especially for companies that want to enter new markets. Customer demands, desires, consumption habits and cultures are different in new market which companies want to sell new product from market they are in. Therefore, they con not succeed with their existing products. Product development process is difficult and costly. To be successful it must be based on systematic and serious research (Green & Keegan, 2015: 302-303). Companies implement some planned stages when developing new products. These stages are below:

- Idea generation: It involves generating ideas for new products in line with the gaps on market.
- Idea screening: It means to scan new ideas and decide the most appropriate and feasible one. Includes preliminary tests and feedback from customers.
- Concept development and testing: It means testing of idea or product which is feasible by customer. Idea or product can be redesigned according to tester's reactions and feedbacks.
- Market strategy / business analysis: It includes marketing mix. Product, place, price and promotion. Where should be sold at what price and at what promotions?

- Feasibility analysis: It includes the suitability of the product for the market and the manufacturer. Companies analysis production capacity, raw materials, workers, costs, environment, transportation, rivalries and customer for feasibility.
- Product design: It is defined production of feasible prototype for market. Companies focus on research and development, financial issues, marketing and product's technical features.
- Test marketing: A random sample is selected from target market and developed product' final form tested. Companies apply test marketing without making huge investment before product is placed on market. Otherwise it may be too late, and company loses lots of money and its reputation.
- Market entry: It is the stage in which developed product put on target market. At this stage, with the data obtained by the previous seven stages, the product is finalized and introduced the market. Newly developed product available for everyone (Rouse, 2019).

3.5. Information Accuracy

In order to be successful for SCM, information of the transactions must be shared among parties in a timely, complete, sufficient, reliable and accurate manner. Supply chain partners should convey real time information each other to coordinate all activities in operations. One of the most important features of the information shared between parties is its accuracy. The accuracy of information is especially vital for just in time manufacturing. In the absence of accurate information, companies experience serious financial losses. Their performance decrease and they cannot produce goods on time so that customer may be dissatisfied. Lack of information accuracy also effect inventory level and delivery time which reduce performance and customer satisfaction as well (Galvan et al., 2016: 517-519). Furthermore, accurate information prevents information asymmetry between supply chain partners. Thus, better and higher quality information is obtained, and this contributes stronger decision making process (Yan & Pei, 2011: 377-378).

CONCLUSION

Supply chain management, which has developed after the Second World War, is one of the main determinants of competition among companies. Supply chain is a network including of suppliers, manufacturers, distributors, retailers, and customers.

For the successful management of supply chain network, the financial flow, material flow, information flow and communication between partners must be designed correctly. All these flows are vital and depend on timely, effective and efficient planning. Competition environment has globalized with the effect of technologic developments in today's industry. Thus, companies have become compelled to work together and cooperate more to achieve competitive advantages. In this context, especially in supply chain network, companies are not able to survive alone. They all need each other. In order to carry on production and sustainability they must collaborate. To be effective and efficient in SCM as well as cooperation, companies should pay attention to the following; **Customer relationship management** (CRM), **customer service management (CSM),** demand management, product development, **supplier relationship management (SRM),** order fulfilment and returns management.

Internet usage has increased after the industry 4.0 revolution which includes big data, cloud computing and internet of things. It caused companies to communicate more easily and quickly to convey necessary information and knowledge regarding production, raw materials, financial issues, transportation, delivery time and customer demand in the supply chain network. Because of the increasing complexity in production and supply chain operations, companies that have to deal with more information and data have attached more importance to information and information sharing. However, there are companies which do not share information with the supply chain network despite dealing with a lot of information and data in their daily work. These companies cause information asymmetry which negatively affect performance of supply chain network. In order to avoid asymmetry, information about manufacturing, procurement, transportation, distribution, warehouse and customer should be high quality, reliable, timely and accurate. These all components affect companies' performance and customer satisfaction. These are the main objectives and targets for all companies. Consequently, companies should pay more attention to information management for their achievements in the supply chain. Otherwise, the supply chain performance decreases due to inadequate or excessive and outdated inventory. Products delivered late or damaged also cause them to lose their competitive advantages and reputations. In this context, companies need to avoid information asymmetry and integrate both SCM and information management applications.

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CHAPTER 23

A SUCCESS-SOLUTION FOR SMART COMPANIES: BUSINESS INTELLIGENCE ANALYTICS

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Mükerrem Bahar Başkır

INTRODUCTION

Companies that making production all over the world have faced with serious competitive conditions in the globalizing world economy. In order to become more advantageous than the companies they compete with; they have to ensure a reduction in production costs, greater production flexibility and more efficient processes. These are the common demands of the producer firms almost in every sector.

The technological transformation in businesses has made the word "smart" very often used by courtesy of the Fourth Industrial Revolution. Today, we define many objects in our life and our environment as "smart". Such as smartphone, smart-watch, smart-computer, smart-wearable clothes, smart-tv, smart-home, smart-city. Here, what is meant to be expressed with the word "smart"; objects are connected to the internet, communicating with each other and with people through internet infrastructures to update themselves in accordance with changing conditions and warning. As a matter of fact, this is what is wanted to be explained with the concept of smart business.

As a consequence of being "smart", companies focus on technology-based decision-making processes more than ever. Thus, being a smart company becomes unavoidable for all the companies worldwide. Besides, companies need technological-solutions to keep up with fast sectoral growth incidental to the fourth industrial revolution (Industry 4.0). The desirable solution is Business Intelligence (BI) and related technologies. BI analytics provides meaningful and

quicker information obtained from big business data. Smart companies can carry out their business enterprises and evaluate market-situations using BI analytical-tools such as multidimensional cube analysis, data visualizing, data mining, machine learning, big data analysis, decision support systems, etc. BI technology-request generates BI market. There are numerous BI analytics/products to support the business decisions of smart companies.

This study is organized as follows: First section includes the historical development of the industrial revolution. Brand new technologies in Industry 4.0 are represented in section 2. The general information about smart businesses is clarified in section 3. Section 4 shows BI solution for smart companies, the basis of BI architecture and lifecycle are represented. The latest trends in BI and penetration of BI analytics/products are investigated in section 5. Conclusions are drawn in section 6.

1. THE HISTORICAL PROCESS OF THE INDUSTRIAL REVOLUTION

The first major change in individuals' lifestyles is the transition period from hunting and gathering to agriculture. This period was about 10 thousand years ago. The prominent issue in this period was the domestication of animals. Agricultural revolution has combined animal labor with human labor for production, transportation and communication purposes. Food production improved gradually and played a role in accelerating population growth. This situation enabled people to settle in larger scales. As a result, the urbanization process has started (Schwab, 2016).

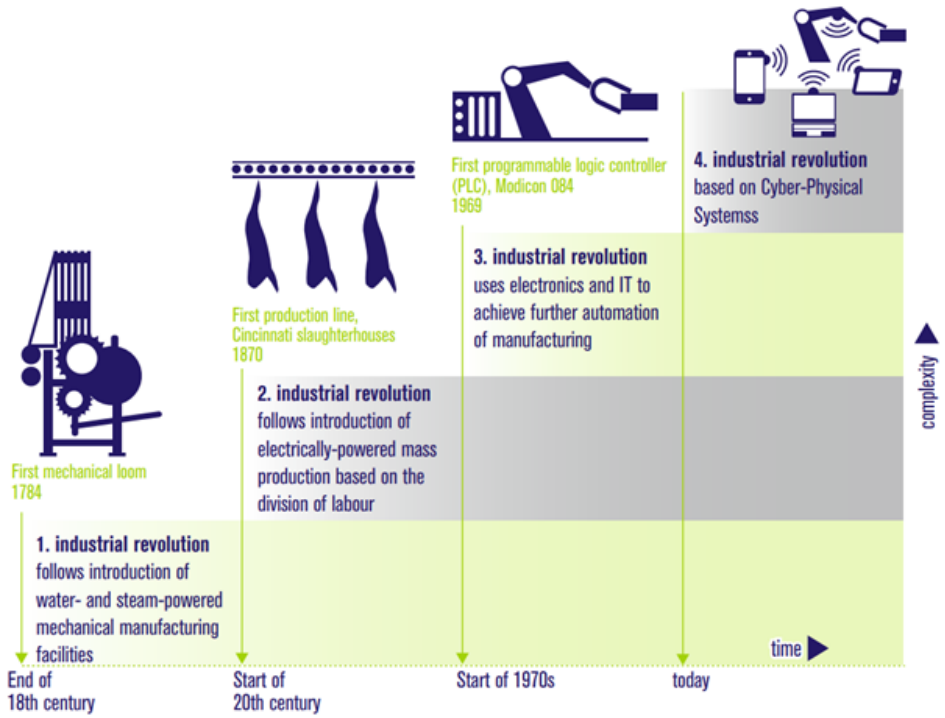

Figure 1. The Four Stages of the Industrial Revolution (Kagerman, 2013: 13)

A number of advances followed the agricultural revolution since the 18th century. Figure 1 shows the 4 stages of the Industrial Revolution. At the end of the 18th century, England-based technological developments in Europe provided the production systems used in the world; from the workshop to the factory, piece production to mass production (EBSO, 2015: 4). England was referred to as the "Workshop of the World" during the 1765-1850 Industrial Revolution. In this process, Belgium and France followed Britain (Günay, 2002: 12). One of the important elements of this period was the invention of steam machines that enabled mass production. These developments in the field of industry ensured Europe to gain a competitive advantage compared to other regions. This process in technological developments is expressed as the "Industrial Revolution" or "Industry 1.0" (EBSO, 2015: 4). This process enabled the transition from muscle strength to mechanical strength (Schwab, 2016).

In the 19th century, electricity was first used in production lines in factories. The use of electricity has led to the development of new forms of production. Henry Ford applied the tape-type mass production model for the first time

in the automotive industry. This model, which is based on low cost, mass production and standard product production, is called "2nd Industrial Revolution" or "Industry 2.0" (Alçın, 2016: 20). The first product of the technology was the electric motor made in 1831 (Günay, 2002: 12). The development of tools such as radio, telephone, typewriter and paper accelerated communication and decreased the distance between individuals at the same time. In this process, the lifestyle and standards of society have also changed. Regarding administration side, centralization came to the fore, migrations to cities accelerated. The 2nd Industrial Revolution, especially in the USA, Germany and Japan, has spread rapidly to many regions of the world (Pamuk & Sosyal, 2018: 43).

Automation systems started to become widespread by the progress of technology in the 1970s. The Second World War and the great depression in America affected the 3rd Industrial Revolution (Industry 3.0) in terms of starting later compared to others. However, these events formed the basis of the 3rd Industrial Revolution. With the development of the software industry in this period, the machines also changed. In this period, the first microcomputer was developed and digital technologies came to the fore. Microprocessors, which were accepted as the 3rd Industrial Revolution, highlighted an electronic and computer-based production structure (Siemens, 2016: 5). In addition, developments have occurred in areas such as bio-agriculture, nuclear, laser, telecommunications, fiber optics and microelectronics. Facilitating communication and transportation has triggered globalization. In this period, the trend towards renewable energy sources started and was supported by the state. The use of solar and wind energy, hydroelectric and geothermal power plants has been tried to be expanded. Sustainability and sustainable growth concepts have gained great importance as the most important concept of the age (Redclift, 2005).

Industry 4.0 was first introduced to the world by the German Government in 2011 (Monostori, 2014). The term of Industry 4.0 is used to describe how the global value chain organization will be transformed (Schwab, 2016). The industrial revolution started with steam machines. And also the invention of electricity, the integration of electronicization and information technologies took place into the industry. Industry 4.0 is a term which related in smart businesses with modular structure. Industry 4.0 aims at smart production by which following physical processes with cyber-physical systems. Industry 4.0 makes objects communicate with each other and with people, thereby provides to make decentralized decisions. In enterprises that are fully integrated and connected to industrial networks,

machines and devices requiring minimum manual intervention will be able to act intelligently and partially autonomously (Monostori, 2014).

The purpose of Industry 4.0 is to achieve an operational level of automation with higher efficiency and productivity (Thames and Schaefer, 2016). In other words; it is a revolution of creating added value by automating jobs that require unskilled labor (Şener & Elevli, 2017: 26).

The 4th Industrial Revolution which enables smart businesses, creates a world where virtual and physical manufacturing systems flexibly cooperate with each other on a global scale. Thus, customization of products and services to customers and creating new operational models are provided (Schwab, 2016). At the same time, Industry 4.0 that provides to be managed increasing energy demand by integrating renewable energy sources also paved the way for the systematic implementation of the modernized energy grid (Faheem et al., 2018).

Industry 4.0 in the value chain is the organization of production processes that communicate with technology and devices. This organization is defined as the "smart" business of the future, computer-driven systems follow physical processes, creates a physical virtual copy, based on self-organizing mechanisms, describes a structure that can make autonomous decisions (ITRE, 2016: 20). Industry 4.0 provides greater flexibility and durability in engineering, planning, production, operational and logistics processes together with the highest quality standards (Acatech, 2013: 20).

2. NEW TECHNOLOGIES INTRODUCED BY INDUSTRY 4.0

The main purpose of Industry 4.0 is the realization of smart businesses with production processes that can manage themselves. This is possible with the "Cyber-Physical System" and "Internet of Things" (EBSO, 2015: 9). Information systems and technology and machines which are among the main elements of Industry 4.0 can solve problems, make comments, learn, make decisions, communicate and set priorities in events. However, these systems are not at the desired level yet. Developments in this area are expected to increase by R&D studies. The main elements of these developments in Industry 4.0 can be listed as follows (Mert, 2020: 218-219; Öztemel, 2018: 25-26; Soylu, 2018: 45-48):

- **Real-Time Capability:** The ability to collect and analyze data and the ability to present derived analysis immediately (Schwab, 2016).

- **Autonomous / Intelligent Robots:** They are robots that have mobility, problem solving and decision-making skills in the manufacturing industry.
- **Big Data:** Big data refers to data sets that have dimensions beyond the ability of typical database software tools to capture, store, manage and analyze (McKinsey, 2011: 1).
- **Smart Enterprises:** The merging of virtual and physical worlds through cyber-physical systems and the resulting technical processes and business processes combination means a new industrial period with the concept of "smart enterprise". Placing cyber-physical systems in production systems causes a "smart business". Smart business, its products, resources and processes are characterized by cyber-physical systems. This structure provides significant quality, time, resources and cost advantages compared to conventional production systems. Smart businesses are designed for sustainable and service-oriented business practices. These applications can be summarized as adaptability, flexibility, self-adaptation and learning features, fault tolerance and risk management.
- **Cyber-Physical Systems:** These are systems that allow the integration of the whole system and communication.
- **Internet of Things:** The Internet is that of objects which communicating with each other and will enable their communication through data exchange protocols.
- **Intelligent Computing Network:** It is a combination network that enables machines, software and people to communicate with each other and control and manage the data flow.
- **Virtualization:** A virtual copy of smart businesses is created by combining sensor data with virtual models and simulation models. For example; Siemens' Amberg factory in Germany was established in this way. Production processes have been designed to quickly adapt themselves to customer demands through advanced technologies used in the factory (TOBB, 2016: 21).
- **Decentralization:** The ability of cyber-physical systems to make their own decisions and produce products locally through technologies such as 3D printing.

- **Modularity:** It is to provide a flexible adaptation of smart businesses with changeable or expandable modules which respond to changing needs.
- **Cloud Computing:** Using cloud computing, data storage and software usage can be met with fewer costs. “Pay as much as used” strategy is possible.
- **System Integration:** It is the introduction of manufacturing systems that enable all systems to work in a connected and integrated manner; decide independently but also have to work dependently at the same time.
- **Cyber Security Systems:** These are systems that have a strong ability to prevent cyber-attacks on applications that enable all processes in the IT environment to continue safely.

Industry 4.0 applications have brought along many improvements. Although the expectations are generally positive, they also cause new difficulties. Positive expectations can be summarized as follows (Selek, 2016: 1):

- Facilitation of system monitoring and diagnostics
- Self-awareness of systems and components
- Sustainability of the system with environmentally friendly and resource-saving behaviors
- Providing higher efficiency
- Increasing flexibility in production
- Cost reduction
- Increased customer satisfaction
- Development of new service and business models

Possible challenges of Industry 4.0 applications can be listed as follows (Baysal, 2015: 19):

- Economic benefits that are difficult to measure and excessive investment needs
- The need for graduate students with competencies
- Shortage of competent employees
- Shortcomings at international standards
- Deficiencies in the laws regulating the use of competition data

- Inadequacy in tax incentives related to investments
- Deficiencies in standard conversions, legal regulation and certification
- Insufficiencies in encouraging R&D activities
- The need to improve network infrastructure
- Insufficient legal regulations regarding the use of external data

3. SMART BUSINESSES

Smart business incorporates smart technologies, communicates autonomously with each other along the value chain, integrates advanced software and computer programs to its machines, has computer-driven technologies, smoothly manages complex production processes. And while doing all these, it monitors the physical processes working with humans and machines and creates a virtual copy based on self-organizing mechanisms. These organizations can be defined as business that can make autonomous decisions. Production in smart businesses, by using real-time and high-value support systems, quickly responding to customer demands, minimizes the use of energy and materials and radically improves sustainability, productivity, innovation and economic competition. It also enables a coordinated and performance-oriented production initiative (Yuan et al., 2017).

A high level of automation in smart businesses is standard practice. Automation is possible by a virtual network of system-based production systems that control production processes to a large extent. Flexible production systems which can respond in virtually real-time conditions, provide in-house production processes to be radically optimized. Production advantages are not only limited to one-off production conditions, but also belong to multiple operators in network organizational structures; again, they also can be adapted and optimized.

This system offers a production revolution in terms of both innovation cost and time savings. It also represents the establishment of a production value creation model that creates new and more market opportunities; increases network capacity (GTAI, 2014: 10). In the near future, through the production advantages provided by smart businesses except of raw materials, production costs are expected to improve by 15-25% (EBSO, 2015: 25).

Smart businesses have a flexible system that able to optimize its performance on a network; can adapt to any new situation; learn simultaneously and

autonomously manage the production process. This system has its own basic features. These are connectivity, optimization, transparency, proactivity and agility (Şekkeli & Bakan, 2018: 210).

The success of the 4th Industrial Revolution depends on the innovation capacity of the owners and managers. This innovation, namely the concept of smart businesses known as either the Cyber-Physical System and the Internet of Things or the Internet of Services as the supply and value chain structure should be initiated by taking the starting point (Lasi et al., 2014).

Machines connected with the Internet of Things will make the quality control of the products and detect the errors in the production process faster. In smart businesses where all this process is managed, production will become more efficient with business intelligence analysis. In a sense, Industry 4.0 with reduced demand for labor creates the threat of excessive labor in departments of institutions. In addition, raw material wastes will decrease, scarce resources such as energy and water will not be used more than necessary and environmental and nature will be less damaged while the amount and quality of production in the industry increases by Industry 4.0 (Kablan, 2018: 1564).

Organizations should create an innovative management approach in accordance with Industry 4.0 with the concept of smart business. Smart businesses are realized through smart employees and smart organizational climate (Van der Sluis, 2004). In this respect, the management understanding of Industry 4.0 is related to the management capabilities of the enterprises. These abilities occur some elements such as; value chain processes, smart machine, product, customer-specific product and service, legal issues, global culture, product and service portfolio, market share, customer quality, speed of access (Daft, 2015).

In the concept of Industry 4.0, these capabilities constitute the dynamic aspect of businesses. These skills also highlight innovative workforce capabilities (Griffin & Hauser, 1996). For this reason, enterprises improve their innovative abilities and adopt a management approach in accordance with Industry 4.0 that can be reached by innovative learning and smart organizational climate (Porter & Heppelmann, 2015).

Smart businesses differ from the conventional businesses in many ways. Smart businesses can manage complex production processes quickly and smoothly the high-quality and long-lived products can be produced by capacity of these enterprises. Machines and production resources interact in these enterprises (Önday, 2018: 62). Besides, these differences can be summarized as in Table 1.

Table 1. Comparison of Present and Future Business Features (Önday, 2017: 63)

Businesses Today	Businesses of the Future
Machines need to be preconfigured and adjusted and changed with each use and change. These are operated independently.	The machines work intelligently around security mechanisms, as well as settings, by communicating with other machines.
Process monitoring is quite difficult. Each person works only at a rate of their own efficiency and focuses on a single problem.	Process monitoring takes place comprehensively in a cause-effect relationship. Thus, the machines have the ability to stop production and signal to correct the problems.
Product customization studies are quite difficult, in the context of factors such as time, cost and resources. While the production of ordinary products is made easy, there are delays in the production of special products.	Product customization studies are achieved through the most ideal system and smart compilation in terms of logistics, security, reliability, time costs and sustainability.
Inventory is stocked to take into account changes in the process.	Machines can plan their own production resources. Thus, it is possible to realize a lean production mode just in time.
Machines are limited by the physical structure of the human and the labor base.	The machines are sensitive to the people around them and they work within a harmony.

Information technologies in the implementation of smart businesses are used to integrate underlying equipment resources. Accordingly, the production system has detection, interconnection and data integration capabilities. Data analysis and scientific decisions are used to ensure production planning, equipment service and quality control of products in a smart business. Besides, the Internet of services is provided to virtualize production resources from a local database to the cloud server. Through the human-machine interaction, the global collaborative process of smart production for the order-oriented market has been built. Therefore, the intelligent business represents an engineering system consisting mainly of three elements. These elements are interconnection, collaboration and execution. As is shown in Figure 2, the architecture of the smart business includes four layers, the physical layer, the network layer, the data application layer, and the terminal layer (Chen et al., 2018; Zhang et al., 2016; Shu et al., 2016).

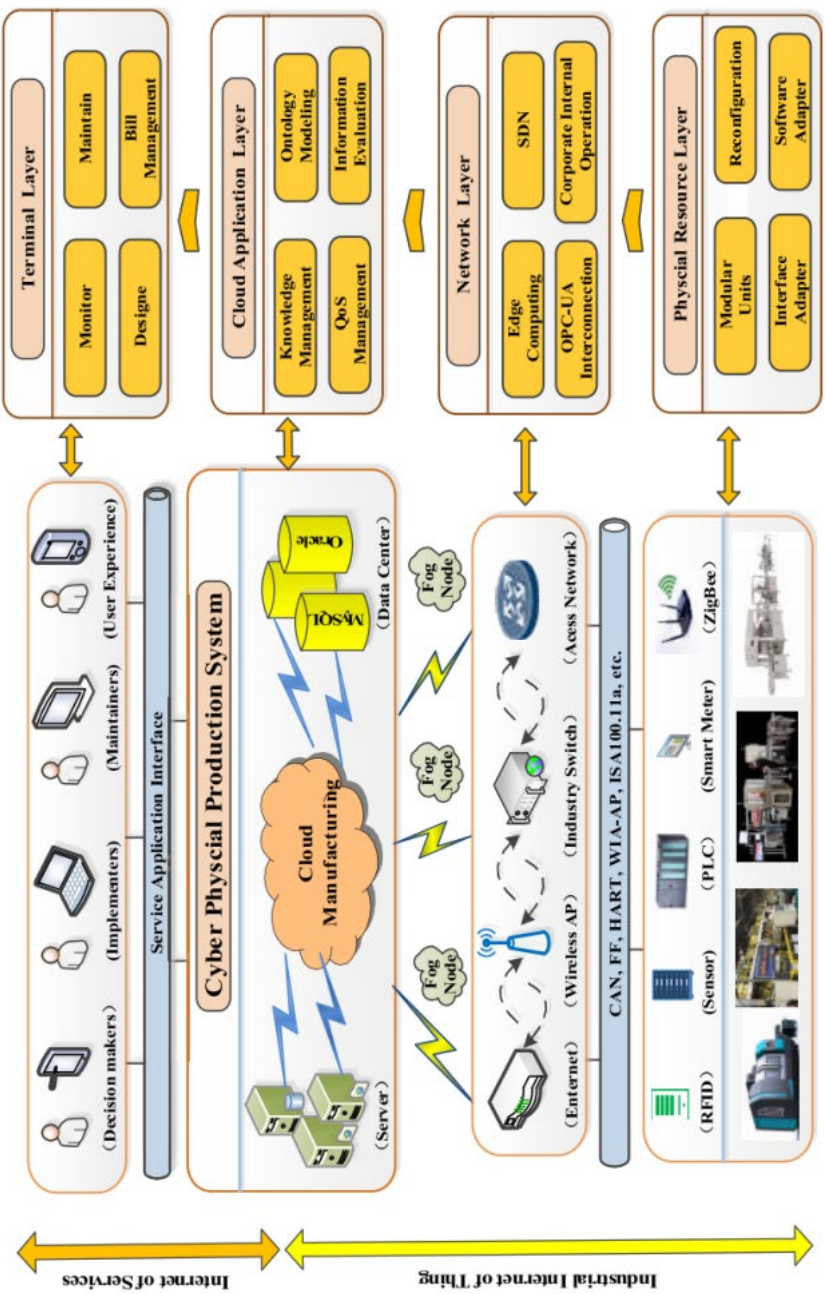

Figure 2. Hierarchical Architecture of Smart Businesses (Chen et al., 2018).

Sub-systems of smart businesses have important components that must be examined separately. As is seen in Figure 3, products manufactured in smart businesses due to the high level of connectivity appear as smart products; logistic processes due to the horizontal and vertical integration level appear as intelligent logistics and transportation; due to the level of mobile networks both inside and outside the enterprise appear as intelligent mobility; with its network infrastructure, energy-efficient smart grids and buildings appear as smart buildings due to its advanced technology level. The main factor that enables these components to interact and synergize with each other is the technology of the internet of services and objects.

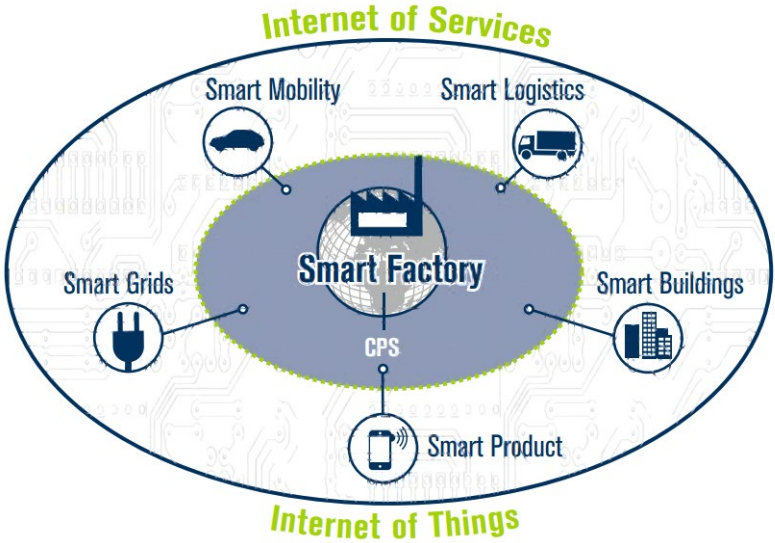

Figure 3. Smart Business & Subsystems (Helbig, 2013: 19)

In another source, smart enterprises are summarized in four layers: physical resource layer, industrial network layer, cloud layer and controller control terminal layer (Figure 4).

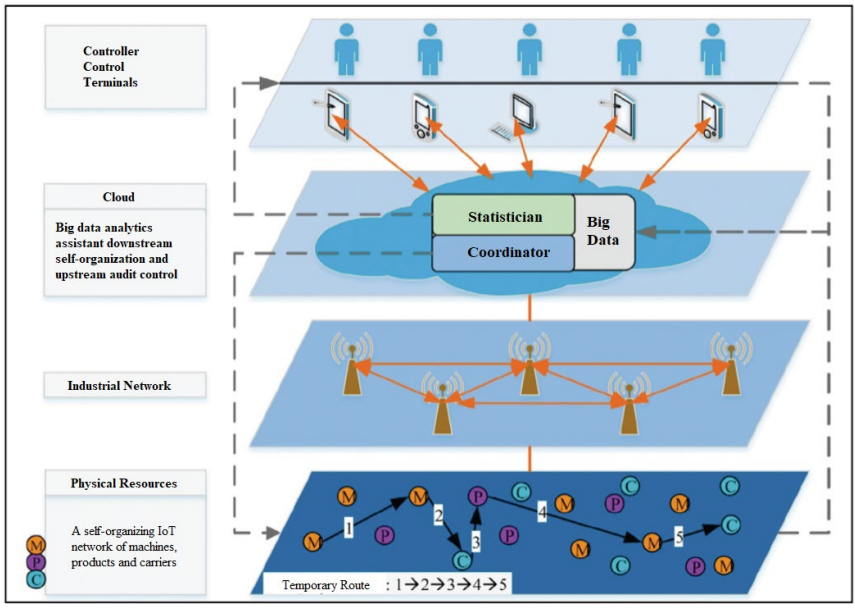

Figure 4. General framework of smart factories (Wang et al., 2016).

Smart businesses are an integrated industrial approach consisting of a combination of many systems (Görçün, 2016: 142-143). In these multi-dimensional enterprises providing efficiency with smart components is the ultimate goal. However, increasing the quality, production speed and flexibility of the products and preventing waste are among other purposes (Gilchrist, 2016: 2018). The technologies that businesses must have in order to become smart businesses or the technological components of businesses that have passed to industry 4.0 are the big data and business intelligence, cloud computing systems, 3D printing, cyber-physical systems, internet of things, autonomous robots and augmented reality (Lasi et al., 2014: 24; Schwab, 2016; Üstündağ & Çevikcan, 2017; Devazes et al., 2017).

Although technological transformation is achieved in businesses, the transformation of working people is also important in these businesses. The workforce in smart businesses; people who will be successful in new products and technology, new jobs and working areas; creative, talented and open to change; will be preferred. The need for unskilled and low-educated employees will decrease by smart businesses. Well-equipped and skilled employees will be preferred. The location of the unskilled workday will be replaced by technology. But labor that can use these technologies will always remain valuable.

4. BUSINESS INTELLIGENCE SOLUTIONS FOR SMART COMPANIES

Global competition requires resource and information sharing intra- and inter-markets to improve product/service quality and to satisfy customer demands. Thus, the main focus of an organization is to organize and analyze the business environment in order to make clear-eyed market-decision. The business environment is a complicated real-life system with its components themselves and the interactions of the components. Companies need to reveal a business data-refinery and convert this refinery into significant information. Companies can gain and track their business values in the market via measuring, analyzing and interpreting business data. Sustainable business value can be generated using the user-friendly technologies which provide fast and reliable business data processing. Smart companies use business intelligence (BI) technologies to manage their big business data and make adequate decisions from them. BI environment takes data as raw material and processes it into a multiplicity of information products (Eckerson, 2003). Figure 5 illustrates the connection between business environment and data processing.

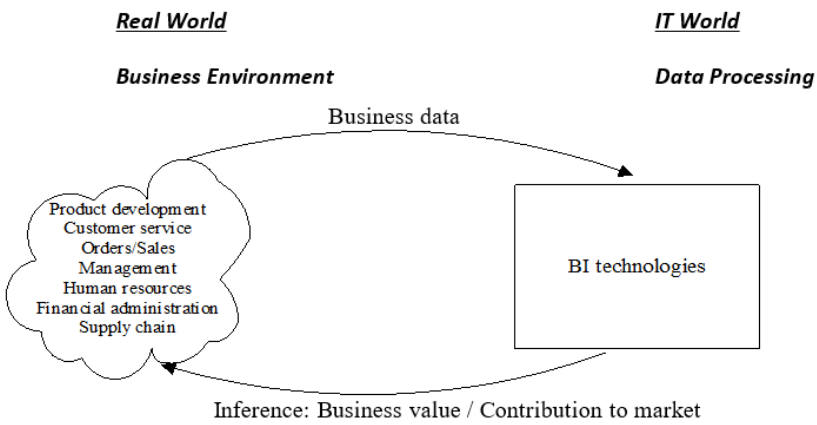

Figure 5. BI Solution for Smart Companies

The BI concept was first used by IBM researcher Hans Peter Luhn in 1958s. He defined BI as having apprehend-ability related to the interrelations of the presented information to reach the specified goal. In 1989, Howard Dresner introduced BI as an umbrella term. Dresner identifies BI as an umbrella involving methods and conceptions to develop business decisions using fact-based

decision support systems. As a part of information technology, BI is a combined decision-making system including queries, architectures, processes and technologies. Briefly, BI has two important features: i) data-driven feature, ii) technology-based feature. The unavoidable fact is that information is a strategic instrument to lead organizations to success. The way of accessing significant information is organizing and processing big business data via information technology-tools (IT-tools). As one of the valuable IT tools, BI technology has a significant influence on providing business value. Additionally, when working with other IT tools, BI technology can get better performance (Vercellis, 2009). Moreover, traditional BI must be adapted for big data derived from Industry 4.0 technologies (Bordeleau, 2018). BI allows organizations to make timely and wise decisions related to various issues such as marketing research, consumer profile, sales reporting, risk management, financial reports, vendor selection, inventory, etc. BI applications can be separated into five main areas: i) Market analysis, ii) Sales reporting, iii) Supply chain management, iv) Financial reporting, v) Customer profile. BI areas and some application-classes are given in Table 2 (see Pareek, 2006: 128).

Table 2. BI Areas and Application-Classes

Market Analysis	**Financial Reporting & Analysis**
• Marketing research/segmentation • Market-performance reporting • Promotion planning • Prospect profiling	• Financial budgeting and forecasting • Balance sheet reporting • Cash flow • Risk management
Sales Reporting & Analysis	**Supply Chain Management**
• Sales pipeline analysis • Sales performance reporting • Channel analysis	• Vendor selection • Cost analysis • Purchase planning
Customer Profile	
• Customer satisfaction analysis • Customer retention planning • Customer loyalty analysis	

A typical BI architecture involves data-warehouse, advanced-statistical techniques, data visualizing, artificial intelligence, data mining, querying, forecasting, decision support, reporting and reviewing. Figure 6 illustrates a typical architecture of the BI framework.

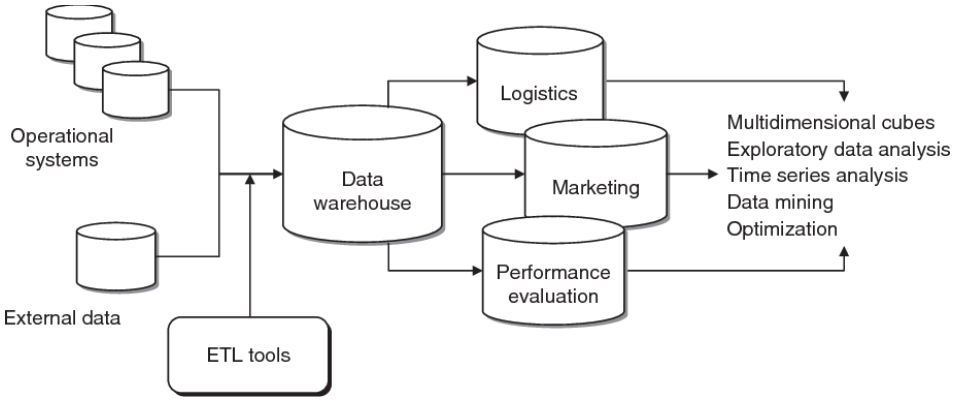

Figure 6. A typical architecture of BI framework (Vercellis, 2009).

Typical business intelligence includes business rules, data profiling, data warehouse and online analytical process, and data mining (Williams & Williams, 2006: 1-4). There are a tremendous number of methodologies in a BI system. These are data mining, optimization, data envelopment analysis, time series analysis, decision support systems, machine learning, artificial intelligence, sales planning, supply chain optimization, revenue management, financial reporting, trend analysis, relational marketing, sales forecasting, etc. Besides, BI includes Extracting-Transformation-Loading (ETL) engine, data warehouse/data mart, OLAP cubes and reporting. Inherently, the business environment consists of heterogeneous data. Quicker and meaningful information can be deduced from the heterogeneous business data via knowledge and also BI analytics. The main data sources of BI are operational data, external data and archived data. The operational system data are restructured using ETL tools to prepare data warehouse/data mart(s). The restructuring procedure can also include some operations on data e.g. data summarizing, data/text merging, data cleaning, data appending. As an important part of BI architecture, a well-designed data warehouse makes BI application successful. The main difference between data warehouse and BI is that the data warehouse procedure gives data in tables instead of reports and/or data visualizations. BI analytics enables users (such as executives, senior managers, line managers) to identify, develop and create new strategic and key business opportunities. Online analytical processing (for short OLAP) can be defined as being organized and queried data in various forms by various users for different purposes (Damar et. al., 2018). Complicated data stacks are prepared by using OLAP cubes in order to make meaningful and useful information from them.

Business intelligence includes tools in various categories as follows (Ranjan, 2005):

- AQL - Associative Query Logic
- Scorecarding
- Business Performance Management and Performance Measurement
- Business Planning
- Business Process Re-engineering
- Competitive Analysis
- Customer Relationship Management (CRM) and Marketing
- Data mining (DM), Data Farming, and Data warehouses
- Decision Support Systems (DSS) and Forecasting
- Document warehouses / Document Management
- Enterprise Management systems
- Executive Information Systems (EIS)
- Finance and Budgeting
- Human Resources
- Knowledge Management
- Mapping, Information visualization, and Dashboarding
- Management Information Systems (MIS)
- Geographic Information Systems (GIS)
- Online Analytical Processing (OLAP) and multidimensional cube analysis
- Real-time business intelligence
- Statistical Data Analysis
- Supply/Demand Chain Management
- Systems intelligence
- Trend Analysis
- User/End-user Query and Reporting
- Web Personalization / Web Mining / Text mining

The data transformation process and accordingly data warehouse projects or big data projects are described as sub-layers of BI projects (Seker, 2016: 23; Damar et. al., 2018: 202). BI project and its layers are summarized in Figure 7.

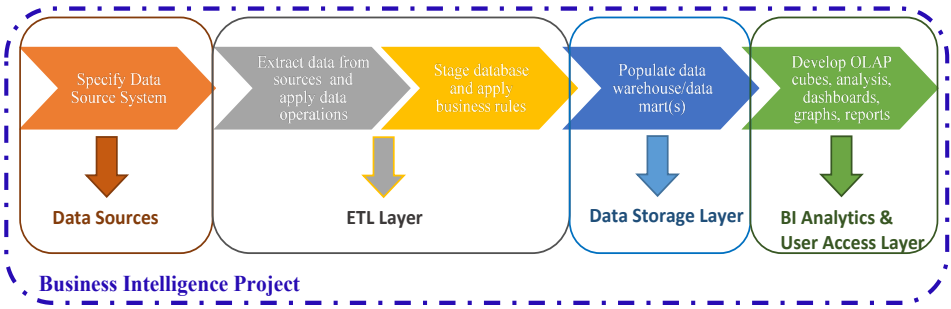

Figure 7. BI Project and Its Layers

In BI analytics and user access layer, numerous analysis methodologies are implemented to support business decisions of users. The main analysis methodologies are multidimensional cube analysis, exploratory data analysis, time series, data mining, optimization. After extracting and organizing big business data, three stages should be executed to make business decisions. First of all, data exploration is executed using statistical and exploratory data analysis. Then, data mining is performed to build models for learning from data. According to Turban et al. (2010), data mining is strictly located at a junction point of several disciplines i.e. statistics, artificial intelligence, machine learning, pattern recognition, management science, information systems, databases. Lastly, just before making key business decisions into actions, optimization models are performed to find the best solution out of a set of action-alternatives.

Although each BI solution has its own cyclical-path due to the application-field, appropriate analytical methods and opinion of decision-makers (Vercellis, 2009); a typical BI solution is characterized by the BI-cycle in Figure 8. The basis of BI-cycle can be likened to Plan-Do-Chek-Act (PDCA) model for continuous improvement. Decision-makers elaborate on the critical factors of a business phenomenon and receive quick responses related to the well-defined business problems through the analysis-phase. During the insight-phase, information provided from the analysis-phase is converted to knowledge. In the decision-phase, knowledge obtained from the insight-phase is transformed into decisions and actions. The evaluation-phase helps companies to measure BI-solutions using key performance indicators. Consequently, a well-defined BI

cycle leads companies to identify and develop key business indicators, analyze to obtain information, gain knowledge, take action, evaluate the solutions/results.

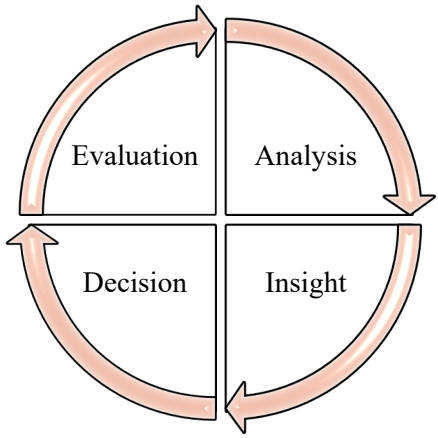

Figure 8. The BI-Cycle

Business intelligence is a strategic-enterprise to measure efficiency, productivity and sustainability in competition strategies of companies (Gangadaran & Swami, 2004; Pazarçeviren et al., 2015). BI systems have a lifecycle as well as other developed systems. A BI system can be developed with business goals, progress-time, costs, resource-conditions, performing planned activities. A typical BI lifecycle illustrated in Figure 9.

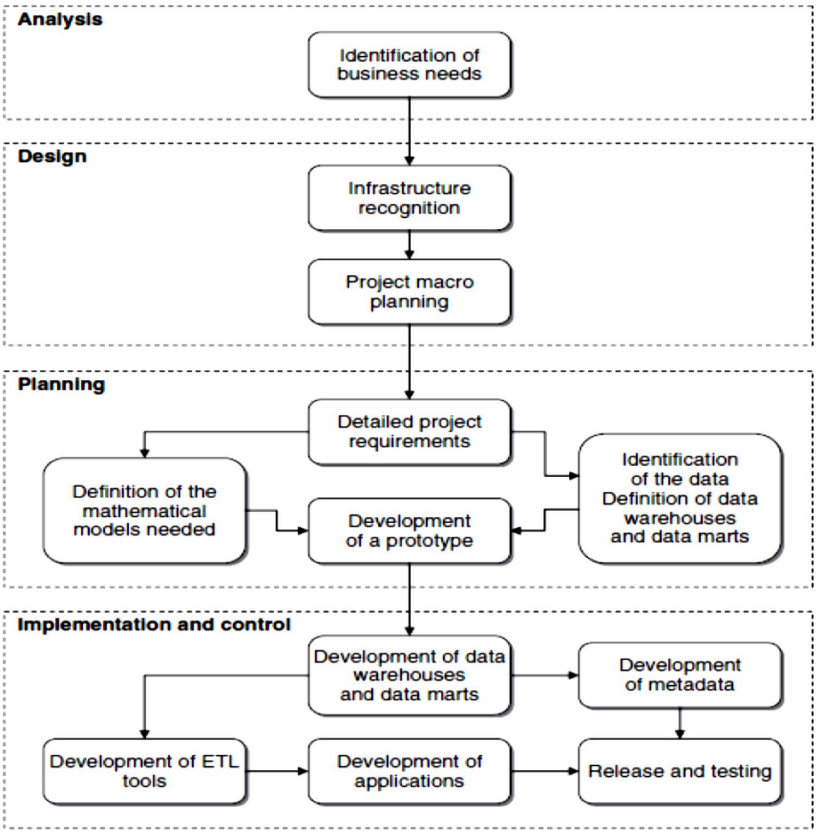

Figure 9. Development-Phases of a BI System (A Typical BI Lifecycle) (Vercellis, 2009).

5. LATEST TRENDS IN BI SOLUTIONS

The new decade has begun for all the companies worldwide with fourth industrial revolution (Industry 4.0). The technology-based business manners and actions are the unavoidable consequences of the fast-growing industry. Smart companies are aware of these consequences. For this reason, smart companies accomplish their decision-making processes via BI technologies. There are various BI analytic-platforms to support business decisions via BI and performance management software suite. Two BI-issues, the latest trends of BI and penetration of BI analytics/products, will be investigated in this section.

The Business Application Research Centre (for short BARC), which is a consulting firm for BI analytics and related business software, reported trends of

the above-mentioned BI-issues. BARC surveyed with totally 2,865 BI experts (users, vendors, consultants) to determine importance of BI analytics. Figure 10 illustrates the importance of BI trends for 2020.

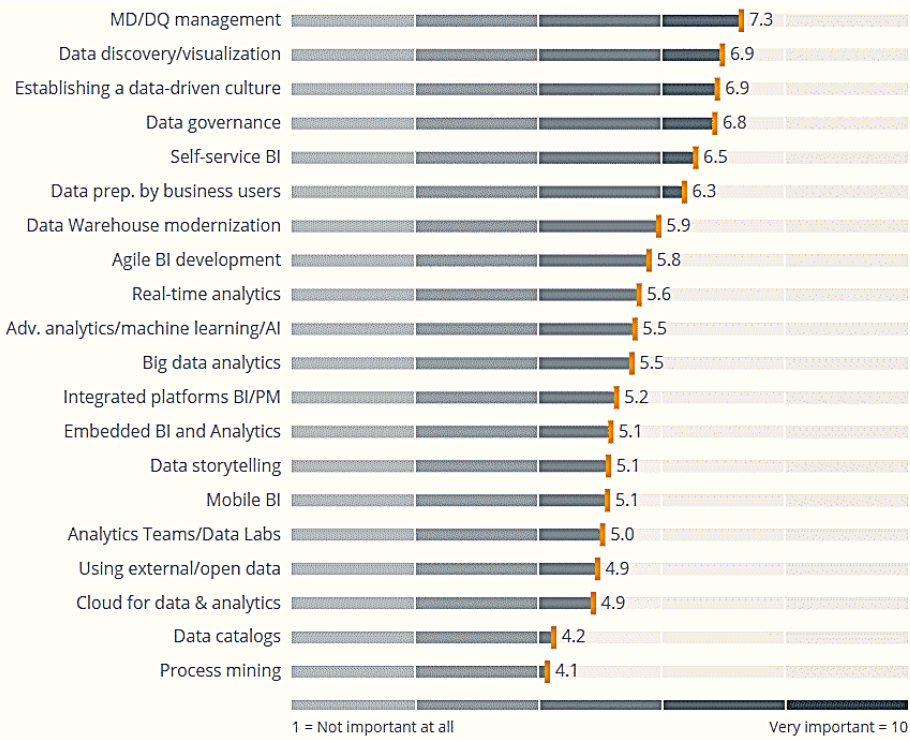

Figure 10. Importance of BI Trends in 2020 (Source: BARC Survey-Top BI Trends)

As a result of BI survey deployment statistics, BARC presents the penetration rates of BI software-products as in Figure 11. The BI penetration rates are affected by various factors comprising planning BI-enterprise, suitability of BI-product, enterprise-activities (https://bi-survey.com/bi-deployment). The BI penetration rates are calculated by 2,322 responses. As is seen in Figure 11, the average BI-penetration rate of all products equals approximately 17% and the penetration rates of 13 vendors/BI analytic-products are above 17%. Logi Analytics takes place on the top with a 40%-penetration rate, following MS Excel with 38% and Yellowfin with 33%. Besides, the penetration rates of 24 vendors/BI analytic-products are below the average BI-penetration rate of 17%. Four out of 24 vendors/BI analytic-products have BI-penetration rates near the average.

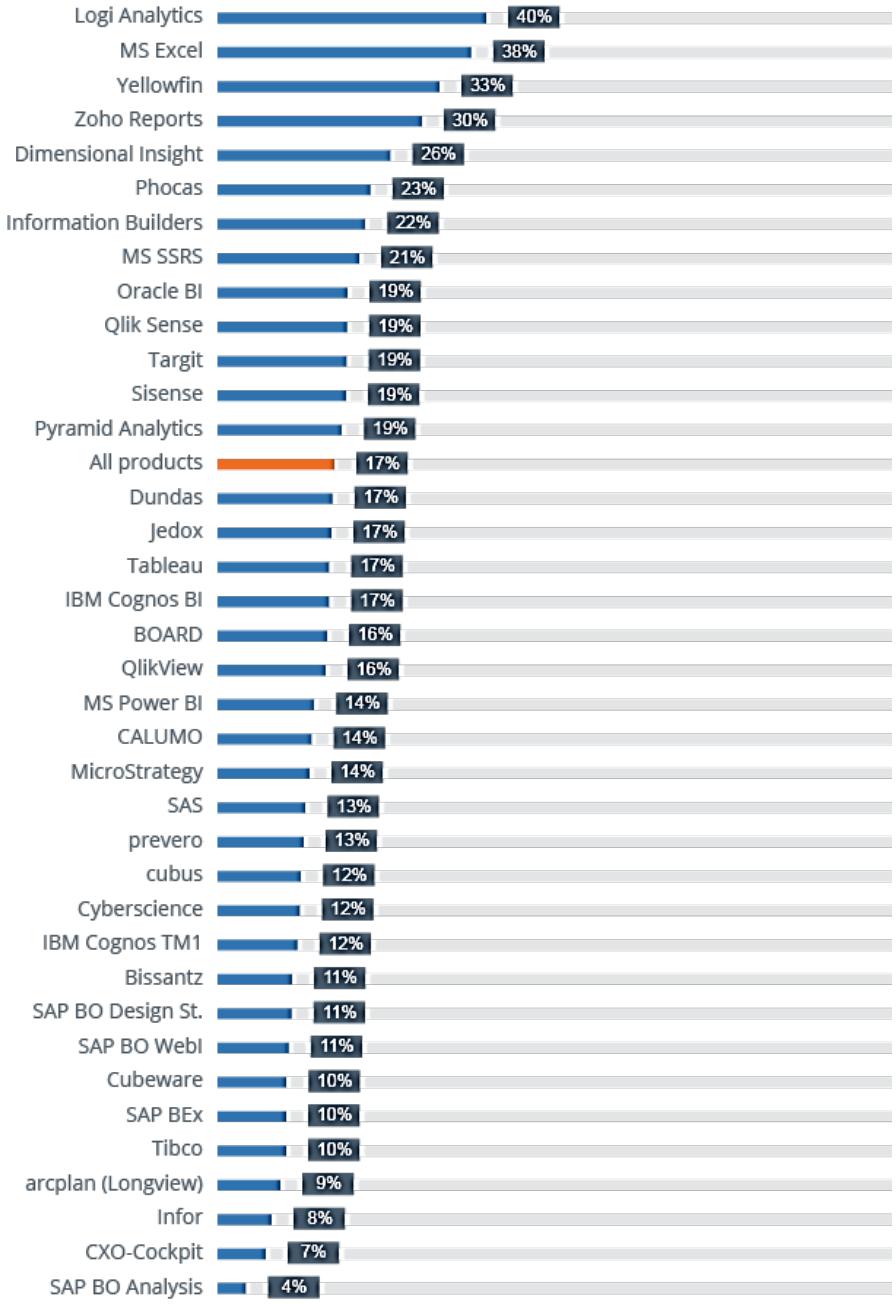

Figure 11. BI-Penetration Rates for 2020. (Source: BARC-BI Penetration Rates by Products)

CONCLUSION

The Fourth Industrial Revolution plays an important role in the sectoral growth rate. Companies make provision against the global competition with the usage of smart technologies in decision-making processes. Business intelligence (BI) analytics becomes the main solution for smart companies. In this study, new technologies, smart businesses, BI solutions and the latest trends in BI are represented by starting with chronology of industrial revolution.

Globalization and population growth bring about industrial revolutions. Business manners and also companies become “smart” with brand new technologies. Smart companies need to use BI and related technologies in order to make timely and successful business decisions. Smart business can be achieved by making inferences from big business data. BI analytics/products enable fast and significant information acquired from big business data. Business enterprises can be performed owing to well-designed BI architecture and BI analytics. Smart company-request for BI analytics/products is rapidly increasing. BI solution-vendors meet the BI-demand successfully. BI-trends can change due to planning, suitability of BI-product, enterprise-activities. BI analytics and hence BI-market will be developed by adding the new technology-based methodologies.

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CHAPTER 24

DIGITAL TRANSITION PROCESS IN LOGISTICS

Serkan Demirdöğen

INTRODUCTION

Developments in technology in recent years have given several opportunities for companies in issues such as flexibility, reactivity, and product customization, as well as rapid technological change, has caused difficulties like increasing complication, changing customer preferences and new legal requirements (Rachinger et al., 2019:1.144). This is exactly the point that digitalization plays an important role in solving problems arising from changes and making the benefit of opportunities stemming from technological changes. The digitalization concept, in the Gartner's dictionary, is defined as using digital technologies to provide the new income and value formation and change a business model (www.gartner.com). There is no generally accepted digitalization definition in literature; however, digitalization activity is called as a transition process based on technology that enhances flexibility, agility and responsiveness of a company by synchronizing strategies, business processes, organization, and information technology structures with each other (Imgrund et al., 2018:1).

Digitalization has a remarkable effect on both the structure, operations, business models of the world of work, and meeting definite requirements for increasing competition, low productivity, profitability ratios, effective planning, problem-solving, and decision-making mechanisms of companies (Carlsson, 2018:424). Just as being in births of all the industrial revolutions, industry 4.0 has been triggered by a specific technology just as steam power in Industry 1.0, electric power in Industry 2.0, and automation systems revolution in Industry 3.0. Industry 4.0 is a 'transition process from machine dominant production to digital production' (Yavas & Ozen, 2020:1). Just as being in many fields, the effects of this transition process are observed in the logistics sector as well.

Indeed, in one respect, improvements in the industry have obliged logistics sector to develop.

Transition and improvement in the logistics sector contribute to the sector to save on fuel cost; establish thermal equilibrium in stores and transportation processes; take customers' opinions; increase fleet efficiency (Poli et al., 2018:33). However, it must be considered that activities such as supply, production, distribution and reverse logistics chain have various difficulties during designing and managing a system towards logistic activities (Strandhagen et al., 2017:360).

In this section evaluated application areas in the sector by reviewing the effects of the digitalization process in parallel with the industrial revolutions on the logistics sector. Transition processes in the logistics sector as Logistic 1.0, Logistic 2.0, Logistic 3.0, and Logistic 4.0 in parallel with the first, second, third, and fourth industrial revolutions were analyzed. Moreover, application areas of digital technologies arising from the fourth industrial revolution were scrutinized under the title of technical components of logistics 4.0.

1. INDUSTRIALIZATION PROCESS AND EFFECTS ON LOGISTICS SECTORS

The first industrial revolution started with the invention of the steam machine in 1760. Steam machines enabled agriculture and feudal social structure to pass to a new production process. Trains, too, became the main means of transportation while the main energy resource was coal in related transition. The textile and steel industry were the dominant industry in terms of employment, production value, and capital investments. The second industrial revolution started with the invention of the internal combustion engine in 1900. Petroleum and electricity were used as energy resources by the invention of the internal combustion engine; this circumstance caused a rapid industrialization period by strengthening serial production. Electronic and information technologies were transferred into practice in the third industrial revolution that started in 1960; besides, automatization started in production (Xu et al., 2018:90).

The fourth industrial revolution is based on data. Companies have acquainted with systems that provide important advantages for themselves in competition and support them to make correct decisions due to the invention of systems that can collect and analyze data. The source of competitive advantage

is not only the result of coordinated or new-based production but also the machines that have a digital structure. For example, those digital machines have a property of giving warning in case of a breakdown when it is necessary to change a part (Nagy et al., 2018:2). The fourth industrial revolution that digitalized almost all manufacturing processes was first introduced in Germany in 2011 (Tay et al., 2018:1389).

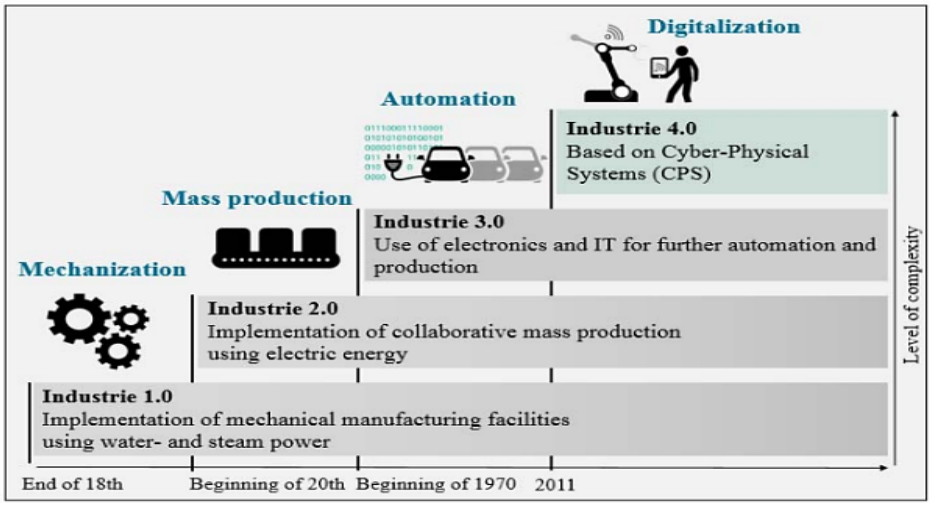

Figure 1: The stages of industrial development (Schmidtke et al., 2018:2)

The chief goal of the fourth industrial revolution is to strengthen the network of products and processes along the value chain. This situation provides companies to use the organizational processes in creating new goods and services in a more effective manner. The feature that is related to the fourth industrial revolution is intelligent networks based on cyber-physical systems (Barreto et al., 2017:1246-1247).

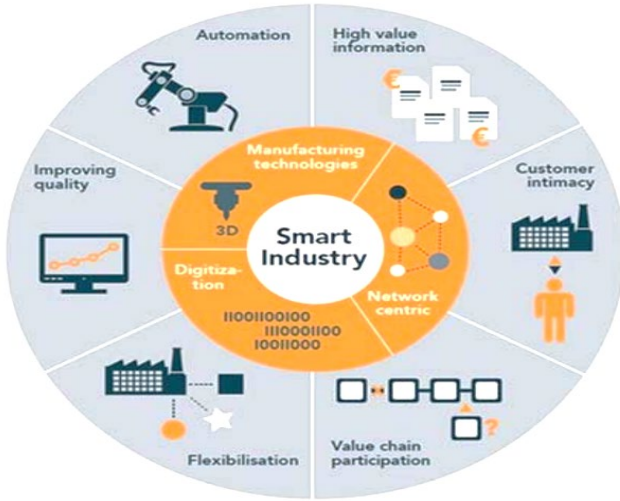

Figure 2. Industry 4.0 Concept (Barreto et al., 2017:1248)

These industrial revolutions have caused several transformations in the logistics sector. The invention of steam machines that is the reason for the first industrial revolution has given rise to pass to mechanization in the transportation system from the late 19th and early 20th centuries. This period is called Logistics 1.0.

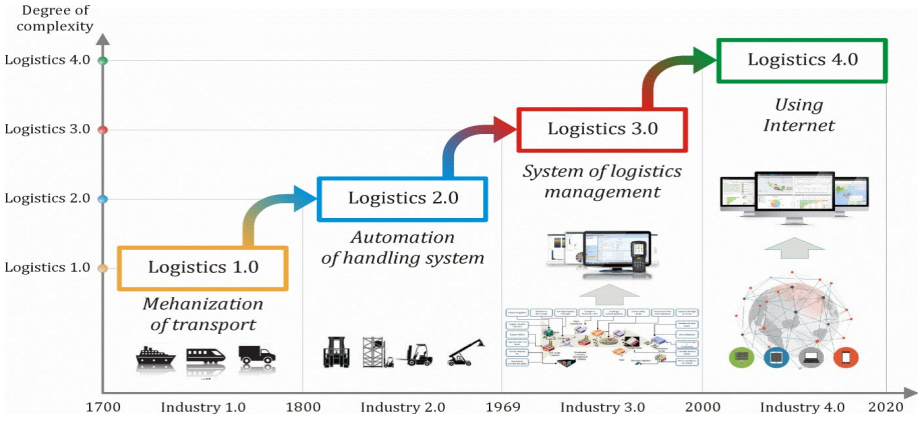

Figure 3. The stages of logistics development (Radivojević & Milosavljević, 2019:284)

The invention of internal combustion engines that is the reason for the second industrial revolution has caused the logistics sector to use automatic loading and unloading systems; this period is also known as Logistics 2.0. Entering into the application the electronics and information technologies in the industry

caused automatization systems to be used in production; this circumstance brought along the third industrial revolution. Reflect of this revolution to the logistics sector is logistics management systems to be used. This period is known as Logistics 3.0. The fourth industrial revolution including digitalization in the industry has resulted in intensively use of the internet and communications network in the logistics sector. This period in the logistics sector is called Logistics 4.0. Timesheet in Figure 3 shows that the transformation of different logistics processes did not happen at the same time with industrial revolutions; it happened soon after each of industrial revolution.

2. LOGISTICS 1.0

Linguistic roots of the word of 'logistics' come from French 'logis' term which means harmony of unions/communities. The logistics concept, in early 19th century, was used to express the planning and movement of military units by armies. Logistics as a business process arose in 1964 for the first time and was called business logistics. Business logistics in those days was only meant the physical distribution of the goods. Logistics is about the optimization of 3P that is the first letters of Place, Period&Pace, and Pattern (Amr et al., 2019:5).

- Place (place and destination); to create value for customers by carrying goods to locations where provide the best value to the customer.
- Period and Speed (time value); to create value for customers by focusing on time. This situation gains favor in terms of stock management at the same time.
- Model (purchase orders); to create value via an order by focusing on preferred models of the products.

The first change in an industry that we can perceive is that production processes including manual tools gave place to machines. This transition was an immediate change that can be accepted as a revolution. We can say that the industrial revolution that cannot have a certain starting and ending started in the second half of the 17th century in England and spread into Western Europe and North America after a few decades later. Rural life swiftly transformed into an industrial life. Manual tools and animal power gave place to machines that are used in goods and people transportation in this period. The final accomplishment of this revolution is the invention of the steam machine that was introduced by James Watt in 1782. Developing shipment and all networks after the invention of the steam machine and also becoming popular steam-motored ships

in the second half of the 19th century were the vital evolutions that have significantly increased the transportation capacity. We can also say that this period was the starting of mass transportation. Again, this period means the 'transport mechanism' for the logistics sector. Figure 4 shows a summary of the supply chain management process in Logistics 1.0 (Galindo, 2016:26).

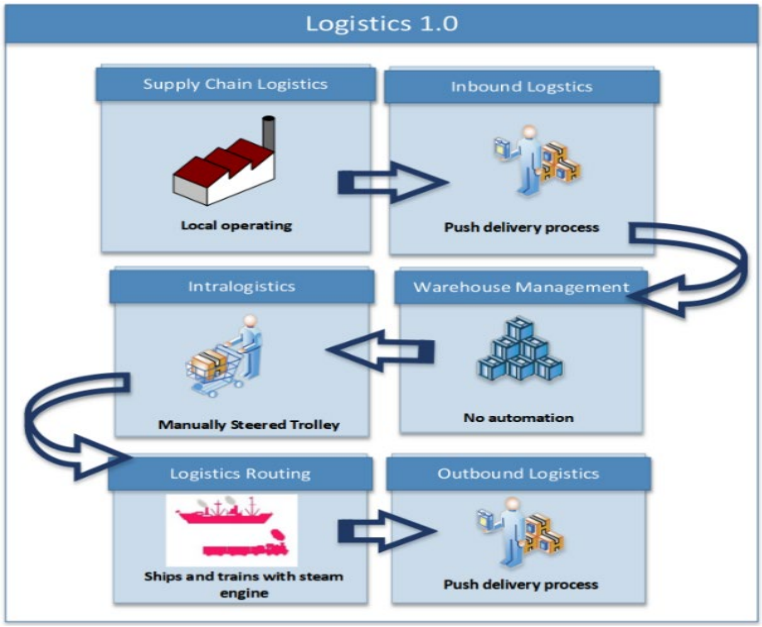

Figure 4. Supply Chain Management Process of Logistics 1.0

Mechanization in transportation in the late 19th and early 20th century is accepted as the first innovation in the logistics sector. Ships and trains with steam engines started to be used as the main means of transport instead of people and animal power to properly carry the goods and containers for long-distance. New means of transport with steam engines have caused transportation capacity to significantly increase. Logistic activities in the twentieth century are accepted as the starting of the mass transportation era (Wang, 2016:69).

3. LOGISTICS 2.0

The second period of change in logistics is perceived as an evolution rather than a revolution in terms of technology. New resources of raw materials such as steel, copper, or aluminum that have huge importance for developing ma-

chines in that period were found; unprecedented evolvement happened in the chemical industry; significant improvements were seen in communication and transportation systems by using power sources such as electricity and petroleum. Railroads and ships were used in transportation in a widespread manner while there was performing serial production via electric power (Galindo, 2016:26).

The invention of electric energy and starting mass production in manufacturing caused the second innovation that is called cargo handling and discharge in logistics (loading and unloading). Because practical logistics equipment such as automatic stores, automatic separation systems, and automatic loading/unloading systems needed powerful machines with electric motors. Moreover, commonly using container ships in harbors caused port loading systems to change (Wang, 2016:69). Figure 5 shows a summary of the supply chain management process in Logistics 2.0 (Galindo, 2016:28).

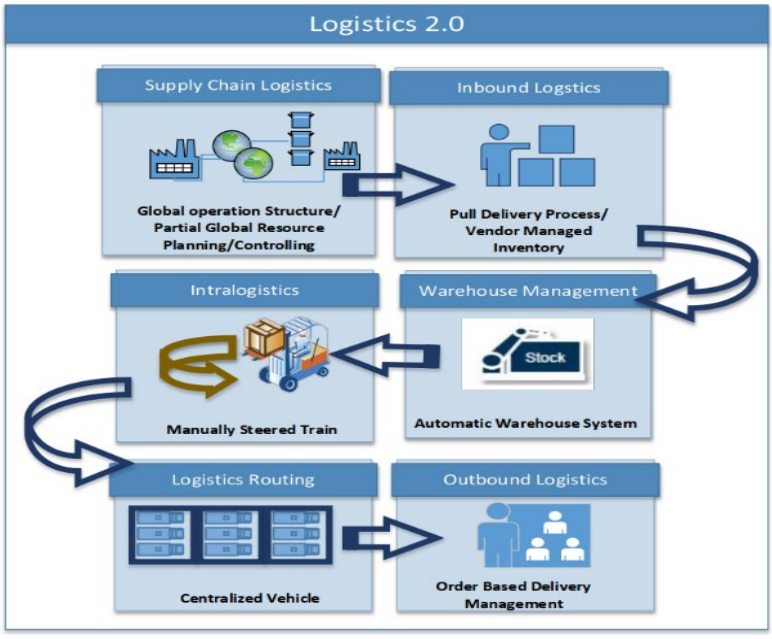

Figure 5. Supply Chain Management Process of Logistics 2

In conclusion, the focal point of Logistics 1.0 was carrying the goods while Logistics 2.0, in addition to this, focused on the issue of how the optimization level can be increased for more improvements. This situation caused a loyalty level between different companies which work as a supplier for each

other to increase. In short, Logistics 2.0 is about the coordination process between different parties belong to the same chain. This coordination process was accepted as a major innovation at those times and this is because Logistics 2.0 was accepted as an evolution. There was a need to arise for adding the fourth 'p' namely 'Process Coordination /Partnerships management' to 3p that optimizes logistical processes and is expressed in Logistics 1.0 (Amr et al., 2019:5).

4. LOGISTICS 3.0

Developing numerical controlled machines that provide the required flexibility to optimize the serial production and using industrial robots in manufacturing are the most important factors that trigger the third industrial revolution. We can entitle the third industrial revolution as a period in which computers were commonly used in manufacturing processes. Those developments in the industry caused new developments in the logistics sector as well (Galindo, 2016:26). The third innovation that emerged in the logistics sector by the effect of the third industrial revolution is the systematization of the logistic activities. This period started with the invention of computers and information technology in the 1980s. Significantly improvements in logistic management, stock and shipping efficiency, and automation by being used information technology systems such as warehouse management system and shipping management systems in logistics (Wang, 2016:69). Figure 6 shows a summary of the supply chain management process in Logistics 2.0 (Galindo, 2016:30).

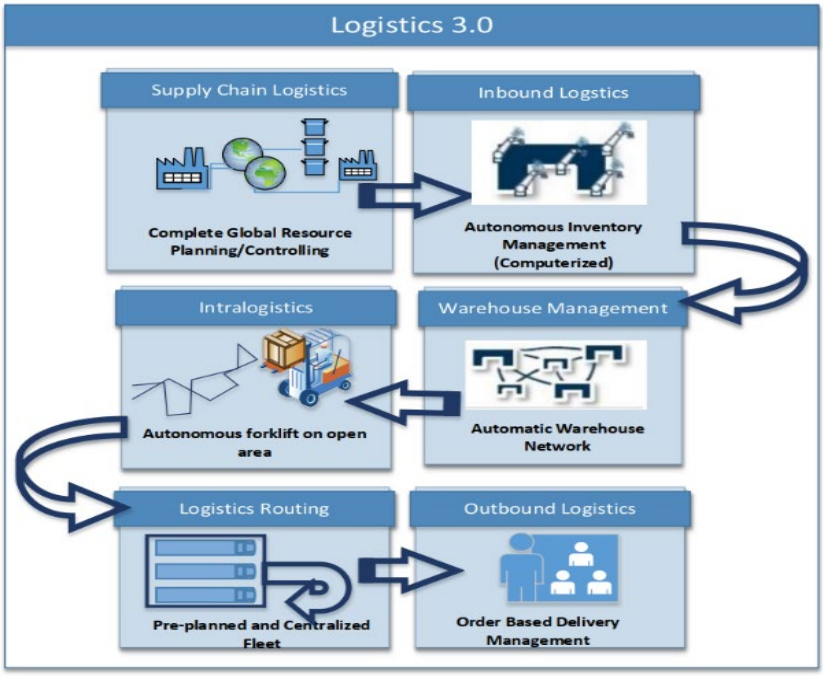

Figure 6. Supply Chain Management Process of Logistics 3

After 'Logistics 2.0' operating activities grouped as product development, supply chain management, or operational activities that are supported by many movements in law, finance, human resources, marketing, and the like. Grouping the activities caused coordination problems in companies. Those new problems triggered companies to focus on the 'Flow Management' issue. Under these circumstances, there was a need to arise for adding the fifth 'p' to 4P (Place, Period & Pace, Pattern, and Process Coordination/Partnerships management) that is effective in the optimization of logistics activities. This new 'p' was called 'Pliancy'. Companies, in that new period, focused on workflows, cashflows, service flows, decision making, and idea generation processes at managerial level and all the flows that create value for the customers (Amr et al., 2019:5).

5. LOGISTICS 4.0

The most important factor that started the fourth industrial revolution is integrating objects and service activities into the internet. It is possible for machines to real-timely communicate with each other and people on the internet of things. Objects that are known as smart products and smart systems; there hap-

pened the digitalization process in factories (Galindo, 2016:26). The fourth innovation in the logistics sector emerged through the effect of the fourth revolution; it has continued today. Logistics 4.0 process that is substantially guided by the internet of things and big data started as a result of this innovation emerged in the sector. The chief goal of Logistics 4.0 is to provide labor saving and standardization in supply chain management. The Internet of things and big data evolution significantly minimizes the works that people need to interfere at each step of the supply chain. New technologies like automatic guide vehicles and warehouse robots supplant operations and decision-making procedures that are performed by persons. Figure 7 shows a summary of the future activities of the supply chain within the Logistics 4.0 concept (Wang, 2016:69).

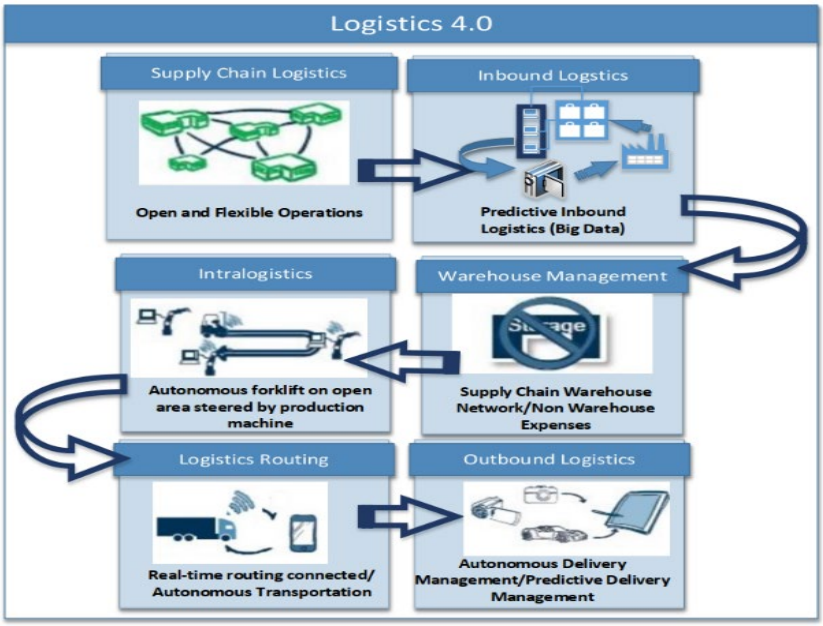

Figure 7. Supply Chain Management Process of Logistics 4

Logistics and supply chain started to be defined as cyber-physical systems by Industry 4.0. Cyber-physical system (CPS) is characterized as the systems which directly attach real (physical) objects and processes to data processing (virtual) objects and processes via open, partly global, and always interconnected information networks. These systems that have emerged by Industry 4.0 brought a new scope to supply chains. This new scope enables all the parties to transparently follow the processes from the shipment stage to the end of their

economic life. Cyber-Physical systems monitor the processes in real life and copy them to the virtual world for a noncentral decision-making process. These systems use sensors in the systems of the Internet of Things to real-timely communicate and form an interaction with 'things'. Cyber-Physical Systems consist of smart objects (things) that transfer all the classical logistics and supply chain processes to smart logistic and supply chain processes. Cyber-Physical systems are formed by the integration of cloud computing and equipment systems (sensors, robots, trucks, etc.) as a data storage system. This integration transforms the factory and its all components including products, services, and logistics into smart parts. This situation causes logistics to be called 'Smart Logistics' that is the application of various technologies to increase the efficiency of specific processes (Amr et al., 2019:5). Components and technologies of Logistics 4.0 can be seen in Figure 8.

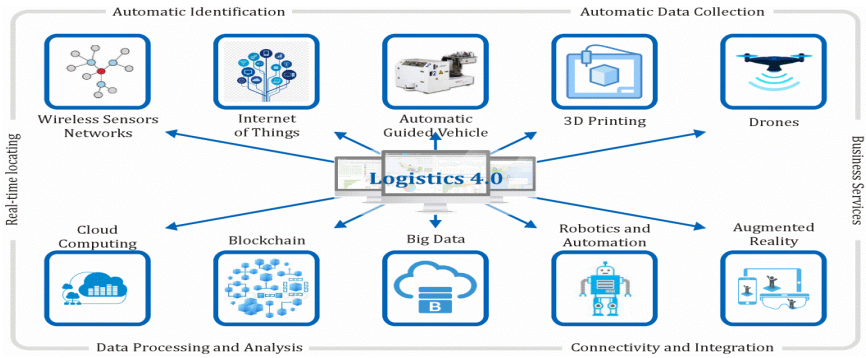

Figure 8. Logistics 4.0 components and technologies (Radivojević & Milosavljević, 2019:287)

6. TECHNICAL COMPONENTS OF LOGISTICS 4.0

6.1. Logistics 4.0 and Internet of Things

Internet of Things (IoT) has the potential to accelerate data-based logistics and connect almost everything to the internet. Things can now send, get, process, and storage information daily. This status ensures things to actively participate in logistical processes (Bubner et al., 2016:40). Information is a key factor in logistics and intensive knowledge positively affects competitive capacity. Companies can provide the development of logistics processes better by benefiting from information that is obtained by the internet of things technology (Yao, 2018:41).

Figure 9. The IoT Ecosystem (Macaulay et al., 2015:25)

Some of application areas of internet of things technology in logistics sector are as follow:

- *Position management systems:* Position management systems help companies, notably logistics companies in issues such as minimizing robbery; removing times losses arising from traffic; being sure about the seller that he acts in accordance with obligations (www.digiteum.com). A smart position management system that can provide to be followed driver's activities, vehicle positions and delivery status in logistics. Executives can be informed instant messages after goods are delivered or reached a certain location. Such solutions make delivery planning and program-preparing and program-following easy. All the changes are determined in an instant and real-timely reflected process by the internet of things technology. Accordingly, this technology can be successfully used to improve position management and ease the business processes (https://channels. theinnovationenterprise.com).
- *Stock tracking and storing:* Stock management and storing activities are one of the most important parts of logistics ecosystem. Using small and cheap systems enable companies to easily follow their stocks, statuses and positions and also establish a smart warehouse system. People who work with the internet of things technology can successfully avoid losses; provide products to be stored in a safe manner; find a required stock item. In addition to all these, error ratios of personnel can be minimized by these systems (https://channels. theinnovationenterprise.com). Again, companies transparently follow their stocks by a

qualified stock control system that consists of these technologies. Changeable customer demands can be met; irregular material entrance to the warehouses can be avoided; there can be take precautions against price fluctuations by these related technologies (Yerpude & Singhal, 2018:4).

- *Internet of things and estimation analytics:* Estimation analytics has a strategic position in many sectors and it also significantly contributes to establishing effective business development; improving decision making process; developing new business approaches and risk methods. Devices with internet provide collecting a large amount of data and transferring it to a central system for more detailed analyses. Internet of things and predictive analytical solutions can be utilized to make delivery and rota plans and determine several problems before the wheels have come off. In conclusion, timely replacement of machine parts ensures to be avoided accidents and used equipments in an efficient way (https://channels. theinnovationenterprise.com).
- *Internet of things and blockchain:* Supply chain management have various difficulties from illegal food applications to paying attention to product conditions. This is because both the companies and customers want to follow product life cycle from the production stage to delivery. Blockchain both solves many security issues of the internet of things technology and enriches the supply chains at the same time. Gathering these two technologies can meet security, transparency and traceability needs in the supply chain. Using tags and sectors that are defined by radiofrequencies can ensure many things such as temperature and humidity of the products, position of vehicles and stages of shipping processes to be monitored. Data can be recorded in blockchain; each of the products take a digital identity that guarantees lifecycle of product and all the information (https://channels.theinnovationenterprise.com).
- *Self-driving cars:* We will be witness to being popular self-driving cars in the near future. Logistics companies will be the first to benefit from the integration of these vehicles into business processes. These data are transformed into smart driving routes and address descriptions by analysis systems while there is collected a large amount of data is collected by the internet of things. Companies, by this means, minimize traffic accidents and optimize traffic flow (https://channels.thein novationenterprise.com).

- *Drone-based delivery:* A drone has a grand using potential in retail, logistics, agriculture and e-commerce fields. Drones can add speed and efficiency to the work environment. Drones, in logistic sector, provide business process automation in issues such as smart stock tracking, fast transport of goods and in-store immediate delivery. Furthermore, they also can provide to perform final delivery stage. A rapid transformation and growth process in logistic sector that facing many challenges and is under intensive technological advances are foreseen. Stock tracking and position management solutions, self-driving systems and internet of things that provides smart communication opportunities revolutionize in logistics (www.channels. theinnovationenterprise. com).

6.2. Logistics 4.0 and Cloud Computing

Computer-aided service applications, just as being in other industries, have frequently changed because of developing information and communication technology in time. Computer-aided service applications changed into a model consisting of business services that users can access from anywhere to the applications via a 'cloud' (Pal, 2016:12). Information technology systems and applications have huge importance for companies and institutions. Information and communication technology (ICT) have significantly affected organizational processes and logistics over the last two decades. Information technology (IT) service consists of a set of interdependent equipment and software resources. Logistic systems, in general, include many suppliers, producers, carriers, 3PL (third logistics partners), 4PL (fourth logistics partners), and financial institutions that are required for being carried a product from the place of manufacture to the customers. Researches on cloud computing technology reveal that each of the agents in the logistics system has a part of data and a share to successfully deliver the goods to the final location. Cloud computing as a new business model has a strong impression on all the information technologies. Cloud informatics brings remarkable competitive advantages to the companies by providing flexible and gradual access to data processing resources. A company needs to carry a part or all of the IT services to the cloud to use the cloud in an efficient way (Ilin et al. 2013:30).

Planning, organizing, and managing the complex logistical processes are generally conducted by big logistics companies that have complex software systems. Cloud computing technology encourages many small and medium-sized logistics companies to collaborate on information technology equipment

and software; thus, they will be able to benefit from the services of this technology (Arnold et al., 2013:2). Almost all the companies which render logistic services have used cloud logistics technology that provides rapid, efficient, and flexible access to information technology services for innovative supply chain solutions in recent years. Opportunities that are given by cloud computing technology to companies are as follow:

- Effective, flexible and harmonic business models,
- Privatized and customized logistics services that are so important for small and medium-sized enterprises in terms of being economic.
- Possibility to control the supply chain processes by easily shared real-time data and digitized processes,
- Providing price transparency for logistics service software users by pay-per-use and rental models.

On the other hand, cloud computing technology has challenges such as data migration and security issues (to control sensitive data); problems in integration and adaptation of modular cloud services to supply chain management systems; concern that delays caused by the increased amount of data in the system prevent real-time data to be obtained (Bubner et al., 2016:38).

6.3. Logistics 4.0 and Three Dimensional (3D) Printers

The logistics sector is a sector in which new alternatives are continuously researched to improve processes and establish local-global connections. One of the innovations that arose in the sector is three-dimensional printing technology. The relationship between the logistics industry and 3-dimensional printers is interesting because of several reasons. The integration of a three-dimensional printer into the supply chain is natural and almost inevitable. Potential applications in production processes are the most important innovation of this technology. Benefits of these related printers for logistics companies are aligned below (https://ignasisayol.com):

- Reduction the number of the shipment and its volumes; for example, a part of goods that are produced in China or other Asian markets can be produced in regions closer to America and Europe,
- Reduction the stock levels; it is to reduce the stocks that emerged by mass customization,

- Being provided logistics service providers to play an organizer tole for raw-material and final goods in complex and disjointed supply chains,
- Establishing new market segments and opportunities to create value,
- Shortening the time and cost of transportation by providing goods to be produced in a location close to consumption points (Bubner et al., 2016:34).

Much as the current three-dimensional printer technology does not enable serial production in which goods are produced the same, it is a crucial factor in having a competitive advantage and getting a better logistics service (Wieczorek, 2017:446). In short, three-dimensional printers as a great facilitator of customizing products may have remarkable effects on subparts of the supply chain such as production and distribution (Mohr & Khan, 2016:153).

6.4. Logistics 4.0 and Wireless Sensor Networks

A new technology that is called Wireless Sensor Network (WSN) has been observed in the traditional knowledge network. This technology has commonly used in industry, agriculture, national defense, and other fields. Wireless sensor networks consist of many wireless sensor knots that have the ability of wireless communication and data processing that can be deployed in specific areas. Monitoring and control of the specific areas can be ensured by these systems; there also can be established communication networks. Wireless sensor network technology focuses on microsensors, data collection, data processing, communication, control, and other functions. It can be said all in all that wireless sensor networks adopt a flexible management strategy to meet the needs of different applications and are the application-oriented and data-centric network (Xu et al., 2017:1).

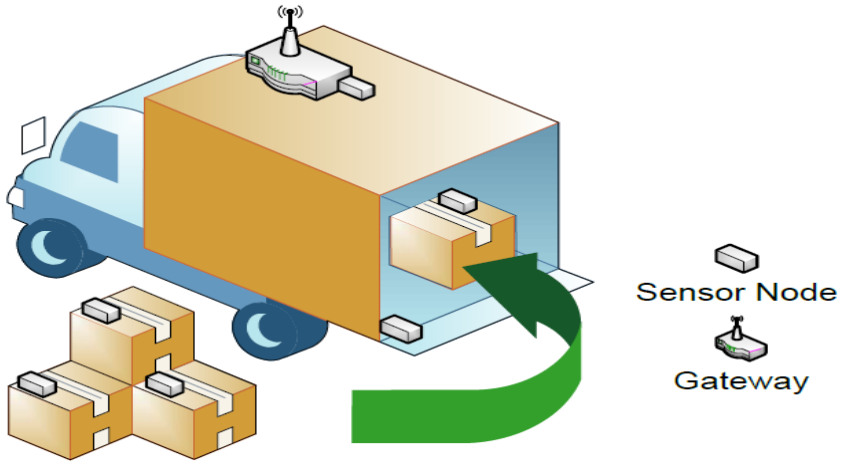

Figure 10. Wireless Sensor Network for Logistics (Becker et al., 2010:1).

One of the best examples of wireless sensor networks technology in the logistics sector is Radio Frequency Identification (RFID). There are two components of RFID technology. Tags that are the first of these components are used to store the data while readers that are the other main component are used to take these data from the tags. Wireless sensor networks (WSN) technology in RFID technology provides the system to be established by small smart and interdependent sensing devices with a large wireless communication opportunity. WSN and RFID systems are used as integrated with each other (Alshahrany et al., 2015:152). Some of the application areas of WSN technology in the logistics sector are as follow (Radivojević & Milosavljević, 2019:289):

- Measuring the payload by WSN and 3-dimensional cameras,
- Quality control of the goods by analysis of data that are obtained from sensors,
- Using sensors in logistics infrastructure and facilities by being mounted to transport and transfer equipment,
- Improving safety and health conditions of workers by playing sensors within working clothes

The logistics sector uses WSN technology in several fields as well as it is considered that applying this technology to this sector brings along several difficulties (Becker et al., 2010:1).

6.5. Logistics 4.0 and Robotics/Automation

One of the extreme hardships that the logistics sector face is the labor supply. Companies in the four corners of the world have difficulties in getting qualified workers for carrying their goods from suppliers to customers. The labor necessity in the logistics sector has gradually increased by the e-commerce revolution and consequently needed more parcel transfer. The trouble has gradually grown when the problem of decreasing the population level in the western world is added. Logistics robots play a significant role in solving the problems in getting the required labor. The Logistics world is much more complex compared to production and this related world needs robots with more abilities. A different function of a logistics robot needs to be used with infinite combinations. For example, robots easily move and react if they can see the environment (Kückelhaus & Beckmann, 2016:5).

Logistics robots make the processes of storing and carrying goods automatically. They are generally used in organizing and carrying goods from warehouses that is a process called intralogistics. Logistics robots bring along a high amount of efficiency gain and profitability for companies with logistics robots by tendering much more working hours compared to the manual workforce. Some of the areas of usage of logistics robots are as follow:

- The primary usage area of logistics robots is being used for mobile automatic guided vehicles (AGV) in warehouses and storage facilities for carrying the products. Those robots work on predefined roads and can be moved at any time of the day for shipment and storing. AGV has an important role in regulating supply chain and lowers the cost,
- Classifying products in stores or assembly lines,
- Using to carrying goods out of doors just as being in the agricultural sector,
- Real-timely controlling shelf stocks in retail trade.

Much as logistic robots have differences based on usage areas, they generally are the mobile robots which aim to automatize carrying the goods (https://www.robotics.org). Some of the benefits of robots for companies in the sector are aligned below:

- To reduce the increasing employment costs,
- Performing the things that people cannot do or people do not want to do,
- Doing duties that necessitate high precision and perfect timing,

- To simplify the complex supply chain and provide the integration of networks (https://aethon.com).

6.6. Logistics 4.0 and Augmented Reality

Augmented reality (AR) that combines the digital and physical world brings new perspectives on issues such as logistic planning, transportation, and conducting processes. For example, workers can reach the exact information at the right time with the help of overhead screens with several virtual information. AR ensures people to understand their environment by integrating related information into the sight by smart glasses. Augmented reality technology has the potential to increase process efficiency and quality and also significantly contribute to minimizing the stress arising from manual usage (Bubner et al., 2016:35).

The major duty of an augmented reality environment is to ensure the stereogram of the target object and combine this with the display of objective reality. It is not an obligation to show reality in the background. However, the person can easily perceive the situation if 3D object visualization is performed in a natural environment by keeping a real background (Ginters & Gutierrez, 2013:9).

Smart devices with enhanced computer vision are used in various logistical workflows. Some of the areas related to logistics sector in which augmented reality technology is used are as follow:

- Transportation and receiving: Transportation and receiving applications use AR technology for faster identity authentication and providing reports. Overhead indicators with computer help personnel to complete transportation and receiving duties; it also helps to lower the labor costs and increase process efficiency.
- Mobil PoD (Mobile Proof of Delivery): Mobile delivery confirmation applications use AR feedbacks to give real-time information to users by smart device screens. Related applications can advantage in critical delivery changes and shorten the delivery time.
- Asset management: Asset management applications can enable fast and efficient repair or replacement by benefiting from the scope of the augmented reality by determining assets in a specific area. Logistics companies get significant information such as state of assets and redistribution opportunities due to these opportunities (www.scandit.com).

6.7. Logistics 4.0 and Blockchain

There is a need for collaboration with other stakeholders to be perfect in logistics by optimizing complex information and financial transaction flow beside the physical commodity flow. In the logistics industry, there is a high amount of trading volume that arising from the scattered and competitive nature of the sector. Many fields of logistics value chain necessitate several manual transactions that are obliged by regulatory authorities. For example, companies, in general, need manual data entry and documents recorded on papers to carry out customs clearance. All these developments cause disputes in global trade by complication the tracking of products within the supply chain. Blockchain technology can help to solve these disagreements in the logistics sector at this juncture; it can also bring remarkable gains in the efficiency of logistical processes. This technology provides data transparency by providing access to information about supply chain stakeholders through a single resource. In addition to all these benefits, blockchain technology brings along the items below:

- Lean power can provide cost-saving via more automation and error-free processes,
- It can accelerate the physical flow of the goods by providing visibility and predictability to logistics operations,
- It helps sustainable supply chains to be established by following the goods from the production stage; it also helps compete against product counterfeiting,
- It tenders a big potential for new logistics services and more innovative business models (Heutger & Kückelhaus 2018:12),
- Much more paperwork of global container transportation causes time and money loss. Blockchain technology avoids those losses by easing of paperwork

There is expected far-reaching effects from being applied blockchain technology in logistics and transport sector. Blockchain stays the course of being an important platform in changing production, marketing, purchase and consumption methods by changing the running of supply chain processes (Dobrovnik et al., 2018:1). In short, blockchain technology is expected to provide opportunities such as increasing the efficiency of transportation process; stock tracking; more transparency; invoicing; payments and settling disputes (www. kryptographe.com).

6.8. Logistics 4.0 and Big Data

Much as the big data has several definitions, it is defined as datasets that cannot be perceived, hidden, and processed by classical methods and technologies within an acceptable period (Borgi et al., 2017:44). The logistics sector is an ideal area to benefit from the technological and methodological progress of the big data. Logistic providers, today, manage a huge commodity flow and establish a large data set at the same time. Logistics companies have tracked the starting point and destination, size, weight, content and location, and global distribution networks for millions of packages every day. However, those companies probably cannot utilize all information on logistics processes. Although there is a big potential to improve operational efficiency and customer experience and also establish new beneficial business models, companies cannot use this potential up to the hilt. For example, let's think the advantages of integration of data of more than one logistic provide into the supply chain; dissociations in the available market can be removed and new collaborations can arouse by this means. Big data technology will be a trend that changes the game for the logistics industry (Jeske et al., 2013:5). Strategical importance of this technology springs from its advantages such as professionally processing information; data mining and analysis of long-term trends in the market. The logistics sector will both have internal information and much external information by being big data technology popular. Logistics companies will have the opportunity to estimate differentiated and customized services for each of the customers based on data analysis. In addition to all these, data analyses help logistics companies to follow the developments in the industry; increase customer loyalty, transparency of sector service management, and quality; optimize profitability (Wang et al., 2017:3).

6.9. Logistics 4.0 and Drones

Drone, in the simplest terms, is defined as unmanned air vehicles (https://opendocs.ids.ac.uk). Interest in using unmanned air vehicles to deliver packaged goods has gradually increased in recent years. Many companies have already conducted pilot projects of this method that they are planned to submit as a delivery preference (Vlahovic et al., 2016:4016). This system that is tested for easily carrying small packages is now used to deliver goods such as drinks, chocolate, coffee, and over the counter drugs (Riu & Menendez, 2019:4).

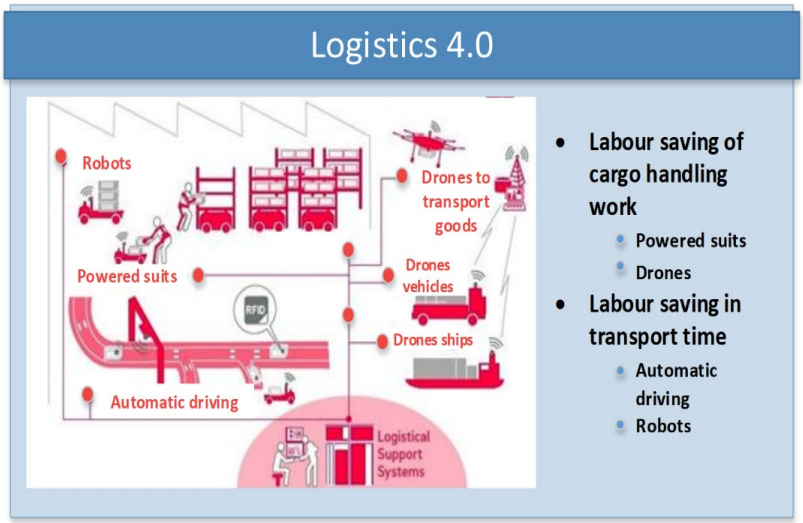

Figure 11. Technology involved in Logistics 4.0 so far (Galindo, 2016:32).

Distribution of drones, in the logistics sector, is accepted as the future of distribution activities. Because there are many advantages of this distribution style for companies. Some of these advantages are as follow (Lokhande et al., 2018:2.181):

- Fast delivery: Drones can fly to their targets through a straight line,
- Delivery to hard-to-reach areas: Drones are ideal to be reached medicine and healthcare materials to far and underdeveloped areas,
- Reduction in costs: Automatic unmanned air vehicles significantly lowers human labor costs,
- Increase in competitive capacity: Companies which render fast drone delivery will have a crucial advantage compared to their competitors,
- Being eco-friendly: Drone deliveries have minimum negative effects on the environment compared to traditional deliveries including railroad or airway. This situation brings along the adjective of eco-friendly to companies,
- It provides advantages such as the control of the infrastructure of the supply chain; periodic stocktaking in stores and following container yards (www.sustainablelogisticsinternational.com),
- Drones collect video and image data for automatic operational decisions.

6.10. Logistics 4.0 and Automatic Guided Vehicle Systems

The industry has started to adopt more types of automation for increasing the quality and accuracy of production due to the better time management by the progress of robotic technologies. One of these related technologies is the automatic guided vehicle systems that are known as "AVG" and important in industrial logistics and transportation (Hossain et al., 2010:237).

AGV means the mobile robot to carry the objects normally. They are conservatively used in manufacturing systems; however, they have become popular in many other industries as well (Saputra & Rijanto, 2012:3). AGC is utilized almost in all the branches of industry, notably automotive, printing, pharmaceutical, metal, food, aviation, and port operations (Schulze et al., 2008:1). The important matter in an AGV system is the control systems. Traditionally, AGV in transportation works is controlled by a server center via wireless communication (Saputra & Rijanto, 2012:3).

AGV systems are gradually more preferred in terms of shortening transportation time; minimizing accidents that harm the operator and freight; providing reliability; being easily adapted to freight through different routes; decreasing labor necessity and increasing efficiency (Rocha et al., 2010:248).

CONCLUSION

It is seen that the development in technology positively affects the logistics activities that have an important position in many business lines. Much as this effect has not corresponded to industrial revolutions, it emerged after a specific time and caused logistics activities to significantly improve. The invention of the steam machine that is the reason for the first industrial revolution caused mechanization in transportation activities in the logistics sector while autoloading vehicles started to be used in the logistics sector by the second industrial revolution that is based on the invention of internal combustion engines. Autonomous systems started to be utilized in the logistics sector after the third industrial revolution. Regarding the effect of the fourth industrial revolution, we can talk about a digital transformation in logistics just as being in the production processes.

New technologies such as internet of things, big data, cloud computing, blockchain, automation systems, robots, 3D printers, augmented reality, wireless communication networks, and unmanned vehicles that are the main compo-

nents of the fourth industrial revolution have been adapted to the production processes by the companies. Coming into use these technologies has triggered great transformations in many domains, notably industry, agriculture, tertiary, and health sector. There are observed significant increases in productivity, goods, and services quality by using technologies of Industry 4.0; there also are observed significant reductions in costs. Moreover, related technologies have enabled to be monitored all of the stages of the supply chain from raw material to delivery. Companies who adopt and successfully use related technologies of Industry 4.0, namely the digital era, benefit from this process as a remarkable competitive advantage. Almost all machines and equipment that are used in this new period with advanced automation can communicate with each other by internet and sensors; data of the business processes can be stored in cloud systems. Machines and systems that can automatically decide and apply owing to artificial intelligence have been developed in the production processes. These innovations that caused great transformations in the industry significantly affect logistics activities, too, that integratedly work with production systems.

Logistics 4.0 period means the starting of the digitalization period in logistics is also the time when internet of things, big data, cloud computing, blockchain, automation systems, robots, 3D printers, augmented reality, wireless communication networks, unmanned vehicles are adapted to the sector. This adaptation gives chances to quickly and safely conduct goods entrance and goods issue by radio-frequency identification systems; track vehicles; establish the best transport routes and smart storehouses; use automatic guided vehicles in the factory and warehouse; conduct real-time stock tracking; automatically classify the stocks and create new business models. Companies that use these technologies will need less labor; they can make fuel saving due to the tracking of moving vans; minimize the chaos and losses arising from reasons such as spoiling in transportation processes; reach customer satisfaction by minimizing the error rate almost in all the activities. Moreover, being used technologies like big data, cloud computing and blockchain in logistics activities by the Logistics 4.0 can significantly contribute to store the information in the sector; benefit from related information if required; occur a big integrated system including producers, consumers and notably logistics companies; provide collaboration between stakeholders at the end of this integration.

Making production in different locations of the world and transferring those goods to many different places of the world due to increasing competition and advances in technology have caused logistics activities to become complex

and hard to conduct. On the one hand, this complex structure in logistics activities decreases the productivity of the companies; on the other hand, it has caused companies to have difficulties to meet customer demands. It is inevitable for companies to realize digital transformation for both meetings the demands of customers who expect fast and safe delivery and lower the costs.

Digital transformation processes should be perfectly planned by companies. First of all, top management's support ought to be received for this transformation; then it needs to be determined whether there are sufficient finance and labor resources for the same transformation. Much as it is a gain for only a few companies in the sector who succeed in this transformation, it should not be forgotten that it is not enough for getting positive results in terms of the sector.

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CHAPTER 25

THE FUTURE OF KNOWLEDGE MANAGEMENT: WEB 4.0

İbrahim Yıkılmaz

INTRODUCTION

Knowledge appears as the main actor in all domains of life, particularly in the social and economic sphere, within the information society (Drucker 1968; Bell 1973; Toffler 1990). Knowledge management has an important place in establishing a sustainable competitive advantage along with the developments experienced on a global scale. Besides, transforming the information that is produced in large amounts on a global scale into a useful asset increases the importance of KM (Kalseth & Cummings, 2001:164). Technological advances and new industry production understanding initially gave KM a more inclusive, strategic, and dynamic definition and position in the management process (North & Maier, 2018). KM is responsible for improving the ability to generate and use the knowledge and the process of learning and also interaction between different parties (human, human-machine, machine-machine) (Ansari, 2019).

Organizational knowledge management is a multidisciplinary issue that includes"socio-cultural, organizational, behavioral, and technical" aspects. ICT and IT have an important role to enable effective KM (Kane & Alavi, 2007; Alavi & Leidner, 2001; Allameh & Zare, 2011). ICT and IT (internet, data warehouse, web) are effective to systematize the knowledge and enable effective knowledge management process ("creation, storage, transfer, sharing and application") and improving the community and network of practices. For Santoro et al. (2017); the effective knowledge management system is identified by powerful IT infrastructure (software, internet, extranet, etc.), collaborative technologies (shared database, document repository, etc.), and ICT adoptions. Especially ICT adoption enables sharing information with several stakeholders, cost reduction, and interaction with various business agents. In this context, web4.0, which is evaluated to sizablycontribute to the future of knowledge management and its efficiency, was be examined in detail.

For Yang and Xia (2015), web4.0 offers advanced symbiotic network and international operating system. Web4.0 applications are capable of processing knowledge in the big metadata at any time and place with the help of various carriers (not only PC,mobile phone). WeboS, Intellectual Agents, and intellectual web enable a personalized interaction according to the needs and expectations of the individual. Web 4.0 applications facilitate both mentally and intellectually true symbiosis life experience at the center of the virtual and real-life collaboration. The web4.0, which will be the source of this paradigm shift, and the KM, which will increase in importance in the future of organizations, have been discussed in detail in the next chapters of the study. It is considered that the study will be useful in raising awareness about knowledge management and its future in the administrative process.

1. KNOWLEDGE MANAGEMENT

Effective knowledge management has a remarkable position in achieving the goals and vision of organizations in a knowledge-based economy (Ugvu & Ezema, 2010:185). Much as there are different definitions, knowledge management consists of the set of creation and sharing processes of the information that is necessary for the optimization of the decisions to be taken in reaching the targets of organizations in line with the determined mission (Townley, 2001:45). Obtaining the necessary information at the stage of the provision of products and services for the needs of internal and external stakeholders in different platforms includes the delivery process of this information, which will create added value to the most proper stakeholders and systems. Knowledge management that is a process of generating value in the organizational environment; helps the sharing and retrieving of information by means of technology, thus organizational performance increases (Cross & Baird, 2000; O'Dell & Grayson, 1998:6; Ugwu & Ezema, 2010:184). Productivity, efficiency, and innovative solutions are increased with the high responsiveness and innovation provided by effective Knowledge management Thus, it provides organizations to tighten their expenses and also establish effective management (Clarke, 2004).

It is stated that knowledge management has three different contributions to organizational practice (Kalseth and Cummings, 2001:167). KM provides the organization to obtain necessary information on its goals, strategies and, performance evaluation. Besides, the storage and accessibility of information in the appropriate format support the decision process in the most accurate place and time.

Information technology and knowledge management are accepted as the most important strategic enablers of success in the administrative processes of organizations (Carayannis, 1999). Especially, creating knowledge and delivering it to the right addresses have an important role in providing a competitive advantage (Dias & Bresciani, 2006; Karl & Cummings, 2001; Argote & Ingram, 2000).

Knowledge is inexhaustible, transferrable and unlike it is produced in large quantities, a little can be used. Also, the most valuable information capacity of the organization leaves the organization when the employees return home at the end of the day. These features make knowledge different from other valuable commodities (Dalkir, 2011:2). At this point, knowledge management is a systematic and organized instrument of having the most possible usage of the knowledge base of the enterprise and the potential of specific talents, competencies, insights, innovations, and ideas in order to establish a more effective and productive company (Dalkir, 2011).

The knowledge management process is defined under different subdimensions. Within the scope of this study, a framework for the knowledge management formed by Alavi & Leidner (2001), which is cited in many studies (Alavi & Denford, 2011), was taken as a basis. It is a framework that takes its root from the sociology of knowledge and considers organizations as social collectives and “knowledge systems” (Alavi & Leidner, 2001). The process of knowledge management is based on four dimensions: *"creation, storage and retrieval, transfer, and application".*

1.1. Knowledge Creation

Knowledge is developed, exchanged, amplified, extended, and validated in organizational settings by the social, collective,and individual cognitive processes (Nonaka, 1994). For Nonaka's (1994) spiral model; developing a new concept has emerged as a result of the continuous interaction of tacit and explicit knowledge. When the spiral is getting longer; knowledge travels to the group, and then to the organizational levels by starting from the individual. The formation of knowledge in a cyclical process within the context of tacit and explicit knowledge interactionproduces four separate "modes" with the conversion of knowledge. The first mode; "tacit to tacit knowledge" interaction is created by the help of interaction between the individuals. Not with language; the observation, imitation, and practice enable to create a tacit knowledge through the

shared experience and that's named "socialization". The second mode of transfer of knowledge emerges as an interaction of two explicit knowledge in the social mechanisms of being held by individuals. The second mode of transfer of knowledge has emerged as an interaction of two explicit knowledge in the social mechanisms of being held by individuals. Individuals share and integrate information by processes such as meetings and communications over the internet. Reconfiguring current information through the collection, elimination, recategorization, and recontextualization of explicit knowledge will create new, explicit knowledge. This cycle of explicit knowledge-building is called "combination". The last two modes (third and fourth) are formed by conversion of two knowledge types; tacit and explicit. The process of transformation of Tacit knowledge towards explicit knowledge is called "externalization" and vise versa is called" internalization". The articulation of gained experiences and best practices can be given examples to the "externalization" and knowledge obtained as a result of reading or discussion on any subject given an example to the "internalization" (Alavi & Leidner, 2001). The modes are shown in detail in figure 1:

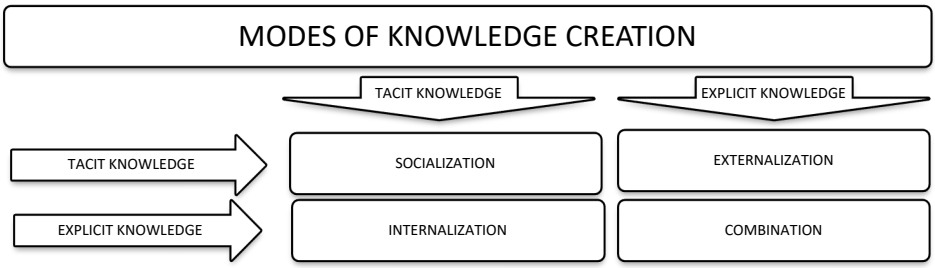

Figure 1: Modes Of The Knowledge Creation (prepared by the author)

Nonaka and Konno (1998) focus on BA (common space to develop relationships) in the creation of knowledge. The “phenomenal” place is the main platform of knowledge creation and this place enables the creation of knowledge in individuals, groups, teams, meetings, or in interaction with the customer. There are four BA-types and each of SECI's four knowledge conversion modes suited to each BA category. Each BA exhibits a supportive and accelerating feature in the process of creating knowledge.

The originating ba is the main and key ba from where the knowledge-creation process starts. The transfer and recreation of the tacit knowledge take place in the physical environment, especially through interactions established face to face in originating BA, which is named as "socialization" in SECI. The

organizational culture and the determined vision are shared among the members of the organization with originating ba.

The interacting ba takes place in a more conscious interaction than originating ba. It is essential for a project or cross-functional team to select individuals with the best blend of particular knowledge and capabilities to convert the mental models of an individual into common terms and concepts. The participants share their mental models by analyzing and reflectioning their own knowledge at the same time. Interacting ba, which is named as externalization in the SECI. is the place where tacit knowledge is converted into explicit knowledge. Dialogue and collaboration are of great importance in the realization of this process.

A cyber ba, which represents the combination phase in SECI, is a virtual world where the interaction takes place. Through integrating new kinds of explicit knowledge with the existing information and expertise, new explicit knowledge is created and systematized through the organization. The process of conversion is supported by information technology, internet network usage and documentation.

Exercising bain which the explicit knowledge supports the internalization phase in the SECI and is converted to the tacit knowledge. Focused training with senior mentors and learning by progressive effort enables internalize the knowledge of formal knowledge (explicit knowledge).

Shared and supported knowledge in each BA creates the knowledge base of the organization. The organization BA is the place where the knowledge is created in a constantly dynamic structure of conversion of tacit to explicit and vise versa.The four characteristics of BA and their relation with SECI are explained figure 2:

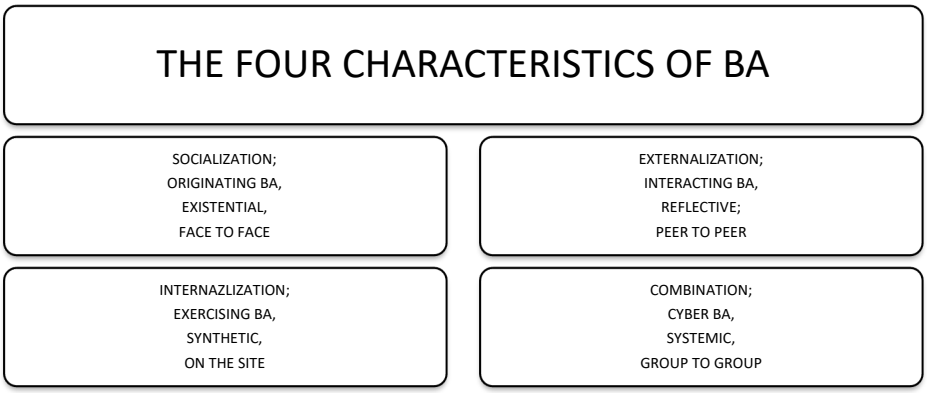

Figure 2: The four characteristics of BA and their relation with SECI (Nonaka & Konno 1998:46).

1.2. Knowledge Storage and Retrival

However, organizations are perceived as a place where the knowledge is created; it is stated that the knowledge is not effectively used or most of it is not included in a system that will be retrieved for use when it is needed (Argote et al., 1990; Darr et al., 1995). It should not be forgotten that organization memory is as important as creating knowledge and has great importance in the effective knowledge management process (Alavi & Leidner, 2001). According to Jennex and Offman (2003); Organizational memory, which is considered as abstract and concrete form, consists of the informal themes and information in the culture of an organization and individual's mind and structured concepts and information which is stored in computerized records and files. These two different forms (abstract and concrete) have two functions. Representation provides only the truth (or experience or expertise) about a particular circumstance or context. Interpretation facilitates change and understanding by offering points of reference, processes, protocols as a way of synthesizing previous knowledge to respond to current scenarios. Forms and Functions of Organizational Memory are presented at figure 3:

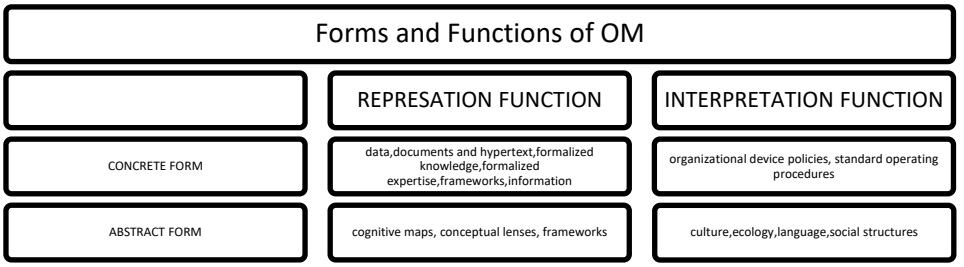

Figure 3: Forms and Functions of Organizational Memory (Jennex & Olfman, 2003:3)

Organizational memory is the collection of shared knowledge (Huber, Davenport, & King, 1998) which is essential in present to be required and re-called from the past for the efficiency of the organizational process (Stein & Zwass, 1995; Walsh & Ungson, 1991). Advanced technology for computer storage and sophisticated recovery techniques (multimedia databases, and data-base management systems) and groupware isthe facilitator of the Organizational Memory (Alavi & Leidner, 2001).

There is also another classification of the OM, internal, and external(Alavi & Denford, 2011:107). Internal memory is the knowledge resources that exist inside an organization's members or groups (Walsh & Ungson, 1991). Besides, external memory is an organizational knowledge created in coded form and included in official procedures and computer files. The development of external memoryconsists of some stages which are determining the knowledge content and its source, and developing the content and make it available when needed. Most of the advancements in IT technology are especially focus on developing the content and make it available when needed (Alavi & Denford, 2011).

1.3. Knowledge Transfer

A broader perspective knowledge transfer, which focuses on more in the dissemination of knowledge as opposed to knowledge sharing (King,2007), is defined as the transfer of knowledge from the source such that the receiver learns and uses it in any process (Ko et al.,2005:62).Three kinds of knowledge exchange modes are mentioned in the process of transferring information (Alavi & Denford, 2011). The exchange between the individuals and individuals; knowledge and repository; and repository-repository.

"The Network model" and "the knowledge stock model" are the two mod-els of IT application that enables knowledge transfer and sharing. The network

model promotes the exchange of knowledge between "person-to-person" through the creation of digital linkages between them. By comparison, the stock model focuses on the online transmission of codified knowledge between computer-supported repositories(Alavi & Denford, 2011).

1.4. The Knowledge Application

The knowledge application process is the effective usage of knowledge within the organization during the decision making and execution of processes contributing to the performance of the organization (Irma et al., 2014). According to Grant (1996), the interaction between the users who use the knowledge takes place in the form of two processes in which mostly classified as recommendations rather than a real exchange of knowledge. The first one, the direction, is the transfer of decision and instructions rather than knowledge transfer. Here, one of the sources of knowledge or individual directs the action of the other individual. Instead of a complete flow of information, there is a transfer of instructions or directions. The second type of interaction, Routines, contains information took place in rules and standards that guide behavior. Its development depends on "continuous repetition" and an effective interaction can be built with the effective use of IT systems (Grant, 1996; Sabherwal & Sabherwal, 2007).

There are two types of practices in knowledge management. Communities of practice can be explained as the process of sharing the knowledge, desire, and experience of individuals who come together within the framework of their own wishes and interests (Lave & Wenger, 1991; Smith & McKeen, 2002; Plaskoff, 2003). Wide participation, interest in some special fields, and willingness of its participants may have more productive results in the transfer and development of knowledge (Lado & Zhang, 1998; Cho, Chung, King, & Shunn, 2008). Supporting these groups and providing the necessary technical infrastructure within the organization is important in terms of the use and dissemination of knowledge (Alavi & Denford, 2011). The second type of practice in KM, the network of practice, refers to the interactions on a certain subject and application with open activity and self-organizing features connected digitally (Wasko & Faraj, 2005: 37). This is different from interactions in a meeting, group, or project team within the organization. It is a process where participants come together at their own wishes and that participation is connected with open access. In addition, the sharing of knowledge is more diversified and developed as opposed to within the organization thanks to different and independent participants (Wasko & Teigland, 2004).

As the needs of organizations diversify in the establishment of creative solutions and sustainable competition, the importance of the network increases (Nonaka & Takeuchi, 1995; Quinn et al., 1997; Nohria & Eccles, 1992) and especially the inter-networks, a network that transcends the limits of organization, offers open access to join and participate in the knowledge interaction (Carlsson, 2001:62).

Knowledge management systems support the knowledge management process through the integration of technologies (Fernandez & Sabherwal, 2015:64). Information management systems facilitate the creation, preservation, hierarchical organizing of knowledge within the organization, and exchange of appropriate knowledge for use in the process of accomplishment of the goal of the organization (Choiet.al., 2020:55). Figure 4 summarizes the Knowledge Management Systems and examples of applications:

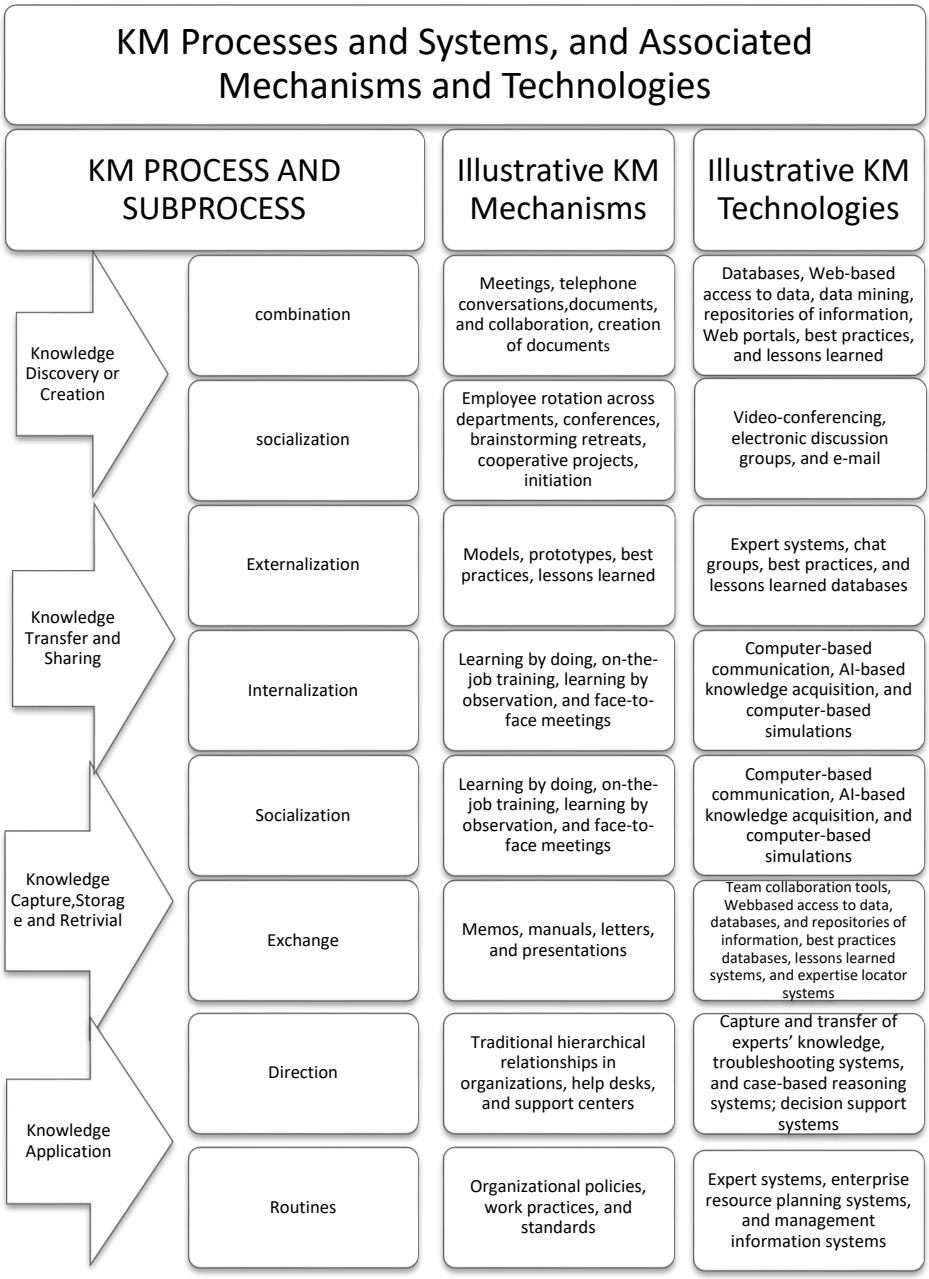

Figure 4: KM Processes and Systems, and Associated Mechanisms and Technologies (Irma et al, 2014:89)

As is seen in figure 4; technological advances contribute to all aspects of knowledge management. ICT and IT have a significant role in both corporate growth and effective KM (Kane and Alavi, 2007; Allameh and Zare, 2011; Alavi and Leidner, 2001). ICT and IT (internet, data warehouse, web) are effective to systematize the knowledge and enable effective knowledge management process ("creation, storage, transfer and sharing, application") and improving the community and network of practices. For Santoro et al., 2017; the effective knowledge management system is identified by powerful IT infrastructure (software, internet, extranet, etc.), collaborative technologies (shared database, document repository, etc.), and ICT adoptions. Especially ICT adoption enables sharing information with several stakeholders, cost reduction, and interaction with various business agents. In this context, web 4.0, which is evaluated to contribute much to the future of knowledge management and its efficiency, will be examined in detail.

2. THE FUTURE OF KNOWLEDGE MANAGEMENT: WEB 4.0

Internet and web are different concepts, although they are usually used as two interchangeable concepts. Internet is considered as a "network of networks where many computers are in communication with each other" and the "World Wide Web" is a way to access information and knowledge connected by hyperlinks in a form of text, graphics, video with the help of the internet (Nath, Dhar & Basishtha, 2014). Web which is being accelerated by technological developments enables various actors to interact in the distribution of information and knowledge. Especially the web has a great contribution to the communication between the customer and the organization about meeting the mutual demands and expectations in creative products and services of organization (Almeida, 2017).

The web has rapidly developed in the recent historical period. Web1.0 that is generally defined as an informational web, performs an interaction process in which a limited amount of web pages and contentsare included only at the reading mode for the user. The user obtains information using the internet and unfortunately, this system does not allow interaction with content (Nath, Dhar & Basishtha, 2014; Almeida, 2017). Web1.0 is slow and needs to be refreshed when the new information emerged, one-way communication, read-only, and static (Aghaei, Nematbakhsh & Khosravi Farsani, 2012:2).

Web 2.0 which emerged between 2000 and 2009 brought about the development in social networks and enables consumer engagement in the creation process of content. Websites like Wikipedia, Facebook, Youtube, Twitter, or Instagram and their availability with the help of mobile phones encourage the participant to produce content and increase hisparticipation (Almedia, 2017). Web 2.0 is called as "read-write web" and has a structure that allows writing and editing and allows the exchange of knowledge (Murugesan, 2007). Web 2.0 is designed for creating user-generated content, the contribution of each user, reuse the collective information, and enabling the collaborative knowledge construction and sharing with the help of crowdsourcing, creating big scale data, and open access to the users (Nath, Dhar & Basishtha 2014). Web 2.0 is developed to complement the missing side of Web 1.0. Web 2.0 enables consumers and developers to communicate and exchange knowledge. For the examples of some applications, Web 2.0 offers are wikis (allowing the users to edit and share knowledge) and social networking, Blogs (Blogger), Social Networks (Facebook, MySpace), Instant Messaging (Yahoo, GoogleTalk, AIM), Mashups, Auction Web site (eBay), Professional Networking (Linked-in,Plaxo) (Haughn, 2015; https: // jayathriwijayarathne . blogspot. Com).

Web 3.0, introduced as Semantic Web, is emerged between 2010 to 2019. Web 3.0 marks a period in which contents are customized in accordance with users' past searches, interests, and areas. Unlike traditional search services, Web 3.0 offers more intelligent access to knowledge (Almedia, 2017). It provides more intelligent services. In particular, information processing will enable the provision of a type of service that follows individual preferences in search processes. Semantic web, which can be summarized as the ontologically better-defined version of the knowledge currently used in the web, improves the quality of user access and interaction by establishing some logical and reasonable relationships (Nacer & Aissani, 2014).Web 3.0 allows the user's search process to become more effective by focusing on intention and contextual meaning. The semantic web (Web 3.0) has already started to be applied in business sectors such as logistics, tourism, collaborative work, finance, telecommunication, bioinformatics, business intelligence, geographic intelligent systems (Grimm & Abecker, 2007; Doğan et al.; 2018). Web 3.0 provides a communicative platform for the sharing of knowledge. It has a structure that facilitates communication and working with different devices (Rajiv & Lal, 2011; Xiaoting, & Li, 2010; Russell, 2006; Zhang & Yang, 2009). Comparison among the Web1.0 to web3.0 is shared in figure 5:

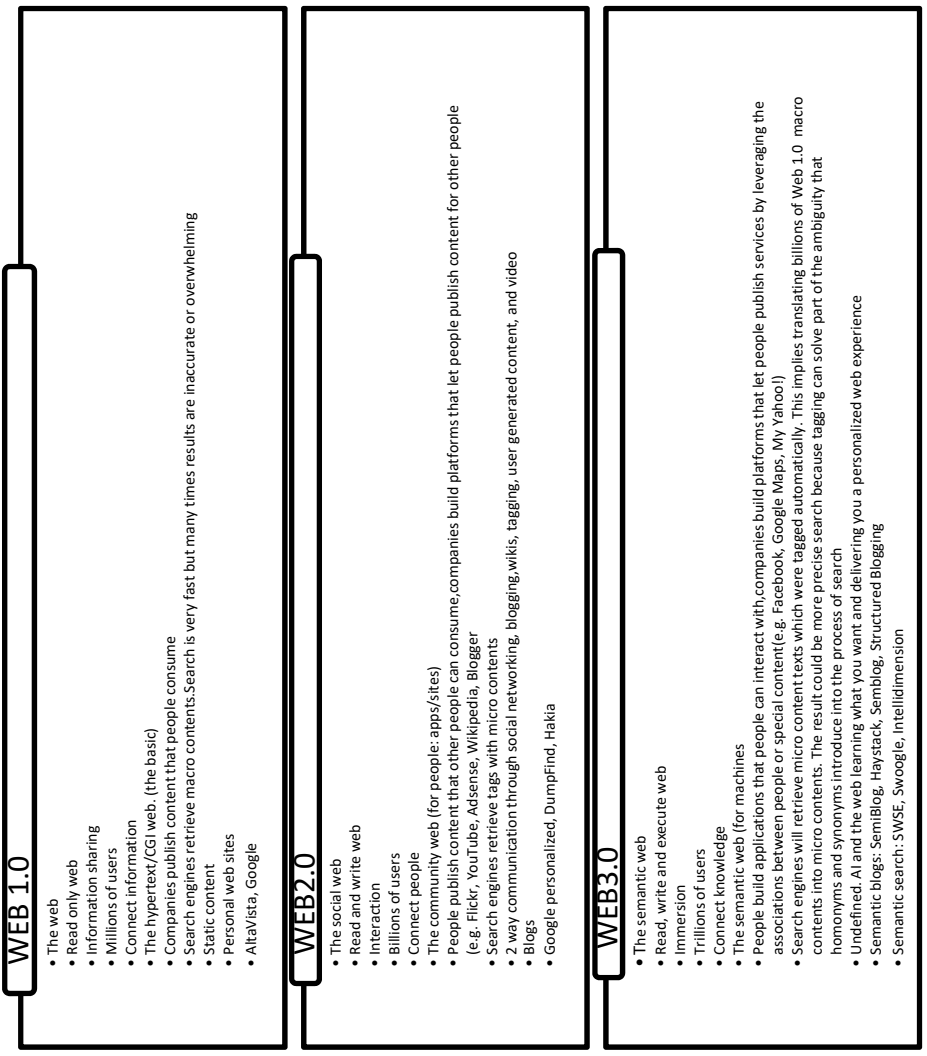

Figure 5: Comparison among the Web1.0 to web3.0
Source:It is adapted from (Noh,2015:790)

Web 4.0 is called “The Smart Web,” and “The Web of Things (a subset of “The Internet of Things') (White, 2015:87). Web 4.0 focuses on each user's universal 'web personality’' and the knowledge flow will be highly customized and user anonymity will disappear (Polanska, 2014:337). In addition to other developments, web 4.0 will be "a read-write-execution-concurrency web" with intelligent interactions which is known as a symbiotic web where human minds and machines can interact in symbiosis (Aghaei, Nematbakhsh, and Farsani, 2012:2). With the development of more complex and mind-controlled interfaces; the machine will be clever enough to read content and decideonWeb 4.0 (Hemnath, 2010). Web 4.0 will enable openness, clarity, and transparency by enabling mass participation, sharing information, and making certain decisions. It will serve as a kind of operating system and support the formation of highly intelligent interactions as an alternative to the human brain (Aghaei, Nematbakhsh & Farsani, 2012:8, Callari, 2009; Cake, 2008). Web 4.0 will have norm-autonomous agents which gives full freedom to act. This will enable it to impersonate both service supplier and user and has automatic reasoning (Korhonen & Karhu, 2011:9). Web 4.0 will be more intelligent and collaborative with the help of a wide agent-centered paradigm (Sołtysik & Piorunkiewicz, 2013; Urugesan, et.al., 2011). Web 4.0 has a natural language understanding so everyone will be able to execute their transactions in their own language. Machine to machine communication will take it further and present a new interface enable act without direct user intervention (Nath & Iswary, 2015)

Web4.0 offers a future beyond previous technological advancement (people to people or machine to machine) where everything can be integrated and enable knowledge sharing and interaction. Some advantages of Web4.0 are as follow: the newly developed patternwhich enables communication with the machine; makes internet usage easy; wide intelligent agents will help create, reuse, and retrieving the exact knowledge on exact time and form (Nath & Iswary, 2015).

For to Yang and Xia (2015), it is possible to access information and knowledge at any time and place with the help of various carriers thanks to the web 4.0 advanced symbiotic network and international operating system. Carriers, which are limited by PC and mobile now, will become more flexible as web4.0 allows everything to be connected. Web4.0 will establish a personalized interaction according to the needs and expectations of the individual who needs information. Thus, knowledge in the big data will be presented to the user in the best form and optimal time.

It would be appropriate to explain some of the concepts that serve the unique features of web4.0 in more detail. These concepts can be summarized as follows (Noh, 2015):

- Symbiotic Web

Web4.0 called a symbiotic web that enables the intelligent interaction between the human and machine with the help of some kind of highly advanced interface and some components. In the process of human and machine interaction, the machine can decide on any issue and take action according to the content that reached by itself (Hemnanth, 2010). With the highly intelligent interface and components, humans and machines are collaboratively interacting and create knowledge and corporate with each other (Pathel, 2013; Aghai et al, 2012)

- Web Os

WebOS, developed by Palm devices; Linux based and offers web operating systems. An operating system that works with the possibilities of the internet without the need for some restrictions and devices or desktop installations. The history of web browsing in this system, your photos files, remnants of web browsing, and big amounts of data can be stored (Casey et al., 2011) Today, it has started to become widespread in many devices especially in televisions and mobile applications.

- Massive and Intelligent Web

Web 4.0 is also characterized as some sort of "middleware working" between software and operating systems (Callari, 2009). Web 4.0 can operate like a "middleware functioning pipe" between the software and operating system that enable data flow between two applicants (Callari, 2009; https://azure.microsoft.com/en-us/overview/what-is- middleware/). Also with the help of advanced AI technology and ultra-smart agents, web 4.0 can decide instead of us. “Ultra-intelligent electronic agents” will enable improve the process of analyzing information and create new ideas and proper solutions for the current situations (Fowler & Rodd, 2013; Burrus, 2013).

Within the framework of all these described, comparison of the four-generation web is presented in figure 6:

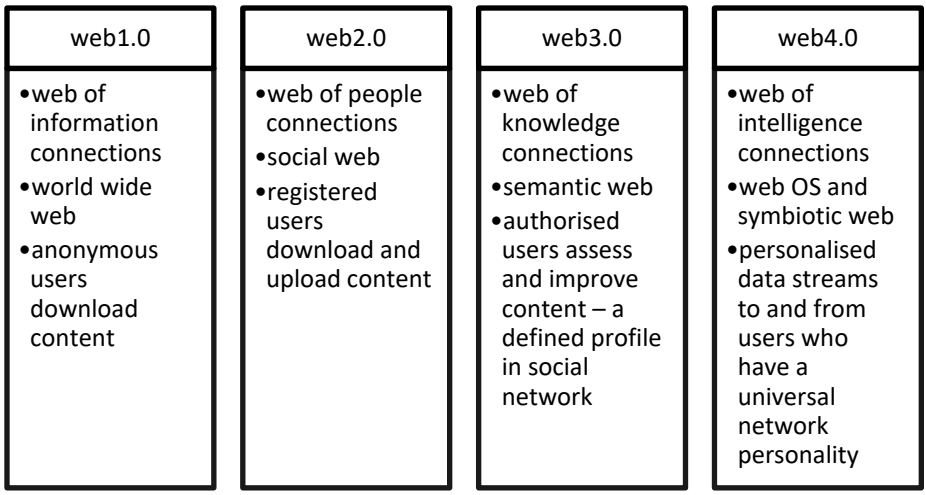

Figure 6: The comparison of the four-generation web (Polanska, 2014).

CONCLUSION

For Ansari (2019), knowledge management has expanded its definition in the new industrial period (Industry4.0) and information society: ***knowledge management is a "strategic and operational function implement exploration and exploitation processes".*** The KM is responsible for improving the process of knowledge creation and improving capacities and various parties (human, human-machine, machine-machine) learning and interaction process. Compared to the previous 3 web technologies; it is clear that web4.0 will bring a new paradigm shift to the concept of knowledge management process with its features of efficient utilization of knowledge, enriching learning and interaction styles in an intelligent platform, providing intelligent and highly personalized information services and creating a platform for interaction and knowledge creation (Yang & Xia, 2015).

One-way interaction, production, storage, and implementation of knowledge turns into a multiple, complex, and "intelligent" interaction with the possibility of webOS, massive, intelligent, and symbiotic web offered by web4.0. WebOS's open web-based operating system possibilities, the development of some decision-making systems such as symbiotic web and smart assistant, and more personalized interaction between humans and machines offered

by massive and intelligent web; indicate that the web 4.0 will evolve and provide service beyond expectations.

Within the scope of effective management of tacit and explicit knowledge, which is the main basis of the organizations' effectiveness and creative performances, the changes and new business styles offered by web 4.0 should be analyzed in detail. The interaction with the consumer is developing very fast in most sectors. For example, VR and web-based interactive applications, which are included in marketing, tourism, and municipal services, enrichedcustomer experiences. Airline Companies offer new solutions to consumers in making decisions about seat selection with augmented reality (http://www.nsocialtr.com).Applications are such offering you a virtual teacher in language learning (MondlyAR), assistant sharing information about the size and how it will look when buying furniture in your home(Housecraft), scanning the food and help you to decide worth buying or not(ROAR); just a beginning of this journey. Besides, according to the PWC Global report (2016); Drone use is developing in many areas such as logistics, infrastructure processes, insurance, agriculture, security, and mining. For example, in logistics, drone added a different dimension to service quality and customer experience. While this technological advancement surprises us, Web 4.0 applications are capable of processing knowledge to a more complex level, both mentally and intellectually in the true symbiosis of daily life. Web4.0's virtual assistance agents learn a lot about you (habits, decisions, tastes, etc.). Beyond today's version, such as Siri, Cortana, or Google Now; they can support you in several specific areas of decision making. Business and KM will become completely different in near future with the smart agents that can make a decision for us and systems that communicate with each other with the help of the Web of Things, Massive and Intelligent Web. In this context, organizations have responsibilities in terms of following the innovations offered by Web4.0 and integrating them into the structure of the organizations. It is considered that for sustainable competition; following new developments in the field of Knowledge Management and improving the current way of doing business according to the innovations offered by web 4.0 should be a special issue in the strategic choices of decision-makers and practitioners.

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CHAPTER 26

KNOWLEDGE MANAGEMENT AND CORPORATE GOVERNANCE WITHIN COVID-19 PERIOD

Erdal Şen
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INTRODUCTION

In the light of globalization, rapid technological change, and contemporary business; organizations are exposed to challenges caused by the uncertain and complex competitive environment (Jelenic, 2011; Akkaya & Tabak, 2020; Şen, 2020) in which knowledge management affords the processes and structures to create, capture, analyze, and act on information, which benefits organizations in managing the ongoing change in such environment (Lim & Klobas, 2000) and also results in maximum gains to a business by realizing the expertise of its members (Lee & Kelkar, 2011).

Robertson (1992), defined globalization as "the compression of the world and the intensification of consciousness of the world as a whole". Hall (1996) added that globalization is the process of making the world more interconnected through connecting cultures and communities in new continuum unions. In other words, it is the interaction and integration between individuals, organizations, and governance of various communities; a process that's an unavoidable phenomenon in human history that's been bringing the whole globe closer through information, knowledge, culture and exchange of products (Alexandru et al., 2007).

Globalization has been derived by advanced developments in information and communication technologies, by which developments in Information and Communication Technology (ICT), knowledge and information sharing, have mold globalization process that making the planet a “Global Village” (Dalglish, 2006).

Due to the globalization of work and the fast-changing nature; ICT is considered to be significant in supporting Knowledge Management (KM) (Alavi &

Leidner, 1999; Duffy, 2001; Hislop, 2002; Mphidi & Snyman, 2004), by which KM may be linked with the opportunities provided by ICT (Earl, 1994; Zack, 1998; Numata et al., 1997) that grant the ability to transfer and share significant knowledge without geographical barriers, and additionally, its various applications may be beneficial in generating and transferring a particular knowledge (Bolisani & Scarco, 1998).

On the other hand, ICT, in the globalization context can be seen as: "Global knowledge, access, participation and governance in the Information Age", (Alexandru et al., 2007), by which in the emerging "Information Revolution", it will be impractical to handle multiple individual affairs, particularly in trade and business without utilizing IT, and in fact, IT is considered to be the recent economic asset of the " Information Age" which will be increasingly referred to as " Information Society" (Jimba, 1998).

In this regard, in today's world, KM has become more important in accordance with a scope of variables including the growth of globalization, the speeding up in the pace of technological changes, or the necessity to share the best practices (Akhavan & Philsoophian, 2018; Akhavan et al., 2015; Akhavan et al., 2013; Donate & Guadamilla, 2011).

Thus, organizations need to be aware that expanding their capabilities to utilize knowledge effectively especially in fields like innovation is the key to remain competitive while it might be challenging for organizations to deal with the ever-emerging new technologies and evaluate their capabilities in knowledge management (Kabir, 2012). Companies can achieve the successful results by using dynamic capabilities that help them to stay competitive within the long term and sustainability for this reason (Akkaya & Üstgörül, 2020).

Due to globalization, rapid changes and effective transformations are being the results of digitalization. All variables including the processes, structures and systems, that data is considered as the primary resource has got very high potential for governance and currently related other applications. Also, COVID-19 pandemic made this "Digital Revolution" to be much more critical and increased the importance and effectiveness of all these variables.

1. DATA, INFORMATION AND KNOWLEDGE

Despite many attempts at the definition of "data" "information" and "knowledge", and the role of "ICT" "people" and "innovation" in the process of transforming data into knowledge; Liew (2007), emphasize that there still seems

to be lack of a clear and complete picture of what they are and how they are related.

Several researchers argue that; the data, information, and knowledge are interrelated in sequential order. This order is the one in which "data are the raw material for information, and information is the raw material for knowledge" (Zins, 2007).

According to Bolisani and Scarso (1999), the transmission of data can be done with the help of ICT's within a double transformation process that can transfer data from a sender to a receiver as from knowledge to information and, next, data, and/or from data to information and, finally, to knowledge.

This transformation requires several activities, in this regard, in 1997 Kamel et al. emphasize that initially data should be composed into messages according to the language that is applied for the communications, then this data is developed into information through interpretation, and subsequently, in order to become knowledge, information need to be linked with actual usage which both sender and receiver can utilize based on their own experience.

Moreover, Liew (2007) concludes that the fundamental to understand the relationship between data, information and knowledge is to know where the information reside. By which he argues that a book, for example, is considered to be data, information, and knowledge in various contextes, as it is a knowledge for an author, information for a potential leader, and data that is contained in a Storage Media called "Book".

2. KNOWLEDGE MANAGEMENT WITHIN PREVIOUS PANDEMICS PERIODS

Knowledge management technologies were effectively utilized during the Ebola Pandemic of 2001 in West Africa, by which these technologies were used in text messaging and were beneficial in the provisions of remote telemedicine in the quarantine phase and also in the execution of remote health training. Besides**,** in the outbreak of SARS (Severe Acute Respiratory Syndrome) in 2003, accelerated vaccine initiative was entirely created through the online knowledge sharing and collaboration within a British Columbian team of researchers and scientists who came up with the vaccine (Abijah, 2020).

One year after the SARS outbreak, National Health Command Center (NHCC) was established by the Taiwan Government which is considered to be a part of the Disaster Management Centre, that directs large-outbreak response

and carries out the communication among central, local, and regional authorities (Wang et al., 2020).

3. KNOWLEDGE MANAGEMENT WITHIN THE COVID-19 PERIOD

In December 2019, a type of Coronavirus, referred to as SARS-CoV-2, resulted in an epidemic in the city of Wuhan in China, that was then speedily spread to the world, was possibly the greatest pandemic since the Spanish Flu that arose at the beginning of the last century. At the end of March 2020, more than half of a million people around the globe were infected by COVID-19 and more than 26000 death cases were reported (Garcell, 2020).

At that point, as healthcare processes are driven by knowledge, KM and KM tools are gaining increased importance in the health sector (Bordoloi & Islam 2012), and the increased integration between technology, human and organization, is as well increasing the potential of health information systems (Yusof et al., 2008)

By which, knowledge management becomes an orderly and intentional integration of those concerned in handling a selected technology and the processes undergone within the initiative to utilize this technology, and thus the structures that govern such initiative which reinforces the utility of a given innovation (Dalkir, 2005).

In response to COVID-19, currently, this integration is leading to creation of comprehensive knowledge regarding the pandemic that's also shared among all concerned stakeholders, whether or not they were infected or potential to be infected, and the right knowledge applications are being utilized so as to realize a positive outcome (Abijah, 2020).

As crises are regularly associated with ambiguity of cause, effect, and resolution methods (Pearson & Clair, 1998), stakeholders who respond to an emergency need access to a wide range of real-time information and knowledge that also demand coordination (Jennex & Raman, 2009).

Thus, the importance of knowledge management must not be underestimated at this critical time of the outbreak (Kohn, 2020), and as KM has increased its technological advancements and its delivery of accurate and real-time information (Abijah, 2020), digitalization is emerging its way during the pandemic.

Recent SARS, H1N1 and Ebola outbreaks provide stakeholders with several lessons about the use of digital health for public health crises. Thus, these lessons should be transferred and utilized to improve the response against COVID-19 pandemic, and as well to increase the preparedness for the next possible pandemics (Alwashmi, 2020).

It was determined by Murphy and Jennex (2006), that developed KM technologies for searching, storing and retrieving knowledge will be utilized to integrate KM into decision making during an emergency.

In this regard, currently during COVID-19 crises, Virtual Reality (VR) is being utilized and considered to be a good communication and collaboration tool by which it offers the option of video calls, that connects people without the need of traveling and makes them feel as if they are together within the same space (Javaid et al., 2020), examples of this is the remote work that is one of the significant technologically advanced product of knowledge, which might help in decreasing the possibility and vulnerability to such an extremely contagious infection, by distancing the remote worker from the potential COVID-19 exposure (Abijah, 2020), besides the telemedicine technology that is associated with patient e-knowledge (Shahmoradi et al., 2017).

Cloud Computing is also enabling individuals to continue their digital lives and share knowledge, by using applications like Zoom Video Communications (Javaid et al., 2020).

Similarly, during the outbreak, in China, communication programs such as Weibo, TikTok, and WeChat, were extensively used for providing mental health education. Also, books on COVID-19 related knowledge such as control, prevention, and mental health education were published for the public with free access. Besides the online psychological counseling services that were freely offered on a 24/7 basis, Artificial Intelligence (AI) programs were utilized for psychological crises' interventions during the pandemic (Liu et al., 2020).

AI applications are also being used in different areas of COVID-19, such as in the development of drugs and vaccines, in the early detection and diagnosis of the infection, monitoring treatment, contact tracing, and projection of cases and mortality (Vaishya et al., 2020).

Responding to different stakeholders' expectations, priorities, and the various resource and skills within intense and time-pressured situations such as disasters leads to adversities in making accurate decisions. In this context, KM is suggested to be useful to capture and then re-use particular crises response knowledge that can support decision making (Dorasmy, 2013).

Therefore, the Internet of Things (IoT) is providing platforms that benefit Public Health agencies by granting access to data that helps in monitoring the pandemic. Such as the 'Worldometer' that is currently giving all stakeholders a real-time update on the actual number of individuals diagnosed with COVID-19 worldwide, daily new affected, critical condition, recovered, and death cases as well as the disease distribution among countries (Ting et al., 2020).

Equally important, Big Data is equipping stakeholders such as doctors, scientists, epidemiologists, and policymakers with the latest information from real-time collected data by COVID-19 trackers from sources worldwide that can be utilized in making better decisions regarding the virus (Javaid et al., 2020).

Although IT has been heavily utilized in the health sector such as in the Centers for Disease Control and Prevention (CDC) with the aim of preventing and controlling infectious diseases, IT was not developed enough to be used by general people. However, during the current period of COVID-19, personal-oriented and mobile phone-based information technologies are being developed, and commonly utilized in China that can help in decreasing the virus transmission and in preserving a normal social order. An example of that is the application of Health Status Code, that utilizes Big Data and mobile internet technologies, to assist governments in making related decisions (Pan, 2020).

Public education is considered to be a valuable strategy to empower the public either by social media, broadcast media, and other means (Lee et al., 2020). Thus, the World Health Organization has a leading role in sharing COVID-19 related knowledge by increasing public awareness on the outbreak through communicating symptoms, precautions, treatment, and preventive measures. For example, WHO has partnered with WhatsApp and Facebook in order to launch a dedicated messaging service that can reach more than 2 billion users, in multiple languages, to ensure keeping people safe from COVID-19. In addition to keeping individuals updated and informed, this messaging service, also provides real-time numbers and latest situation reports, that aid governments in the decision-making processes, and in protecting the health of their populations (WHO, 2020).

Additionally, United Nations has set up an accessible and interactive Regional Knowledge Hub to fight COVID-19, which acts as collective key UN knowledge that can be utilized into strategic actions to support all stakeholders in fighting the pandemic (UNDP, 2020).

Moreover, Nguyen et al. (2020) proposed an architecture that combines Blockchain and AI to support stakeholders during the fight against COVID-19.

They emphasize that through this architecture, raw data are initially collected from multiple sources such as clinical labs and social media, which subsequently develop into Big Data that then its privacy and security are protected by Blockchain which itself provides possible solutions for COVID-19 such as outbreak tracing. After that, data collected are analyzed by AI-based solutions that provide reliable predictions and analysis on the Big Data collected through outbreak estimation such as COVID-19 detection, vaccine/drug development, etc., and finally, all stakeholders such as governments and health care providers can benefit from the data initially collected.

4. CORPORATE GOVERNANCE DURING COVID-19 PERIOD

Corporate Governance is a comprehensive term that goes beyond achieving goals of organizations to also manage the relationship with stakeholders including the shareholders and the board of directors. It outlines the processes, customs, policies, laws, and institutions that coordinate the corporations and organizations and in the way, they act, carry out and control their activities (Khan, 2011).

The Corporate governance principles developed by the Organization of Economic Cooperation and Development (OECD) in 1999, and then revised in 2004, deal with six fundamental areas of corporate governance–ensuring the basis for an effective corporate governance framework; The Rights of Shareholders and Key Ownership Functions and Equitable Treatment of Shareholders; Institutional Investors, Stock Markets, and other Intermediaries; The Role of Stakeholders in Corporate Governance; Disclosure and Transparency; and the Responsibilities of the Board. However, the principles of Corporate governance developed by Capital Markets Board of Turkey (SPK), the Turkish Government, carry out four areas–Fairness; Transparency; Accountability; and Responsibility (Şen, 2017a; TKYD, 2014).

Since all crises are regularly associated with harm to organizational stakeholders, including employees, consumers, nearby communities, and the natural environment (Mitroff et al., 1996), thus crises necessarily highlight on corporate public, legal, social, economic and ethical responsibilities (Pauchant & Mitroff, 1992; Wood, 1991; Jones, 1980; Carroll, 1979; Preston & Post, 1975), and ad-

dress the issue on the way of governing corporations and the actions that should be taken by managers (Freeman, 1994).

Tedros Adhanom Ghebreyesus, Director-General of the World Health Organization (WHO) voices that "We're not just fighting an epidemic; we're fighting an infodemic" (UN, 2020).

To this point, during the COVID-19 crises, governments should significantly be transparent and provide clear and true information. By which, governments and figures within the media should make use of experts' knowledge like WHO and CDC, who attempt to prevent causing panic among the general public through delivering information sensibly and precisely (Mian & Khan, 2020).

Consequently, effective response against a pandemic associated with a novel infectious disease similar to COVID-19 relies on roles, responsibilities, and collective efforts such as developed response plans through specialized knowledge and expertise, solid governance, innovative ways of utilizing existing and future technologies, strong community participation (Shaw et al., 2020), as well as correct and timely information (Hua & Shaw, 2020).

CONCLUSION

In today's new world many challenges, such as rapid changes, transformations, "Information Revolution" and "Technological Revolution" are dominating several aspects of business and management, forcing organizations to adapt and respond accordingly to remain competitive. Thus, knowledge, data, information, technology, knowledge management and corporate governance are gaining growing importance and playing an important role as parts of the response and adaptation strategies implemented against such imposed challenges.

Data, information and knowledge are among the valuable assets of all institutions. Especially in the new paradigm that emerged after the "COVID-19", which the relevant assets stand out as intellectual capital elements. In this context, knowledge and governance are especially important in terms of strategy determination and implementation (Şen & Batı, 2020). Stakeholder management and the interaction with the individual may define good governance outcomes. According to the evaluation of this structure as in the "Perspective of Individual"; data, information and knowledge are the basic variables of the most

important powerful resources of stakeholder management and governance (Şen, 2017b). This structure along with all these variables can be explained within the concept of "Senism" in the new world that will occur because of digitalization and COVID-19.

When evaluated in terms of interaction with the individual; an organization managed based on good governance and successful knowledge management practices, may gain an important potential for competitive advantage and sustainability.

In today's businesses, where change takes place much faster, the business world in all areas and all kinds of sectors is transformed by “Post-Modern Revolution”; Industry 4.0 where the information system plays an important role in managing this transformation (Akkaya, 2019). Agility and contemporary knowledge can set up new initiatives or strategies different from other actors in the industry to respond to market changes and competition in time (Koçyiğit & Akkaya, 2020).

Crises and pandemics are considered to be serious challenges to both humanity and businesses. In this context, COVID-19 has become an unavoidable and exceptional phenomenon that is forcing the whole world, at the same period of time to alternate the traditional strategies with more agile and innovative ones, to sustain their ability to remain operating in such global widespread challenges. In other words, forcing the globe to shift to a “New Normal”.

Hence, COVID-19 is becoming a determinant for competitive advantage on a global level, which addresses the issue of how the whole world will respond to and manage such a pandemic effectively by utilizing what is already known in both a contemporary way and a timely manner.

As the COVID-19 period has not ended and it’s not determined till when it will remain ongoing, more conclusions and comprehensively new and different perspectives regarding business and management aspects will be generated, particularly according to their effectiveness during the fight against both the virus and its consequent challenges.

However, during the current and past few months of the COVID-19 crises, it is apparent that technological advancements such as ICTs, and Industry 4.0 have been gaining increased importance, acceptance, and utilization whether on the individual or organizational levels. This can be seen in the utilization of

technologies in knowledge management strategies, the innovative ways of fighting against the virus, and the governance of corporations.

"KM" "Technology" "Corporate Governance" are interrelated and among the valuable assets of all institutions, by which, until the current period of time, those three variables have created a collaborated effort to respond to the Coronavirus that is continuing to threaten the humanity and businesses worldwide.

In this regard, this established discipline should not be underestimated, particularly during COVID-19 period, in order to ensure that the right data, information, knowledge, advanced technologies are being utilized at an optimal level, along with governing corporations to combat the pandemic and increase the chances of organizations continuity.

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