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Knowledge and knowledge management in organization: identifying the critical role of IT in the knowledge management process

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ABSTRACT

Knowledge constitutes a wide and complex matter which has provided a definition for the epistemological dispute in the philosophy of the West since the times of the classical Greek era. Nonetheless, in the recent years, great interest has occurred in approaching knowledge as an important organizational resource. The increased interest in organizational knowledge and knowledge management originates from the conversion into the area of knowledge economy, in which it is perceived as the primary source of the creation of value and sustainable competitive advantage. Knowledge Management (KM) constitutes an integral part of the business world in contemporary times. This can be seen at a time of analyzing the modern literature of business, management, technology as well as organization. This worker views and interprets KM literature in enterprises. The main aim of the research is to summarize literature on the subject of Knowledge Management (KM) and to get the sense of the primary concepts/common terms, conventional definitions in the area of knowledge and Knowledge Management (KM).This work constitutes a profound overview on the process of the management of organizational knowledge with great focus put on the possible part of IT in the different phases of the process of knowledge management. The author chose this subject as not much research has been carried out to analyze this side of KM.

Keywords: Knowledge, Knowledge Management (KM), Knowledge Management Systems (KMS), Knowledge Management process, Information technology

1. INTRODUCTION

We find ourselves in a time of the economy of knowledge in which information has a significant part. In order to obtain information, the business makes use of various kinds of information systems. Information can be found in every place and we decide on how to gather it and applying it for the benefit of our business. Information has to be purified and warehoused into a database in other words called a knowledge base. Success of an enterprise is dependant on how it is approaching all the information. Our world is evolving quickly which is necessary for the success of companies in the promptly changing environment of the knowledge arena. Success in the contemporary global, economy which is based on wide connection originates from the quick, effective division of information to make it is possible to make decisions that are successful in a timely manner.

A perspective of companies based on knowledge has recently occurred in the literature of strategic management [1-3]. Such a perspective is based on a theory basing on resources of a company primarily discussed by E. T. Penrose [4] and broadened by others [5-7]. As per E. T. Penrose, it is not really about renewable resources (for example capital and facilities) as such creating the company's competitive advantage, it is the services created through these resources. What is more, the resource-based perception claims that distinctions in factors which are external, like for example conditions of the industry, do not clarify the differences in profit-earning capacity in the long run [8]. To add to effective advantage which is competitive, resources have to be beneficial, limited, and poorly imitable [5]. Inimitability originates from a few possible features of a resource, among all social complexity (like the culture of an organization), occasional ambiguity and historical circumstances [5]. D. Miller as well as J. Shamsie [9] thinks of resources as based on property or knowledge. Legally guarded by a certain company, assets basing on property may give competitive benefits to a moment when the market transforms, in a way that the asset will not be of value any longer. Assets based on knowledge, on the contrary, are guarded from being copied illegally, as they are usually subtle or hard to understand or duplicate by external observers.

The knowledge-based approach theorizes that services provided by renewable resources rely on the way in which they are fused and handles, which consecutively is one of the functions of the company's know-how (that is knowledge). It is placed in and transferred via numerous entities which are among all the culture and identity of an organization, patterns, regulations, systems, and paperwork, also actual workers [10-12]. As resources basing on knowledge are often hard to duplicate and socially complicated, the knowledge-based expansion of the approach based on resource stewards companies assumes that such knowledge assets can create sustainable competitive dominance in the long term. Nonetheless, it is to a lesser extent about knowledge which is present at anytime as such, than the company's capability to make effective use (that is manipulate, warehouse, and administer) the present knowledge and construct new knowledge, which shapes the base for obtaining competitive advantage thanks to assets established on knowledge. It is in this place where IT plays a significant part in making the knowledge-based perception of the company effective. Modern IT (for example the Internet, intra- and extranets, searching engines, data warehouses, techniques of data mining) maybe applied to arrange, enlarge, and expedite intra- and inter-company KM on a large scale.

KM is a crucial conception in the contemporary business world. It is a strongly developing field which contributes much to different kinds of multinational companies. It is

obvious from literature of different disciplines like for example contemporary business and management. At first glance it seems like KM had emerged the end of the 90s.Some people perceive it as a passing business trend or craze [12], however a more detailed analysis of the term exposes significant analysis and research performed in the field, and a lot of the most successful companies, businesses, and corporations in the world are devoting significant resources in this activity [13]. L. Prussak [14] assessed that around80% of 1000 businesses all over the world are undertaking knowledge projects. Presence in Knowledge Management (KM) conferences, workshops and so on is growing and there have been a lot of books and papers on the subject of knowledge and knowledge management for the last decades. Knowledge Management started to obtain shape and appear in sight in the agendas of seminars and conferences at the start of the 1990s, however it is significant to notice that the discussion had started a lot earlier [15,16].

P. Drukes [17] firstly invented the notion knowledge worker. Organizations may draw from previous experiences warehoused in systems of corporate memory [18]. D. Barton-Leonard [19] provided proof of a chappual steel situation as a KM story of success. I. Nonaka as well as H. Takenchi [20] learned about the way knowledge was created, made use of, and broadcasted in organizations and how it contributed to the dispersion of innovation. A lot of people, seeing the significance of evaluating intellectual assets, noticed the increasing significance of organizational knowledge being a benefit [21-23]. Numerous practices arranged in organizations maybe widely shaped as supplying the knowledge plan. These knowledge projects vary from establishing an intranet, making use of Lotus Notes or a different team-oriented software, forming personal development agendas, coaching, or making information available. More and more often, organizations come up with particular initiatives or programs with special attention put on knowledge. Knowledge teams and leaders emerge in organizations operating globally.Table1 depicts a few of significant research results in the area of Knowledge Management, considered currently as references for consecutive research.

Table 1. Significant research contributions to KM

KM Subjects	Generation	Authors
Explicit, Tacit and Implicit knowledge	I	Polyani [24], Nonaka and Takeuchi [25]
KM basics	I	Wiig[26], Liebowitz and Beckman [27]
KM frameworks	II	Holsapple and Joshi [28], Rubenstein et al. [29]
KM undertakings	II	Davenport et al. [30]
KM &Artificial Intelligence	II	Fowler [31], Liebowitz, [32]
KM &supporting decisions	III	Courtney[33], Bolloju et al. [34]

KM questionnaires	III	Liao [35], Kakabadse et al. [36], Singh et.al. [37] Anantatmula and Kanungo [38], Wong and Aspinwall [39]
KM software tools	III	Tyndale [40]
KM in small and medium enterprises	III	McAdam and Reid [41], Wong and Aspinwall [42]
KM in higher levels of education	III	Rowley [43], Metaxiotis and Psarras [44]
KM standardizing	III	Weber et al.[45]

The work is arranged in to three basic parts. The first one constitutes a summary of management papers in the area of knowledge, KM, and its classification (systems as well as processes). The aim of this part is to create a review of the available literature on KM. The next part describes the KM process with special attention put on identifying the possible role of IT in different phases of the KM process. The last part constitutes a sum up and conclusion.
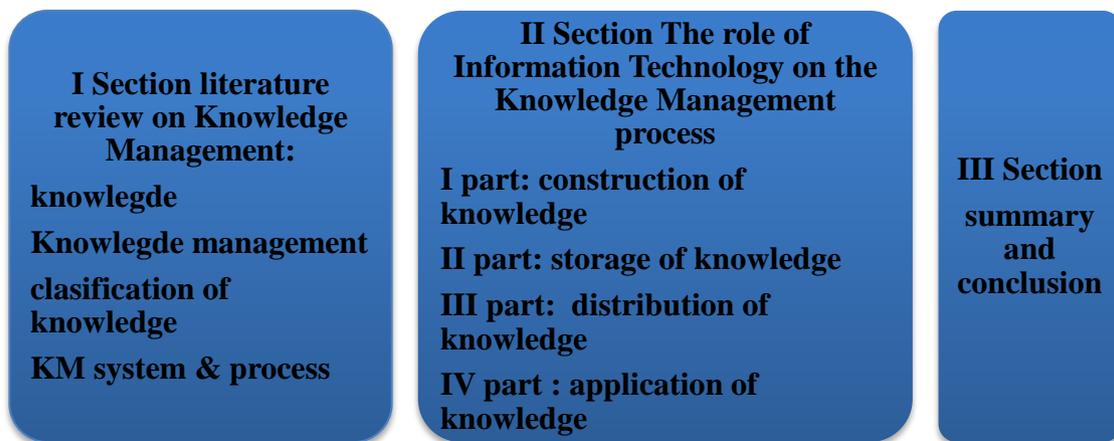
I Section literature review on Knowledge Management:

knowlegde

Knowlegde management

clasification of knowledge

KM system & process

II Section The role of Information Technology on the Knowledge Management process

I part: construction of knowledge

II part: storage of knowledge

III part: distribution of knowledge

IV part : application of knowledge

III Section

summary and conclusion

Figure 1. Work structure – Three crucial sections

2. KNOWLEDGE AND KM: REVIEW OF LITERATURE

From a company's approach based on knowledge, a company maybe perceived as a system of knowledge committed in the creation of knowledge, its storage, transfer, and usage. This approach his in line with organizational cognition being defined as the ability to collect, warehouse, transform, and use knowledge. It should be noted in this explanation that cognition is withdrawn from physical as well as biological systems where these competences should be placed [46]. That is why cognition and knowledge maybe transformed and analyzed at a level of an individual, a group and an organization. The company's knowledge-based approach leads to the consecutive significant question: how can we define knowledge and the

way it can influence an organization to perform its effective management? To understand KM, it is crucial to first analyze what the very notion of knowledge is.

2. 1. Understaning the meaning of knowledege

A discussion on knowledge has been brought to life once again in the past decade, beginning with scholars of economics [47-49], theory of organizations [50] as well as philosophy [51]. These approaches covered the features of knowledge and its partite enterprise has resulted in a lively discussion between scholars and practitioners of different areas during the previous ten years. Knowledge obtained significant appraisal in economic analysis by A. Marshall [49] who stated that capital is made of, mostly, knowledge as well as organization and that the first one gives the most power in manufacturing organizations more and more centered around management. In year 1959, P. Drucker [52] invented the notion knowledge worker and further on stated that, in a society of knowledge, the primary economic resource is not capital, natural resources or even labor anymore – he argued that it is and will continue to be knowledge. The capability to make use of intellectual skills and form new solutions for the needs of people now has a main role in the international info-economy. The knowledge and capabilities of humans have always formed the basis of the shaping of values, however this truism is now more clear in the times of information in which the intellective element of labor is more and more significant [53]. For many years, companies have paid lip service to KM, being focused more on renewable and physical assets. The knowledge element of the value-patterns had been concealed by leaning towards perceiving labor as essentially a physical action [53].

A part of the authors, especially in Information technology literature, discuss the matter of characterizing knowledge by making a differentiation among knowledge, information, as well as data. The words knowledge as well as information can be seen as commonly used mutually in literature and in practice, however a differentiation is helpful. Figure 1showsthe pattern of knowledge transfer in data-information-knowledge [55].

Figure 2. Chain of knowledge flow data- information-knowledge [55].

The data is a representation of remarks or facts which are out of context that are, consequently, not precisely meaningful [54]. Information is a result of putting data in the proximity of content which has meaning, usually as a message [54].As an example, D. M. Vance speaks of information being data which is interpreted into a framework which has meaning, on the other hand knowledge is information which became validated and assumed to be true. Information is transferred to knowledge when it is transformed in individuals' minds,

and knowledge turns into information when it is expressed and shown as graphics, words, different symbolic forms [55]. Knowledge, as a genuine belief, is what people believe in and appreciate based on meaningful and grouped collection of information via experience, communicating or interfering [56-58]. In order to get information which is not needed by anyone and to evaluate what information is worth, a person has to, or needs to, achieve both knowledge in practice and in theory - this involves of the use of discipline or action [59]. Hence, the implementation of knowledge maybe performed as information made productive.

Instead of characterizing knowledge relating to information or data, knowledge may be defined as (1) a condition of the mind, (2) a thing, (3) a process, (4) a case of accessing information, or (5) a possibility. Schubert (1998) makes a suggestion that knowledge is a condition or fact of being aware of something, which is a condition of having knowledge achieved via experience or learning; the total or scope of whatever has been seen, exposed, or acquired. From this point of view, knowledge is a cognitive condition or condition of the mind. R. McQueen (1998) has a similar perception, stating that knowledge means having understanding [60]. As per his point of view, it is impossible to mechanize knowledge. Therefore, the part played by IT in the management of knowledge is providing possibilities for seeking and getting back information so enable individuals to extend their individual knowledge and use this for the needs of the organization.

A few authors have acquired this perception of knowledge being a thing a process [60-62]. M. Zack makes a suggestion that knowledge may be perceived as either an object to be warehoused and managed or a process of at the same time understanding and acting-using competence [61]. Another point of view on knowledge is seeing it as a situation of having access to knowledge [60]. As per this approach, organizational knowledge has to be evolved and arranged to make it easier to reach and retrieve content. The following view can be perceived as expanding the approach towards knowledge being an object, with significant focus on knowledge being accessible. S. A. Carlsson et al., contribute with a different perception, where knowledge is a possibility [62]. As per this view, knowledge maybe perceived as a possibility having potential towards impacting further actions. As per S. A. Carlsson et al., the various perceptions on knowledge result in varying approaches to knowledge management [62]. The perception on knowledge being an object or access to information gives a suggestion of a view on KM which focuses around constructing and handling knowledge stocks. Perceiving knowledge as being a process suggests paying particular attention on the flow of knowledge as well as processes of its formation, sharing with others, and distributing it. The perception on knowledge being a possibility gives the suggestion of a KM perspective focused around constructing basic competencies, and knowing strategic benefits of know-how, as well as forming intellectual capital.

As per U. Schultz, the perception on knowledge relates to the researcher's methodological attitude with functionalists acquiring an approach towards knowledge being an object, interpretivists perceiving knowledge being a kind of process, next criticalists perceiving knowledge to be a cognitive condition and ability [63]. The main indication of these different knowledge concepts is that every point of view offers another strategy for knowledge management and a varying approach towards the role played by systems in supporting KM. Table 1 makes a summary of the explanations of knowledge as well as conclusions coming from different definitions for organizational KM.

Table 2. Definitions of knowledge and Implications

Knowledge Definition	KM implications	Implications for Knowledge Management Systems (KMS)
Knowledge Data &Information: Data artifacts, strict numbers Information is transformed data Knowledge is personalized information	KM is centered around exposing individuals to possibly useful information and making the assimilation of information easier	KMS will not seem significantly different from the current IS, but will be Expanded toward aiding in user assimilation of information
Condition of Mind: Knowledge is the condition when one knows and understands	KM centers around exposing individuals to possibly useful information and making assimilation of information easier	Impossible to mechanize the condition of knowledge. IT should provide sources of knowledge, and not Knowledge alone.
Object: Knowledge are objects available for storage and handling	The crucial KM matter is constructing and handling knowledge stocks	The crucial part of IT constitutes of collecting, codifying, and warehousing knowledge
Process: Knowledge means using expertise	KM centers around knowledge flows and the process of forming, sharing with others, and distributing knowledge	The crucial part of IT to provide a connection between sources of knowledge to forma more expanded breadth and depth of knowledge flows
Access to Information: Knowledge is a state of having access to information	KM centers around organized access to and retrieval of knowledge	The crucial part of IT to make available effective search and retrieval mechanisms to track Appropriate information
Capability: Knowledge is the possibility of influencing action	KM centers around constructing core competencies and understanding know-how crucial for strategy	The crucial part of IT is to increase intellectual capital through supporting growth of individual and organizational capability

Source [55,61-63].

Two main points occur as a result of this discussion: (1) as knowledge tailored to a person, to make individual or group knowledge useful for other people, it has to be revealed and communicated in a way which would make it possible to interpret by the recipients. (2) Accumulations of information do not have much value; only information being actively handled by individuals via reflection, enlightenment or education may turn out to be of use. A significant analogy of the mentioned two points from the perspective of information systems growth and application, as J. Brown as well as P. Duguid state knowledge can be "tricky" (difficult to transfer) and therefore it might not really disperse in the company due to the fact that technology to communicate and reach knowledge is made possible to access [64]. Knowledge classifications are discussed in the following section.

2. 2. Knowledege classification

As per Nonaka and Takeuichi [1], knowledge may be differentiated into two kinds, knowledge which is explicit as well as tacit. Tacit knowledge is achieved through an individual process internally and warehoused in a human experience or other aspects. Tacit knowledge is composed of cognitive as well as technical components [65]. The cognitive component relates to mental models of an individual which are composed of mental maps, convictions, and points of view. The technical part is made up of specific know-how, techniques and abilities which can be applied to a particular context. Definitive knowledge can be warehoused mechanically or technologically, such as in text books or information systems as well as documentation. Explicit knowledge or in other words 'codified' knowledge relating to one which is possible to be transmitted in a systemic language — like words, numbers, and models [24]. It is easily communicated orally and in writing or via an electronic form. It may also be handled and warehouse with ease in different databases as well as repositories. Explicit knowledge is fixed in previous occurrences or things and is targeted at theory free of its context [1]. Table 3 is a reference for the features of tacit as well as explicit knowledge [66] and Table 4 can be viewed for types of generic knowledge [67].

What is more, a tacit-explicit knowledge perception, on a different dimension (spoken of as the ontological aspects) [66] has distinguished two different kinds of knowledge: individual and social. The first one is formed via and exists within the individual, where as social knowledge is formed through and is included in group actions and interactions between individuals forming and operating as a group. An analogous distinction of knowledge is made by Spender's [2] matrix of the kinds of knowledge. In his matrix presentation, knowledge is distinguished along tacit-explicit as well as individual-social dimensions, which results in four knowledge kinds. Conscious knowledge relates to an individual's explicit knowledge (for example being aware of facts or syntax being part of a programming language). Automatic knowledge relates to tacit knowledge of a person and subconscious skills (for example knowing how to ride a bike). Objectified knowledge constitutes explicit as well as codified knowledge being part of a social system (for example company's operating manuals and formal regulations and practices). Collective knowledge is made of tacit knowledge maintained in a social system and it is included in the processes and interactions (for example organizational culture).

A different knowledge break down which is not based on tacit-explicit nomenclature is related to knowledge as declarative, procedural, causal, conditional, and relational, meaning respectively knowing about, how, why and when. [68].

Table 3. Tacit and explicit knowledge - main features

TACIT KNOWLEDGE	EXPLICIT KNOWLEDGE
Inexpressible in a codifiable form	Codifiable
Subjective	Objective
Personal	Not Presonal
Dependent from context	Independent from context
Sharing is difficult	Sharing is easy

Source [66].

Table 4. Kinds of generic knowledge

Knowledge	INDIVIDUAL	SOCIAL
Tacit	Conscious	Objectified
Explicit	Objectified	Objectified

Source [67].

The distinction of knowledge and its definitions are presented in Table 5. The usage of creating a classification of knowledge is present in the significance of evaluating the organizational knowledge position in relation to the competition and classifying the present intellectual resources [68]. Distinctions of this kind come in useful for the purpose of knowledge management when a knowledge strategy is created [68] and in the assessment of the part played by IT in making KM easier. In the area of information systems (IS), it is common to initially form systems centered around codified knowledge (i.e., explicit organizational knowledge). Systems of management reporting, decision support, as well as executive support systems are all centered around the collection as well as dissemination of this kind of knowledge.

Table 5. Classification and definitions of knowledge

Types of Knowledge	Definitions
Tacit	Knowledge is included in behaviours, experience, and engagement in a particular context

Cognitive Tacit: Mental Models Technical Tacit	Mental Models Know-how possible to use for specific work
Explicit	Articulated, generalized knowledge
Individual	Formed by the individual
Social	Formed by collective group actions
Conscious	An individual's explicit knowledge
Automatic	Tacit, subconscious knowledge of an individual
Objectified	Codified knowledge of a social system
Collective	Tacit knowledge of a social system
Declarative	Know-about
Procedural	Know-how
Causal	Know-why
Conditional	Know-when
Relational	Know-with
Pragmatic	Knowledge which is useful for an organization

Source [1,68].

Understanding the term of knowledge and its classifications is crucial as theoretical developments in this area are influenced by the classification with in different kinds of knowledge. What is more, knowledge differentiations analyzed in this paper may provide information on the creation of KM systems through bringing focus on the necessity for supporting various kinds of knowledge and the movement and flow within these various kinds.

2. 3. Knowledge management in Organizations

When it comes to different resources, the necessity for knowledge resource management resulted in an increase in the area of KM (KM). Literature is full with many explanations of KM. The chosen definitions are presented in the next section.

The community is the biggest differentiator between KM and information management. The essence of KM can be determined as being aware individually of what knowledge has been acquired collectively and making use of it, knowing what we are aware of on an individual level and using it, and being aware of what is not known and educating ourselves [70].

KM is about the support of innovation, the creation of ideas and exploring the organizational power of thought. KM also consists of getting perception and experience in order for them to be available and ready for use whenever, wherever and by whomever [71].

KM is a conscious and methodical arrangement of the employees, technology, procedural schemes, and structure of an organization to contribute with value via reuse as well as innovation. This can be obtained via the promotion of forming, making available and using knowledge and via of the provision of valuable lessons acquired and best practices for the corporation to memorize to care for continued organizational education [72].

Supporting and making easier the processes for the creation, maintaining, making available, and renewal organizational knowledge to develop economic wealth, form value, or increase performance [73].

One of the easiest and complete explanation is an attentive plan of obtaining the proper knowledge to the proper employees at the proper timing and assisting people in sharing and placing information in the center of action in manners which aim to upgrade organizational efficiency [74]. Organizations have always tried to administer knowledge via documentation or archiving operations, however these actions were mostly disintegrated and had a tendency not to be administered under an organization-wide Knowledge Management scheme [75]. Knowledge management is different from such operations in being an attentive and efficient to the acquisition, retention and movement of knowledge [76]. Conceptions of the correct knowledge, proper people and the proper time shows the necessity for determining the needed knowledge within the big amount of information which companies form each day [77], who is in possession of it, and at what time and in what way it should be passed on.

The explanation above makes a crucial association between Knowledge Management and corporate strategy, a connection that provides that Knowledge Management is set towards the improvement of corporate performance and causing the company's management and workers to be conscious and in line with its Knowledge Management objectives [78,79]. Knowledge Management makes a contribution in the creation of such an agenda as a result of its crucial role in the decision-making process, a managerial procedure which his somewhat knowledge-intensive [80]. R. Nicolas described three stages of decision-making in complicated situations - intelligence, idea and choice- they all rely on the KM processes, specifically knowledge acquisition, sharing and utilization [80].

The initial aims of KM as described in a few companies are as follows: more accurate decision-making (86%), quicker response to main problems (67%), expanding profitability (53%), improving capacity (67%), forming new/more business opportunities (58%), cost reduction (70%), sharing best practice (60%), boosting market share (42%), better share price (23%), and increased attraction/retention of employees(42%). [81,82].

As per Davenport and Prusak [83], the majority of KM projects have one of the following goals: (1) making knowledge distinguishable and presenting the part played by knowledge in a company, in principal via maps or hypertext tools;(2) in order to establish a knowledge-intensive culture via encouraging and promoting behaviors like sharing knowledge (in contrast to hoarding) and proactively searching and offering knowledge; (3) to create an infrastructure of knowledge --not only technically, but also forming a network of connections within people who are given a certain area, time, means, and inspiration to cooperate.

2. 3. 1. Knowledge management (systems and processes)

Numerous studies have discussed the issue of the KM processes; they distinguished KM into a few processes. T. Davenport, S. Jarvenpaa as well as M. Beers (1996) describe four main processes: seeking for existing knowledge, forming new knowledge, organizing the knowledge created, externally applying the knowledge which already exists [84]. KPMG describes even processes which are part of KM: creation, use in the range of the enterprise (e.g. for problem solving), use externally of the enterprise (e.g., sales of intellectual property), sharing as well as dissemination, encapsulation (collecting and keeping track of experience as well as know-how), sourcing (spotting a person or record which add up to the needed knowledge), and education [85].

D. Teece describes eight primary processes: creating new knowledge, reaching valuable knowledge via external sources, applying accessible knowledge in the process of making decisions, applying knowledge in processes, objects, or services, representing knowledge in paperwork, databases and software, making knowledge growth easier through culture as well as incentives, relocating existing knowledge in different components of the organization, as well as assessing what the knowledge assets and/or effect of KM are worth [86]. The Cranfield University research presents ten processes: shaping new knowledge, seeking knowledge internally, obtaining knowledge externally, being in hold of knowledge, processing knowledge, applying knowledge one again, using knowledge to obtain a benefit, making knowledge up to date, internal sharing of knowledge, making knowledge available externally of the organization [87]. The following perceptions of KM have the process perspective in common and show a tendency of taking into account four crucial processes into which four more detailed one scan be included. They are made up of the process of forming knowledge (also its handling and update), the process of warehousing and gaining back knowledge, process of transferring knowledge, and using it.

The Knowledge Management System is a technical-organizational system for management which is formed to provide support the realization of Knowledge Management in the area of an organization [88]. Literature has indicated three views on designing a KMS additionally to a hybrid perspective.

The codification (*hard*) approach puts attention on the collection and warehousing of knowledge in electronic means, enabling retrieving it back and, as a result of its character, has a tendency to undertake EK [89]. This perception undertakes a scheme of people-to-documents, searching for ways to once again apply knowledge via investment in forming durable databases and giving awards employees contributing to an Information Technology-based KMS [90].

On the other hand, personalization draws attention to knowledge transfer via direct social interaction actions like for example groups of practice and discussion [90]. This perspective uses a direct personal strategy targeted at sharing knowledge and caring for innovation, and thus is perceived as the more convenient for spreading TK [89]. This point of view, average investment is undertaken in Information Technology because its role is solely to connect, and further investment is undertaken in acquiring specialized human capital and awarding employees due to knowledge sharing [90].

Taking into account that not every type of knowledge may become articulated, and without aiming at neglecting valuable tacit knowledge, the KMS for seeking human capital perspective does not make attempts to collect knowledge, instead has a target to find the location of the knowledge in the scope of the enterprise [91]. Such a perspective at tempts to

form (Yellow Knowledge Pages) to indicate towards those who are looking for particular knowledge in the direction of those in the organization which have it, and to make sure they are within reach for advice or knowledge sharing [92]. In order to track down where knowledge is placed in the organization more precisely, some research has analyzed the knowledge flow and the parts played by various members in the acquisition and sharing of knowledge. They distinguished workers into external communication leaders collecting external knowledge and applying it within the organization, internal communication leaders which diffuse knowledge in the area of the organization, and gatekeepers having the uncommon skill to perform both of these [93].

Taking into account the mentioned perspectives and processes, literature shows a myriad of various KMS agendas that make an attempt to provide an organized solution for knowledge organization. It is in general perceived, that the most part of the suggested KMS agendas have a tendency to be 'prescriptive' via the provision of the frame work of Knowledge Management procedures the companies are in need of, however without at all times giving detail specifically on the way they would be applied [94]. In spite of the fact that a part of people argue that a firm has to make a choice between a codifying and personalizing strategy in the development of its KMS [90], other persons [95] share the belief that both of them may be undertaken simultaneously [96]. Therefore, a more up to date fashion would be to create a holistic KMS which would tackle all Knowledge Management processes and use hybridization of codification as well as personalization [97].

Apart from suggesting various approaches to KMS, many different discrepancies maybe seen when reviewing research in the currently available KMS literature. Authors do not find agreement on the processes which ought to be taken into account in a KMS and their flow, and in the applied terminology. Further on, a universally approved KMS framework is still nonexistent [99].In order to reach consensus on primary KMS regulations, recent attempts have been made to elaborate Knowledge Management norms, like the '*European Guide to good Practice in KM'* issued by the European Committee for Standardization [99].

3. THE PART PLAYED BY IT IN THE KNOWLEDGE MANAGEMENT PROCESS IN ORGANIZATION

This part is the author's analysis and discussion on the possible part played by information technologies in organizational KM Figure 3. Taking into account enterprises as knowledge systems are made up of four collections of knowledge processes: (1) construction, (2) warehousing and retrieval, (3) distribution, and (4) use [100,101]. The successive mechanisms of organizational KM are discussed in the following section.
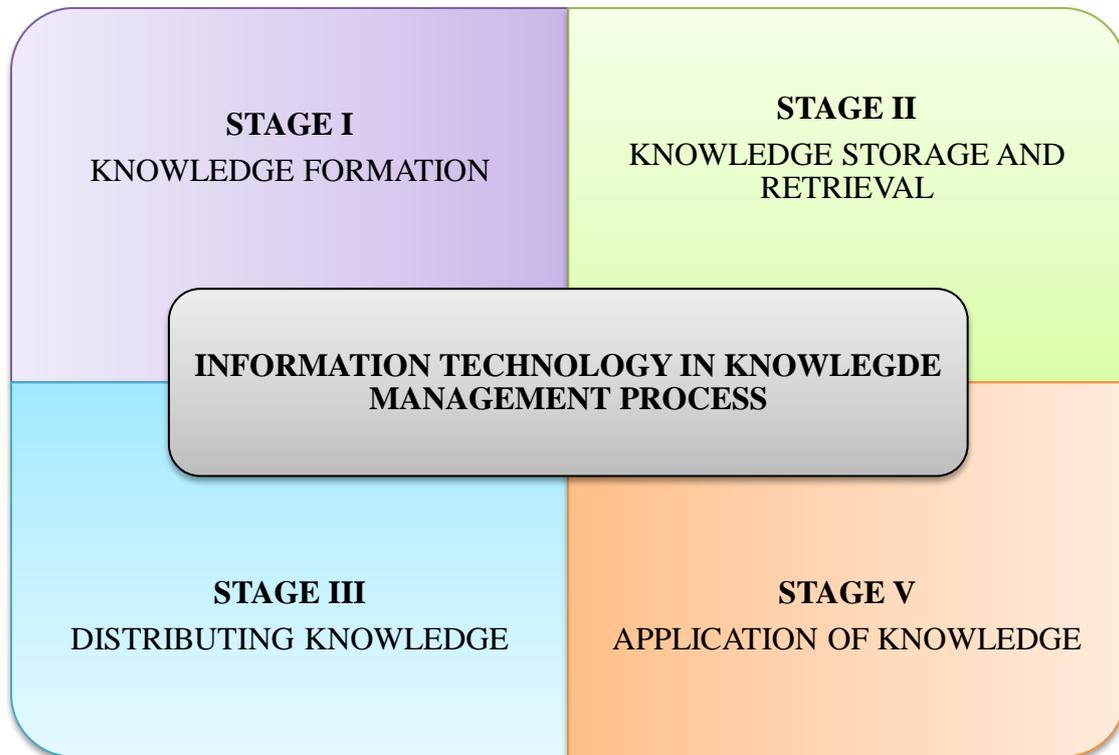
Figure 3. The critical role of the information technology in Knowledge management process

3. 1. First level – knowledge formation

The formation of knowledge occurs via the conversion of tacit knowledge to such that is explicit and back to the initial form via the four mechanisms presented in Figure 3, hence bringing the formation of the knowledge spiral [25]. Tacit knowledge could be relocated from one entity to another via socialization. Examples of a knowledge transfer of such type are apprenticeship as well as coaching on-the-job. Tacit knowledge is turned into explicit knowledge via externalization. Examples of this mechanism are written and oral communication, mechanisms of knowledge acquisition applied in professional system development, and so on. Their mix takes into account forming new explicit knowledge via a mix of various forms of explicit knowledge. For instance, new approaches can be achieved due to operational data via application of the data mining automation. Internalization is a process through which an entity consumes external knowledge via creating their own intellectual model or professional know-how. An illustration of such a process is learning a concept via a book and acquiring it by figuring it out on your own.

Having discussed the source and condition of knowledge, let us now discuss the surroundings and environments which make new knowledge formation easier. I. Nonaka and H. Takeuchi make a suggestion that the crucial question of knowledge formation is setting up an organization's "ba" (described as a common place or space for the formation of knowledge).Four kinds of ba which relate to four modes of knowledge formation described previously are (ba's) indicated as follows: (1) originating, (2) communicating, (3) cyber, and (4) exercising [102].
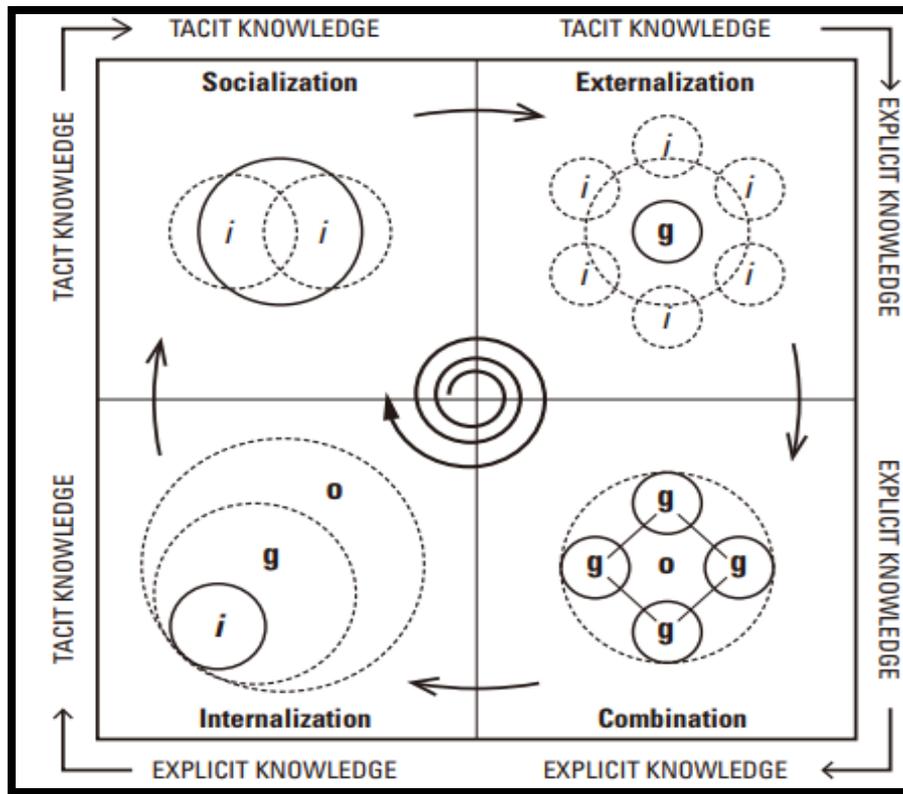
(**i**: individual, **g**: group, **o**: organization)

Figure 4. Four modes of knowledge transformation of Nonaka and Takeuichi [1].

The first one includes the socialization approach of knowledge formation and is the beginning of the process of organizational knowledge formation. Originating ba constitutes a familiar place where entities have common experiences basically via direct interactions, also by presence in the same area during the same time. Interacting ba is connected with the externalization approach of knowledge formation and it relates to a space in which tacit knowledge is transferred to explicit knowledge and made available between entities via conversation and cooperation processes. Cyber ba is connected to a virtual space of interacting and is linked to the combination approach of knowledge formation. Last but not least, exercising ba takes into account the transformation of explicit into tacit knowledge via the internalization process. Hence, exercising ba includes a space for active and continuous independent education. Understanding the features of different ba and the connection with the types of knowledge formation is significant to upgrade organizational knowledge formation. For instance, the appliance of IT abilities in cyber ba is recommended to increase the effectiveness of the combination approach of knowledge formation [102]. Data storing and data mining, paper work warehouses, and software agents, for instance, can pose significant value in cyber ba.

The author further suggests that taking into account the flexibility of today's IT, different forms of organizational ba and the relating schemes of knowledge formation maybe enhanced via the application of different kinds of information systems. Let us take into

account the following examples. Information systems created for supporting cooperation, arrangement and communication processes, being a part of the interacting ba, may make team work easier and in consequence enhance an individual's association with others. E-mails and group support organizations (like for example Lotus Notes) have been proven to increase the amount of "weak ties" (that is informal interactions between people) in organizations [103].

This may speed up the development of knowledge formation discussed by I. Nonaka. Intranets make it possible to being exposed to bigger amounts of online corporate information, horizontally as well as vertically, than it could have been done previously. Thanks to this, the breadth and depth of information to which entities are possibly exposed is larger. Due to the fact that the extent of information exposure is larger, the internalization approach of knowledge formation, wherein entities observe and interpret information resulting in new personal tacit knowledge, can be larger. Hence, intranets may play a significant part in supporting individual education (transformation of explicit knowledge to individual tacit knowledge) via provision of abilities like computer simulation supporting education-by action and smart tutors. A few studies have described the efficiency of advanced IT supporting individual education [104,105]. Tools of this kind, if broadly available in a corporate intranet, may make it possible for entities to acquire more efficiently whenever needed.

Communicating which is mediated via a computer can make the quality of knowledge formation greater via making it possible to construct a forum for shaping and sharing beliefs, for confirmation of interpretation, and for allowing communication of new ideas [106]. Through the provision an extended field for interacting between the members of an organization to share ideas and points of views, and for making dialogue (that is increasing the originating ba), information systems can make it possible for individuals to think of new insights or better interpretations than analyzing information independently. Boland et al. provide a certain example and case of an information system named Spider which forms an environment for organizational knowledge formation in the context of a planning task [107]. Spider gives an environment for the representation, and exchange and debate with various individual points of views. The system updated extended wide field where, assumptions are surfaced and questioned, new forms occur and dialog within varying perspectives is made [108]. Therefore, the quality and frequency of the knowledge formation is made better.

3. 2. Second stage: knowledge storage and retrieval

Warehousing, arranging, and retrieving organizational knowledge also discussed as organizational memory by Walsh and Ungson [108], and E. Stein and V. Zwass [109]; is a significant part of efficient organizational KM. Organizational memory takes into account knowledge in different elementary forms, such as written paper work, organized information warehoused in electronic databases, knowledge which is codified warehoused in professional systems, written organizational processes and schemes as well as tacit knowledge gained by entities and networks of entities [110]. A lot of an organization's explicit knowledge lays in unstructured paper work such as memos, design blueprints, notes etc. [111]. Handling corporate memory takes into account arranging, warehousing and retrieving knowledge.

Two kinds of organizational memory are as follows: semantic and episodic memory [112,109]. The first one relates to generic, explicit and articulated knowledge (for example corporate archives of yearly reports). The latter relates to context-specific knowledge (for example specific conditions of corporate decisions and their results, place, and timing).

Complex computer warehousing technology and practical retrieval methods like data storage as well as data mining, multimedia databases and handling systems of databases, as well as strong search engines are efficient tools in augmenting organizational memory. They make the speed of accessing organizational memory greater. What is more, group ware makes it possible for organizations to form intra-organizational memory as organized and unorganized information and share it within time and space [113]. IT may have a significant part in the augmentation and extension of semantic and episodic corporate memory. Document management methods make the knowledge of corporate past possible, many times divided within many retention facilities, for efficient storage and being made accessible [109]. By using such technologies, a lot of consulting companies have formed semantic memories through the elaboration of wide repositories of knowledge on clients, undertakings, competition and industries in which they operate [114]. Apart from enabling better context of knowledge to be warehoused, IT may make quality of organizational memory better through categorizing knowledge with the use of intuitive taxonomies [115]. Hence, Information technology may increase the broadness, extent, velocity, and quality of knowledge warehousing and retrieval.

3. 3. Third level: distributing knowledge

Taking into account the distributed character of organizational cognition, a significant process of KM in an organizational environment is the relocation of knowledge to places where it is crucial and may be applied. However, it is not an easy task, as per Huber, organizations are not aware of what knowledge they have and own poor systems for tracing and retrieving knowledge which his present within them and generally, the process of knowledge distribution is not sufficiently pursued [116].

Information technology may provide support of all four kinds of knowledge transfer, yet it has mostly been used for informal impersonal means (via venues like Lotus-Notes databases) and formal impersonal (like knowledge maps or for example organization directories). The last one were proven to be significantly helpful transfer mechanisms for a lot of organizations. Consulting companies apply knowledge maps of this type for the purpose of connection of individuals with others who have relevant project knowledge as well as production companies make use of knowledge maps like this to connect product creators. An added innovative appliance of technology for relocation is the use of an intelligent agent software to apply profiles of the members of an organization for the determination of the members that could have interested entities of point-to-point e-mails exchanged within members [75]. Using video technologies may also increase transfer. For instance, offshore drilling expertise is publicized on a global scale at British Petroleum via desktop video conferencing. A usual screen does not only include graphics of the participants but technical data windows, video clips of the actual case considered, specification, contractual information, as well as plans [87].

Information technology may make knowledge sharing greater via an extension of individuals' reach beyond official communication manners. Extending an entity's network to more expanded, yet possibly weaker connections is significant to the knowledge diffusion scheme as networks like this show individuals new ideas [117]. Computer structures and electronic bulletin boards as well as discussion forums shape an electronic association of practice which makes contact with a person searching for knowledge and people who might have access to knowledge easier.

A problem perceived with a lateral manner of communication within organizations (where a usual network could not take into account personal contacts with entities laterally), is the problem of accessing individuals with appropriate knowledge [118]. Entities usually have to depend on a widely known third party to make an approach to the so-called strangers of the internal organizational. Information technology makes it possible for lateral knowledge of such type to be accessed quicker via an increase of the individuals' possible network, via a reduction of delays in communication, and via an increase in the amount and capacity of the channels of communication in the organization. What is more, the provision of taxonomies or corporate knowledge maps makes it possible for entities to quickly track the knowledge or the entity having the required knowledge, quicker in comparison to the way it would be probable without support of such type based on IT [116].

3. 4. Fourth level: application of knowledge

A significant part of the theory based on knowledge of the company is that the competitive advantage source has its place in the usage of knowledge as opposed to knowledge alone. R. Grant distinguishes three basic mechanisms for knowledge integration for the shaping of organizational capability: decrees, corporate routines, and self-contained assignment teams [10].Technology may have the ability to provide support to knowledge use via placing knowledge into the routines of an organization. Procedures which are culture-bound maybe placed into Information technology in such a way that the systems on their own become illustrations of corporate standards.

Information Technology may have an important part in the integration of corporate knowledge. For instance, Information technology may enhance corporate knowledge integration and ways of usage via support of team cooperation and collaboration in the solving of problems and decision-making organizations. Groupware may significantly augment collective problem solving and the process of making decisions via supporting an alternative generation, analysis, making priorities and ranks and via developing group memory. Through an increase of the extent of people's internal networks and via an increase in the amount of corporate memory which is available, IT allows the usage of corporate knowledge in time and space. Information technology also has the possibility to augment the velocity of knowledge assimilation and usage through codifying and automating corporate routines.

Information technology may enhance the integration of knowledge through making the capture, updating and accessibility of organizational directives easier. For instance, a lot of organizations are making the ease of connection and handling of their standards more significant (maintenance manuals, approaches and norms) through sharing them within corporate intranets. This makes the speed for making changes better. What is more, organizational units may follow a quicker educational curve via knowledge assessment of other entities which share experiences.

4. SUMMARY: THE PART PLAYED BY IT IN THE FORMATION – WAREHOUSING AND RETRIEVAL - DISTRIBUTION – USE OF KM PROCESS:

The four knowledge mechanisms of creation, warehousing and retrieving, distributing, and usage are crucial for effective management of corporate knowledge. They may be

perceived as chain links, if there is one which is weak, or does not do the job, the efficiency and integrity of all the process will be affected. Hence, attempts to increase KM in organizations have to regard the synergistic interdependencies within the four mechanisms and avoid sub-optimization relating to a particular mechanism. For instance, over-emphasis on the formation of big computer systems for supporting static corporate memory, with a small amount of consideration, if any at all for the demands for formation, distribution and usage of the content of knowledge archives would not be efficient. Our statement is that the usage of IT may form a framework and surroundings for strengthening and speeding up corporate KM via actualizing, supporting, increasing and strengthening knowledge mechanisms at a broad level via enhancement of their dynamics, range, timing, and whole synergy.

Yet next crucial possible part of Information Technology is supporting the corporate KM framework via coordination and assimilation of the four stages of KM. Corporate KM is solely as strong as the weakest link of the whole process: efficient knowledge assimilation depends on the efficient application of tools for the formation of knowledge, warehousing, and its distribution. Similarly, efficient formation of new knowledge relies on efficient warehousing, distribution, and appliance of current knowledge. The KM stages are connected with each other and interdependent. Thus, it is significant to put emphasis on the whole KM process. Information technology may have a crucial part in uniting the chain connections of KM. For instance, an intranet may interconnect all the stages of KM seamlessly. Discussion databases maybe applied for supporting knowledge formation and cooperative discussions. Through capturing interaction of a group, discussion databases give an insight on group memory which may be stored and later sought for and accessed by other participants of an organization. Group generated data may be mixed by data reached from different internal and external databases and circulated via the organization by "push technology" which is based on user-specific profiles. Some people discuss the significance of Information Technology to KM initiatives [101,119,120], Ion the other hand contend that KM will be weakened when lacking the proper usage of IT.

6. CONCLUSION

A literature review presented that corporate knowledge and KM are complex and have many faces. Various knowledge explanations and taxonomies were described and analyzed. For instance, knowledge can be in the form of tacit, or explicit, it may relate to an item, a cognitive condition, or a capacity. It can have its place in entities, groups (that is social systems), paperwork, processes, regulations, physical environment (for example the actual organization of assembly production line), or computer archive. Hence, no single or optimum perspective on corporate KM and KM systems maybe formed. Various KM paths and systems have to be applied in organizations in order to efficiently cope with the divergence of the kinds of knowledge and attributes.

A KM system, through drawing on different information technology tools and abilities may have many roles in supporting corporate KM processes. Concrete examples of Information Technology for the support of four KM mechanisms presented in the work were described in Section 3. It is crucial to remember that KMS, via drawing on different and flexible Information System possibilities may result indifferent kinds of Knowledge

Management support, being an extension beyond traditional warehousing and retrieval of knowledge which is coded.

Corporate knowledge and KM are widely undertaken subjects in numerous literatures inclusive of strategic administration and corporate theory and information systems. It is therefore of great importance that IS analysts are aware, know, and construct upon the already crucial work in broad literatures. This will allow for a differentiation of points of views and perspectives which research of such multi-faceted and comprehensive phenomenon, as corporate KM demands.

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