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Knowledge is an Essential Element at Present World

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Abstract

At present knowledge is an essential element of production, next to labor, land and capital. Knowledge is considered as a collection of experience, appropriate information and skilled insight which offers a structure for estimating and integrating new experiences and information. Due to the recent development of science and technology, knowledge becomes an essential part in every organization. In organizations, knowledge is considered as a storehouse of intelligent for the development of the organizations. Achievement of new knowledge is one of the greatest challenges in the building of intelligent systems in every organization. Employees in institutions must be sincere for the creation and sharing of knowledge to increase their effectiveness in the workplace. A knowledge map is the pictorial illustration of the achieved information from a huge collection of data. It helps an organization to realize how the loss of staff influences intellectual capital, to assist with the selection of terms, and to match technology to knowledge needs and processes. This paper highlights knowledge map which contributes a fundamental role for better knowledge management and learning. Knowledge sharing and transfer are good techniques to exchange knowledge among the organizations which help organizations to explain their level of knowledge internally and externally. An attempt has been made here to analyze in brief the significance of transfer of knowledge.

Keywords: Explicit knowledge, Knowledge mapping, SECI model, Sharing and transferring knowledge, Tacit Knowledge.

Contribution/ Originality: This study contributes to the some detailed analysis of knowledge for the improvement of the individual and organizational structures. At present no nation can think for the sustainable development without proper use of knowledge.

1. INTRODUCTION

From the previous twenty years, knowledge becomes an essential and valuable asset of every organization. At present it is considered as an element that gradually changing of our personal, organizational and social intelligent performance (Wiig, 1993). Hence, organizations need to manage knowledge properly (Ipe, 2003). Knowledge is the consciousness, identification, and applied it for the development of the humankind. It is created in the human minds and increases when people are involved in its acquisition and dissemination. Hence, previous knowledge enhances the formation of developed and advanced knowledge (Nasimi *et al.*, 2013).

Knowledge is built up from data, information and prior knowledge. Data refer to raw facts without any processing, organizing or analysis, and hence they have little meaning and few benefits to managers and decision-makers. Data are un-interpreted materials on which a decision is to be based and depend on facts which may include anything known to be true or exist (Klicon, 1999). Data are bits of content in either text or numerical format (sequences of numbers, letters, pictures, etc.). They are meaningless in themselves. Data are indicated by a set of 'discrete intention details about events' (Davenport and Prusak, 1997; Brooking, 1999). They are normally

structured, but do not bear any information to use them in a particular context (Chini, 2005). They are the raw facts that form the basis for what we know (Gill, 2000). Information refers to data which has developed and shaped to be of more meaning to users. It results from the interpretation of data in a provided background. So, a single material of data may create different information if the circumstance is different (Klicon, 1999). Information refers data that is accumulated to allow comparison, grouping, and categorizing which have been processed to be useful. Hence, information is organized data, tables, statistical presentations in context. We can change data into information by accumulating order, context and purpose (Brooking, 1999; Sensky, 2002; Cong and Pandya, 2003). Again, knowledge is organized information that changes something or somebody; either by being foundations for action, or by creating an individual (or an institution) capable of different successful action (Drucker, 1989; Brooking, 1999). We can transform information into knowledge by the accumulation of meaning and determining what action should be taken (Gill, 2000). Knowledge is derived from information but it is more meaningful than information (Servin and De Brun, 2005). Knowledge is essential for the solution of problem and decision making, because it belongs stronger meaning than data and information (Davenport, 1997). We conclude that data indicates *raw facts* and information indicates *data with context* and knowledge indicates *information with meaning* (Skyrme, 1999). Therefore, knowledge is richer, deeper and precious than information (Davenport, 1997). For example, heights of the students in a class are *data*. If increase of population is higher in illiterate, poor and unconscious society and in the rural sides or in slums in urban area is *information*. The decision makers could employ information on increased population to design a strategy to reduce the over population in the country. This information can be stored, shared and transferred from one user to another for making this *knowledge* platform on over population in the country. Although we observe a distinction between information and knowledge, many people use these two terms interchangeably.

In the knowledge management (KM) point of view, knowledge is connected to data and information. Some scholars consider knowledge hierarchy as *wisdom* which indicates *knowledge with insight* (Skyrme, 1999). Nonaka *et al.* (2000) provide that knowledge is dynamic and context-specific. Famous scientist Albert Einstein stated, “*Knowledge is experience. Everything else is just information.*”

We can divide knowledge into two types: i) tacit knowledge (TK) and ii) explicit knowledge (EK). The TK is the best practices, hands-on skills, intuitions, special know-how, heuristic, and so on. It is individual knowledge that is hard to formalize or articulate. The EK can be codified and transmitted in recognized and systematic language (Polanyi, 1973).

Present economy is emerging knowledge-based. Hence, knowledge becomes the strategic resource of organizations to compete and survive (Mohamed, 2008). Knowledge plays an important role in creating talent environment in institution and in knowledge-based systems in different application domains (Al-Saiyd *et al.*, 2011).

2. LITERATURE REVIEW

The TK is first defined by philosopher, physician and chemist Michael Polanyi as knowledge that cannot be articulated or verbalized (Polanyi, 1966). Ikujiro Nonaka and Hirotaka have observed that western people are more inclined to emphasize on management and transferring of EK, while the eastern people tend to stress TK (Nonaka and Takeuchi, 1995). Also S. Gueldenberg and H. Helting expressed that both TK and EK are complementary and they are

interrelated and play parallel role in knowledge process and creation (Gueldenberg and Helting, 2007). The process of knowledge creation takes place in the 'Ba' (place), which has many meanings dimensions like space, living space, context, culture and time. They have also created the knowledge spiral model in 1995 to show interaction between TK and EK in an organization for socialization, externalization, combination and internalization (SECI) (Nonaka and Takeuchi, 1995). Drucker (1999) observed that in the knowledge society of the new economy knowledge is the only meaningful resource and knowledge becomes power only through targeted, systematic and organized learning.

Scientists have realized that over 90% of the knowledge in organizations is entrenched in the brain of the employees (Bonner, 2000). Blomberg and Werr (2006) identify four different approaches to inter-organizational knowledge work as: i) alliances for learning, ii) industrial networks, iii) innovation/diffusion/clusters, and iv) social networks.

Pamela Cipriano indicated that the five ways of knowing are useful in understanding how one knows something: empirical knowing, ethical knowing, aesthetic knowing, personal knowing and synthesizing knowing (Cipriano, 2007).

According to Davenport and Prusak (1997) the knowledge map is a visualization tool that facilitates us to assess the competence of firms by analyzing its knowledge portfolio.

A. Perrin and N. Rolland have examined the strategy of organizational networks management and knowledge transfer policy. They have found that despite using mechanisms to create and share knowledge efficiently among professional networks, organizations still fall short of expectations because there is lack of support from top management (Perrin and Rolland, 2007).

M. Alvesson and D. Kärreman indicated that utilize of knowledge in management literature suffers from five problems: i) ontological incoherence, ii) vagueness, iii) breadth and conceptual emptiness, iv) tensions between regarding it as objective and evidence of its subjectivity, and v) functionalism. They also showed logic that knowledge is a loose, ambiguous, and rich concept that precludes reduction to simple sets of distinctions (Alvesson and Kärreman, 2001).

3. OBJECTIVES OF THE STUDY

The aim of the study is to represent ins and out of knowledge. The purpose of the study is to discuss aspects of knowledge. We have taken an attempt to discuss the following points:

- To improve the professional skills of employees of organizations.
- To promote the improvement of organizations.
- To propel the progress of organizations.

4. METHODOLOGY OF THE STUDY

The article is prepared with the help of secondary data. We have used websites, books, previous published articles, conference papers and various research reports to prepare this paper. Throughout the paper we have tried to improve the knowledge practice for the enlargement of the organizations. At present knowledge will contribute a competitive advantage for the sustainable global economic development. In the study we take an attempt to discuss the various sides of knowledge thinking for the common readers.

5. HISTORICAL BACKGROUND OF KNOWLEDGE

Naturally knowledge is created from the origin of humankind. Philosophers, Western to Eastern, gave stress on the root of knowledge. The earliest civilizations started in Mesopotamia,

Egypt, India and China. From then, humankind has gained and builds new knowledge that permitted them to understand and adjust to the world they inhabited, and transforming it according to their needs. In both Greece and India, religions and superstitions allowed space for philosophers and scientists to conjecture about the character of the universe (Faucher, 2010).

Since the ancient time knowledge spread orally, then in writing; but it was restricted to a low circle of educated people till the advancement of printing. Since the period of ancient Greeks the notion of knowledge has been actively analyzed. K. Henderson has noted that ancient Greek citizens often faced technological advancement hurdles due to a Platonic mind or body schism (Henderson, 1995).

Plato (427–347 BC), the most famous student of Socrates, believed that knowledge gained through the senses was confused and impure, as the world humans can sense is inadequate copy of the real essence of things. In 369 BC, Plato, through the voice of Socrates in his *Meno*, *Phaedo* and *Theaetetus*, conceptualized knowledge as a true belief with an account, commonly identified as the notion of *Justified True Belief*. Plato explored the character of knowledge, by defining knowledge in three different ways; i) a perception, ii) it is true judgment, and iii) it is true judgment combined with accountability (Jashapara, 2004). The most interesting matter is that all the major works of Plato are in the type of dialogues between Socrates and other philosophers, employing a dialectic form of logic later refined by G. W. F. Hegel (Plato, 1953).

Aristotle (384–322 BC), one of Plato's students, was fundamentally opposed to his views on the value of the senses to obtain knowledge (Aristotle, 1928). For Aristotle, *forms and matter* had to come together for anything to be created. He set the foundation of the scientific technique, and therefore could be considered as the first empiricist (Van Doren, 1991). But his concept was debated in British empiricism (Locke, 1987) German philosophers (Marx, 1976; Hegel, 1977) to the 20th century philosophers (Husserl, 1931; James, 1966). Both Plato and Aristotle shaped the thinking of scientists and philosophers for centuries to come in the West.

Laozi (Lao Tsu) and Kongzi (Confucius) in China and Siddhartha Gautama, the founder of Buddhism, and Mahavira, the founder of Jainism, in India maintained a deep and well documented discussion of the notion of knowledge (Jullien, 2000). Buddhism denies the subsistence of the self (Levine, 2003) only events exist, whereas Chinese philosophers, such as Confucius defended the farming of the self and elevation of the ordinary individual into the ideal person through holistic socialization processes (Scaruffi, 2003).

After the destruction of the Roman Empire, the western world endured the period known as 'the Dark Ages'. Later at the Renaissance the philosophy of knowledge progressed and focused on the extraction of the 'self' from its religious fetters (Scaruffi, 2003). The Renaissance featured a scientific revolution and major advances in knowledge, with the creation of Copernicus, Galileo, and Descartes. The Renaissance gave birth to a significant development in the philosophy of knowledge; the scientific process, a procedure for uncovering latest knowledge (Van Doren, 1991).

David Hume, an empiricist, raised an intrinsic problem with induction in '*An Enquiry Concerning Human Understanding*' in 1777 and showed how empiricists were using inductive logic to justify inductive logic itself, creating a rounded argument of infinite regression. In 1781, Kant showed disagreement the empiricism of Hume, and proposed that our consideration of the external world is grounded not solely in experience, but in both experience and a priori concepts (Chalmers, 1999).

Epistemology addresses primarily the query of ‘what is knowledge?’ and discusses its creation and adoption. Recently, philosophical consideration focuses in the ontological knowledge (Grenon, 2003). At present in our society knowledge has become an essential element of every action. It has been achieved through training, observing and experiencing (Mahmood *et al.*, 2011). However, it is agreed that this definition remained inadequate. Since the ancient civilization many attempts have been taken by scholars to explain the idea of knowledge but no full satisfactory solution has found yet (Nonaka and Takeuchi, 1995).

6. FEATURES OF KNOWLEDGE

At present, knowledge becomes one of the best sources of competitive advantage for an organization. We can say, knowledge is the nominalization of the mental process of ‘knowing’.

Dictionary definition of knowledge is “*The facts, feelings or experiences known by a person or group of people.*” In organizations, analysis of the word ‘knowledge’ is more relevant than other social settings (Ekore, 2014). Since the classical Greek era philosophers had tried to represent knowledge in various ways and had led to many epistemological debates. Recently knowledge is considered as the principal source of value creation and sustainable competitive advantages (Alavi and Leidner, 2001). In organizations, knowledge resides within employees who create, collect, entrance, and apply knowledge in carrying out the employees’ activities (Bock *et al.*, 2005). Robert Nozick has offered the following definition of knowledge (Nozick, 1981): *S* knows that *P* if and only if (where ‘*S*’ stands for the subject who has knowledge and ‘*P*’ for the proposition that is known):

- *P*;
- *S* believes that *P*;
- if *P* were false, *S* would not believe that *P*;
- if *P* is true, *S* will believe that *P*.

Various scholars have defined knowledge in various ways as follows:

Knowledge is a fluid mix of experience, related information and expert insight that offers a structure for evaluating and integrating new experiences and information. It initiates and is applied in the mind of a knower. In organizations, it often becomes entrenched not only in documents but also in organizational routines, practice, methods, progressions, and norms (Davenport and Prusak, 1997).

It is a dynamic framework from which information may be stored, processed and understood (Plotkin, 1994). It is considered as a dynamic human process of justifying personal belief toward the truth (Nonaka and Takeuchi, 1995).

Knowledge can be classified into four ways as: personal, shared and public, hard and soft, practical and theoretical, forefront and backdrop, and internal and external (Pathirage *et al.*, 2008). But most commonly we can divide it into two parts: i) explicit knowledge, and ii) tacit knowledge (Nonaka and Takeuchi, 1995). Organizational knowledge is captured by the organization’s systems, processes, products, rules and culture (Myers, 1996).

6.1. Tacit Knowledge

Tacit knowledge (TK) provides direct experience that is not codifiable via artefacts. About 80% of total knowledge is tacit and the rest 20% is explicit (Mohajan, 2016).

TK is subjective and intangible knowledge which is intuitive and difficult to express and practice with language, diagrams, figures, or numbers (Magnier-Watanabe *et al.*, 2011). The term *tacit knowledge* is originally named by Polanyi (1966). Polanyi referred to the tacit influence of the mind by which all knowledge is discovered and then held to be true. It comes from the individual's mind and is founded on life experiences, reading, learning, environment, beliefs, points of view, technical skills, and other background characteristics (Ekore, 2014). It is private in foundation, context and job specific and complex to formalize and codify, hard to acquire, communicate and share, and weakly familiar but highly operational in the minds of the possessor (Polanyi, 1973; Crowley, 2000; Kidwell *et al.*, 2000; Serban and Luan, 2003).

It is considered as hidden knowledge and very difficult to manage. Sharing of knowledge between the master and apprentice is TK (not through language, but by working with their masters; i.e., observing, imitating and practicing under the master's guidance) (Payne and Sheehan, 2004; Herschel and Jones, 2005). Sources of TK are, informal business processes and communications, personal experiences, and historical understanding (Serban and Luan, 2003).

TK resides in individuals' minds and is transparent and is an element of a personal skill or capability that individuals can rely on in their regular activities without being aware of it, let alone understanding it (Selamat and Choudrie, 2004; Kupers, 2005).

Five primary categories of critical success for KM for the importance of TK are Hasanali (2004): i) leadership, ii) structure, roles, and responsibilities, iii) culture, iv) IT infrastructure, and v) measurement.

6.2. Explicit Knowledge

Explicit (codified) knowledge (EK) can be verbally explained (in formal and systemic language), codified it through many sorts of data that can be stored, and written down in specified documents. It is objective and rational and can be expressed with language, numbers, or formulas. It involves know-how that is transmittable in formal and systematic language and can be stored and disseminated with technology (Crowley, 2000; Nonaka *et al.*, 2001; Magnier-Watanabe *et al.*, 2011; Ekore, 2014). It is easily codified, storable, transferable, and easily expressed and shared (Serban and Luan, 2003). Sources of EK are manuals, policies and procedures, and databases and reports (Serban and Luan, 2003).

Construction firms have been managing EK for years through written documentations, equations, technical specifications, manuals, databases, best practice guides, standards and procedures (Payne and Sheehan, 2004).

6.3. Relations between TK and EK

TK and EK are not two distinct types but intrinsically inseparable (Hildreth and Kimble, 2002). They are mutually complementary and are essential for knowledge creation (Nonaka *et al.*, 2000). For example, to speak a language we need EK; but we need TK to utter it properly (Nonaka and Von, 2009). For the scientific advance, the scientist must have acquired TK in setting up and calibrating his equipment (e.g., new invention and discovery), orchestrating the laboratory, documenting experimental steps, choosing materials, using senses to interpret results, and so on. Also scientific advance assumes the scientist is aware of EK, for example, conjectures, theories, research design, analysis, and conclusions (Nonaka and Von, 2009).

Many authors combined TK and EK into one, and refer to them as one entity, namely TK. [Haldin-Herrgard \(2000\)](#) and [Empson \(2001\)](#) asserted that organizations' knowledge resources can be described as an iceberg. The structured of EK is the visible top of the iceberg (only a small part of the whole iceberg), which is easy to find and recognize and easier to share. Under the surface, invisible and hard to express, is the significant part (the larger part of the whole iceberg) of the iceberg. This hidden part is known to TK resources in organizations.

EK is suitable for everyone to detect and use, whereas TK separates the masters from the common people. The core proficiency of an organization comes from the TK of *know-how* rather than EK of *know-what* ([Haldin-Herrgard, 2000](#)).

We have observed that TK is generally the more important than EK. As it is a source of the core capability and the competitive advantage (it is sustainable) of any organization.

6.4. Epistemological Assumptions

Epistemology is first given by the Aristotle. The word *episteme* is the true, universal and definitive scientific knowledge, *logos* means speech or word. Epistemology is a term first used by the Scottish philosopher James Frederick Ferrier on the model of ontology to describe the branch of philosophy concerned with the nature and scope of knowledge, which is called the true beginning of philosophy ([Alston, 1989](#); [Suchting, 2006](#)). According to Aristotle, all three kinds of knowledge are to be considered as a whole and are equally important in understanding the personality of man and his society ([Wackerhausen, 1996](#)).

Epistemology is a branch of the grand divisions of philosophy and deals with the views of interpreting knowledge. With organizational epistemology we can form a theory on how and why organizations need knowledge ([Koskinen et al., 2003](#)).

Based on the work on cognitive science for the study of scientific organizational knowledge three different epistemologies are suggested by [Varela et al. \(1991\)](#); [Von Krogh and Roos \(1995\)](#) and [Venzin et al. \(1998\)](#) to explain what is knowledge, how is it generated, and what are the conditions for knowledge to generate as follows:

- Cognitivist epistemology is considered organizations as open systems that increase knowledge by the appropriate representation.
- Connectionistic epistemology represents the methods on how to process information are not universal, but change depending on the relationship ([Zander and Kogut, 1995](#)). Organizations run properly through relationships and communication.
- Autopoietic epistemology gives a basically different understanding of the inputs into a system ([Maturana and Varela, 1980](#)). Autopoietic systems are open to data, but closed to information and knowledge.

According to [Polanyi \(1966\)](#) epistemological view, TK will remain inaccessible. Hence it is impossible to make them explicit. It is impossible to teach or explain. The ET and TK represent the epistemological dimensions of knowledge ([Nonaka, 1994](#)).

6.5. Knowledge Creation Process

Knowledge creation is one of the essential elements of KM in organizations ([Argote et al., 2003](#)). It happens by persistently transforming TK into EK and vice-versa. It is found at the individual level, its utilization must occur at the organizational and social level ([Nonaka and Takeuchi, 1995](#)). Problem solving, implementing and integrating, experimenting and prototyping, and importing knowledge are the major knowledge creating activities ([Nonaka, 1991](#)). The ability

of a corporation is to create knowledge allows the corporation to improve better products and services (Nonaka, 1994).

The aim of an organization is a static view of knowledge assets in the knowledge related vision and the theory of dynamic capabilities by explaining how TK and EK interact to create new knowledge (Teece *et al.*, 1997; DeCarolis and Deeds, 1999).

Organizations can create knowledge by using five knowledge enablers as follows (Ichijo, 2004):

- inspiring a knowledge vision,
- managing conversations,
- mobilizing knowledge activists,
- generating the right context, and
- globalizing local knowledge.

The notion of knowledge conversion indicates how TK and EK interact along a continuum. Here continuum refers to continual transform from TK to EK and vice-versa (Nonaka and Von, 2009). An organization needs the combination of both tacit and explicit KM at all of its levels for the successful and sustainable development. All TK can be transform into EK (Tsoukas, 2003). This process is known as codification. Polanyi observes that EK indeed required TK for its interpretation (Polanyi, 1966).

Knowledge adopts alternating forms for mutual enhance of tacit and explicit elements that may give rise to new EK and vice-versa. In these processes, TK and EK mutually enhance each other towards increasing the capacity to act (Nonaka, 1994; Nonaka and Takeuchi, 1995). For knowledge alternates, Nonaka and Takeuchi (1995) have developed the knowledge spiral model in 1995 to show interaction between TK and EK in an organization for socialization, externalization, combination and internalization (SECI) with the goal to “*formalize a generic model of organizational knowledge creation.*” They have given four knowledge conversion techniques as: i) socialization (tacit to tacit), ii) externalization (tacit to explicit), iii) combination (explicit to explicit), and iv) internalization (explicit to tacit). These techniques are simply known as SECI where both types of knowledge expand quantitatively and qualitatively (figure 1). The EK and TK are not separate entities but complemented each other as entities by interacting and interchanging with each other. Nonaka and Takeuchi called this interaction “knowledge conversion” (Nonaka and Takeuchi, 1995).

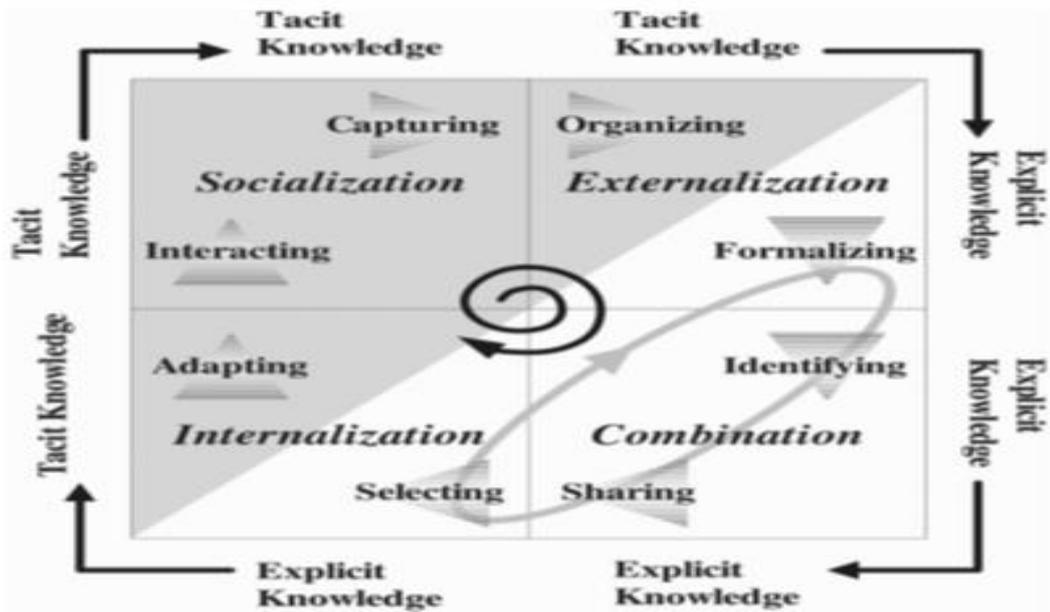


Figure-1. Knowledge transfer process spiral SECI model.
Source: Nonaka and Takeuchi (1995); Nonaka *et al.* (2000).

a. Socialization (tacit to tacit): It is the shared formation and communication of TK among people who have a common tradition and can work together effectively. Using this form the individuals gain TK from another person through observation, intercommunication, discussion, analyzing, imitation and practice, and can acquire new knowledge through shared experiences. These people do not exercise language as the main channel of allocation. It is a direct practice rather than form reading manuals. Sharing of it forms in a group meeting where experiences are elucidated (Nonaka and Takeuchi, 1995). Humans learn to speak and survive in their culture almost entirely by socialization. People in an institution consult about what is necessary to them. They feed off the ideas of others, and the collective experience of sharing knowledge is a powerful means of creating new ideas. Individuals can also acquire TK, create and share mutual trust during face-to-face interactions, sharing the same environment or during informal meetings. For example, communities of practice (CoP), collective or organizational memory are all phenomena that have been studied as best practice of the circulation of TK (Khan *et al.*, 2013). For socialization fewer lectures and more labs, studios, and apprenticeships are needed. On-the-job training is a common example of socialization.

b. Externalization (tacit to explicit): By its nature, TK is difficult to convert into EK (Sulaiman *et al.*, 2009). Externalization is experienced everyday in an institution, due to institutionalization of tacit rules as internal regulations. A standardized storage is required to store the experience gained from the situations and a mechanism providing a search engine which enables for an on demand service to the searcher. A group of expert persons need to make a circle who store their learning and experience to solve the problems efficiently (Khan *et al.*, 2013). It prompts sharing of ideas, beliefs, experiences and instant feedback (Nonaka and Takeuchi, 1995). The explicit form is also derived from drawings, models, words, concepts or metaphors which we can use by experts to articulate TK (McKenzie, 2001). Here ideas are changed into practical reality. Metaphors, analogies, concepts, hypotheses or models have an essential part to play in this process. For example, the appearance of organizational strategies is a phenomenon of the enunciation of collective TK into an explicit formulation embracing a plan, actions and tactics (Baumard, 2001).

c. Combination (explicit to explicit): This is our most familiar process. By taking explicit, explainable knowledge, we can combine it with other EK and can also develop new EK. Individuals exchange and combine their knowledge through mechanisms, such as telephone conversations, documents, meetings, including plans, charts, research and development, and technical papers or computerized communication networks. The combination of ongoing information may be made easy by the selection, summing, ranking, and classification of EK (Nonaka, 1994). There are three basic stages to this category as: i) confining knowledge from the organization and internalizing it, ii) disseminating the EK through networks and systems, and iii) processing the EK into a more usable format like documents, plans, and reports. Combination can be achieved globally through the communications media or by learning in formal settings using lectures, workshops, published papers, conferences, and seminars. For example, creative use of database to get student reports, sorting the courses, enrolling users, categorizing are combination process (Khan *et al.*, 2013).

d. Internalization (explicit to tacit): It is a method from which something we learn becomes automatic. Conversion of this process is more difficult. In this process learning by doing, training and exercises allow the individuals to access the knowledge domain of interest from the group and the organization. It is essential in building understanding and developing a learning culture (Khan *et al.*, 2013). Individuals read, blend, and conceptualize their findings to generate latest insights, concepts and methods. Documentation assists people to internalize experiences, develop and broaden their TK base (Roberts, 2000).

Gourlay and Nurse (2005) state that the SECI model is founded on Japanese management cultural practices and not transferable to other environments. It does not indicate some issues in TK such as structures and technology which are vital. The knowledge originates in individual minds does not address knowledge that arises from collective action such as teamwork and while it acknowledges TK (Mungai, 2014). The SECI model is probably the most widely cited theory in KM. But it is suffered from too static a contrast between TK and EK which is inadequate for a dynamic model of tacit-explicit knowledge interrelation (Adler, 1995).

The knowledge creation structure begins with socialization (by sharing) through the use of TK by the practice of building of a team or field of interaction. Then it is externalized into EK within the institution through sharing knowledge among the staffs. The EK is combined (by communication) with other obtainable EK to form a full sensible set of knowledge. Later the organizational members internalize the EK through practical application and productive action. TK cannot be developed easily with the exchange mechanism (Magnier-Watanabe *et al.*, 2011). Nonaka and Takeuchi (1995) however considered externalization and internalization to be the most critical processes since they require active individual involvement and commitment. After finishing the internalization process, the process goes back to socialization.

6.6. Five Types of Knowledge

TK and EK can be given in five types as: embrained, embodied, encoded, encultured and embedded knowledge. The formation of these types was first suggested by H. M. Collins to explain the psychological and behavioral features of knowledge (Collins, 1993). Blackler (1995) adapts them to explain the different images of knowledge in organizations. Now we briefly describe these five types as follows (Blackler, 1995; Lam, 2000):

Embrained Knowledge (individual-explicit): It depends on individual's theoretical skills and cognitive abilities. This is formal, abstract (knowing) or theoretical knowledge. Moreover it is

general and transferable because it is applicable to different situations and a wide collection of phenomena. It is homogeneous and a priori knowledge which is acquired primarily through prescribed education and training. Scientific knowledge which focuses on the rational understanding and knowing of universal principles falls on this group. The high professional condition of science compared with engineering reflects it.

Embodied Knowledge (tacit-individual): It is contrast to embrained knowledge and action oriented, practical and individual type knowledge. It is first given by Polanyi (1966). It is usually only partly explicit and requiring face-to-face contact, sentient, tactile and other sensory inputs. It has a tough automatic and voluntaristic component (Spender, 1996). It is emergent, fluid and person-specific knowledge (Lam, 2000).

Encoded Knowledge (collective-explicit): It has been codified and accumulated in proposal, receipts, written information, documents and processes. It is well-illustrated by scientific methods to keep the records of the experience of the workers and their skills into objective scientific knowledge. It inclines to create a unique and predictable pattern of behavior and output in organizations. It is inevitably simplified, selective and partial, for it fails to capture and preserve the tacit talents and opinion of individuals (Lam, 2000).

Encultured Knowledge: It is the procedure of obtaining mutual understanding and entranced in cultural arrangements. It is usually depend on language for the mediation of social constructions (Blackler, 1995).

Embedded Knowledge: This knowledge is safe in rules, manuals, products, organizational culture, routines, systems of conduct, morals, artifacts, or structures. It is the accumulated knowledge that resides in organizational schedules and shared form. Badaracco (1991) develops this concept to refer specifically to the understanding which resides in complex social or team relationships that cannot be fully articulated or easily transferred. It is rooted in an institution's 'communities-of practice' (Brown and Duguid, 1991). It is the shared knowledge of coordination, communication and learning generated through organizational identity (Kogut and Zander, 1992). It is relation-specific, contextual and dispersed. It is entrenched in technology, practices and explicit routines.

6.7. World Bank Knowledge for Improvement

The World Development Report (World Bank, 1998) indicated that “*Knowledge is needed to transform the resources we have into things we need, and to raise standards of living, improve health conditions, provide better education and preserve the environment, and to do this in the most optimum way possible. All these value addition activities require knowledge.*”

In view of this, the WB in 1996 developed its *knowledge bank* and by networking with other development agencies began the Knowledge for Development (K4D) program. The purpose of this program was to “*Help client countries make the transition to the knowledge economy, which is one that uses knowledge as the key engine for economic growth.*” The first newsletter of the World Bank's K4D program was launched in 2004. The program was developed to make easier the KM concept, tools and practices among professionals in the WB client countries (World Bank, 2012a). It stands on four pillars of the economy: i) economic and organizational rule for efficient use of presented and future knowledge and the prosperous of entrepreneurship, ii) education and skill citizens who can produce, distribute and utilize knowledge efficiently, iii) IC infrastructure that can proficient improvement system of firms, universities, research centers, think-tanks, mentors, and other institutions who can water into the rising stock of global knowledge,

incorporate and settle in it to regional needs, and produce new technology, and iv) information and communications technology (ICT) that can facilitate the effective communication, dissemination, and processing of information. These four pillars work to accelerate and deepen the improvement techniques of developing economies (Robertson, 2008).

The WB has spent about one-fourth of its country services budget on core knowledge products in 2012. Core knowledge services of WB are; ii) technical assistance (TA), ii) impact evaluations, iii) economic and sector work (ESW), iv) the World Development Report, v) global monitoring, vi) external training and capacity development, vii) research, viii) new product development, and ix) internal reports (World Bank, 2012b).

6.8. Organizational Knowledge

Organizational knowledge is combination of TK and EK (Nonaka and Takeuchi, 1995). In any organization it is necessary to manage and share knowledge among the employees. There are two varieties of organizational knowledge: i) product-specific and ii) skill-specific knowledge. The first one can be recognized in user manuals, maintenance manuals, skilled systems, and separate case basis reasoning systems. The second one is obtained by the knowledge-workers through understanding (Montazemi, 1999). Benefits of organizational based knowledge are as follows (Hayes-Roth and Jacobstein, 1994):

- improve customer service,
- improve decisions,
- decreased personnel required,
- reduced training time,
- order of size of difficult task accomplishment, and
- maintenance of unpredictable or moveable knowledge.

7. KNOWLEDGE MAPS

Knowledge mapping was created in the research group of lead by Donald Dansereau in 1970s. Then it was called network map (Lambiotte *et al.*, 1989). T.H. Davenport and L. Prusak defined a knowledge map (k-map) as knowledge yellow pages. It is usually a representation of 'knowledge about knowledge' rather than of knowledge itself (Davenport and Prusak, 1997). This is an artifact with the intention of guiding users through a complex and changing knowledge domain by representing organized knowledge (Wexler, 2001). It is a graphical format that follows cartographic conventions for the point of review of the relevant knowledge. A k-map is a knowledge representation tool for navigating aid to explore information. It shows the position of an organization's knowledge but it does not actually contain any knowledge. It is a channel to organizational knowledge but not a storehouse of knowledge (Gupta and Deotale, 2014). A k-map allows one to see the background of information flow in his processes (Varney, 2014).

A k-map is a KM method, for codifying knowledge in knowledge layers for all functional areas of an organization, people expertise and assets (Yoon *et al.*, 2014). According to Grey (1999) and Rodríguez *et al.* (2004) k-map is an ongoing mission in organizations to:

- define a classification schema for knowledge types and knowledge sources,
- develop a Meta model of the relationships of the knowledge patterns and knowledge sources,
- discover the location, ownership, value and utilization of knowledge artifacts,
- classify and describe knowledge sources,

- find the constraints to the knowledge movement, and
- the scope of control the current knowledge.

A k-map can be categorized depending on the root domain, form, knowledge layers and knowledge dimensions. It permits a competitive organization to fully influence the existing expertise resident within the agency by identifying barriers and restrictions to fulfill strategic goals and objectives. It contains information about the competition agency's knowledge to the proper use of resources, independent of source.

In brief, k-map is a guide to tell users the location and relationship of knowledge, show what resources are available and help users find the necessary knowledge quickly and easily. A k-map has two effects: i) to make TK explicit, and ii) to build correlation between TK and EK (Ya-Ping and Yan-Wei, 2012). The intellectual environment that is mapped through a k-map is mostly made up of referenced expertise, documented experiences, and extracted and formalized processes or procedures (Eppler, 2004).

The k-maps exercise in education to investigate ten topics: impact of ICTs on learning and achievement, monitoring and evaluation, equity issues, specific ICT tools, costs, running projects and performs, teachers, content and curriculum, policy issues, and school-level issues (Trucano, 2005).

The key principles of knowledge mapping are as follows (Wikipedia, 2016):

- appreciate the knowledge is transient,
- explain the sanction, establish boundaries, and respect personal disclosures,
- use and express the knowledge in different forms, and
- be conscious in sharing knowledge in legal process and protection.

7.1. Types of K-Maps

A k-map generally consists of two parts: i) a ground layer that represents the context for the mapping which usually consists of shared context that is understood by everyone (business model, product, geographic map), and ii) the individual elements that are mapped within this context. K-maps are categorized by: a) purpose, b) graphic form, c) content, d) application level, and e) creation mode. There are various types of k-maps that can be used in the competition agency context as follows (Eppler, 2004; Kilian *et al.*, 2006; Čavalić and Ilguen, 2012; Gajda, 2015):

Knowledge creation maps: These maps illustrate the planned steps to advance a definite organizational competence or create new knowledge.

Knowledge source maps: They are organizational charts that do not describe functions, responsibility and hierarchy, but expertise (Eppler, 2004). They enable identification of persons possessing knowledge resources of particular value.

Radial knowledge maps: They consist of concepts that are linked through propositions but radially organized (Buzan and Buzan, 1996).

Information resource maps: They help to decide their layout and method of storage (Gajda, 2015).

Knowledge assessment maps: They illustrate the assessment of certain knowledge assets graphically.

Knowledge bearer maps: They serve for the identification of knowledge experts in institutions without contents. They are depositories of people and their understandings, knowledge and talents (Kilian *et al.*, 2006).

Knowledge development maps: These maps are used to display the essential steps to develop a positive capability, either individually, as a team, or as an organizational entity. They can deal as visualized learning that gives a general idea for organizational learning. Additionally they offer learning content structure maps and learning reviewing/repetition maps.

Knowledge structure maps: They highlight global structural design of knowledge area. This type of k-maps assists the manager in realizing and interpreting an expert domain (Nohr, 2000).

Knowledge identification maps: They give a graphic overview on knowledge assets and points to their locations/coordinates.

Knowledge application maps: These maps show which sort of knowledge has to be applied at a definite process stage or in a precise business situation. They show which knowledge is necessary for carrying out certain processes.

Knowledge utilization maps: They envisage procedures and connect them with knowledge demands, knowledge bearers and knowledge assets (Nohr, 2000).

Knowledge asset maps: They follow the features of typical territory maps and organize information according to geographical norm (Probst *et al.*, 1999). For example, the share of professors' who actively do research for each university of applied sciences.

The knowledge flow maps: They represent the order in which knowledge resources should be used rather than a map of knowledge (Eppler, 2004).

Knowledge networked maps: They are represented for the system of planned opinion and performing, making sense of complex problems, and communicating with others (Buzan and Buzan, 1996).

Typographic knowledge maps: They provide the capability of locating persons with specific skills and levels of knowledge.

7.2. Purposes and Uses of K-Maps

The purposes of k-maps are as follows (Eppler, 2004):

- They increase the visibility of knowledge sources and facilitate and accelerate the practice of situating appropriate capability.
- They progress the estimation of rational belongings and liabilities in an institute.
- They help the workers to examine and estimate knowledge area.
- They connect processes with knowledge sources, so that they find most items in manuals.
- They sketch the necessary steps for knowledge development in a certain area.

A k-map is used to imagine the basis of knowledge of organizations (Becker *et al.*, 2008). It is exercised in a prototype of an agent based KM system, where a staff agent is found that plays the role of assistant of a member of the maintenance team (Rodríguez *et al.*, 2004). This covers functions, such as, knowledge audit, a network survey and creating a map of the connection of knowledge assets to the core business process (Wikipedia, 2016).

Further k-map displays an efficient strategy for educators, learners, professionals and researchers to contract with a large quantity of information on the web (Okada, 2007). K-maps are common tools used in KM to visually assess the locations of understanding within an institution. The uses of k-maps are as follows (Varney, 2014):

- to identify knowledge sharing opportunities,
- to identify opportunities to reuse information,
- to identify knowledge dependencies and barriers,
- to compile company's internal/external locators,

- to categorize value-added information,
- to precursor to developing communities of practice, and
- to input to after action reviews or lessons learned.

7.3. Advantages of K-Maps

K-maps serve as repositories of knowledge bearers, knowledge assets, knowledge sources, knowledge structures and knowledge utilizations (Kilian *et al.*, 2006). Advantages of k-maps are as follows (Eppler, 2004):

- Organizational knowledge assets become visible for all employees that have access to the intranet, provide a systematic context for the recovery of mentioned information.
- They incorporate the experts to help the beginners.
- Specialists find them much easier to find certain knowledge, experiences, and questions, often related to products or clients.
- Potential to make implicit knowledge explicit by the use of illusion metaphors and symbols.
- They are often used as an important input for strategic planning.
- They show the academic asset of institutions and to make them more manageable. The intelligence that is provided in due course provides important opportunities for the commercialization of knowledge in latest business process.
- Local and middle managements find k-maps helpful in better understanding the training needs of their department, the deficiency of certain knowledge or experiences and the possibilities to exchange.
- The management team of the society will find great benefit in the k-map summarizes competencies and experiences and how they relate to clients or markets.

7.4. Benefits of K-Map

A k-map can clarify vague knowledge, enabling users and learners to easily find desired knowledge. It can enhance the excellence of education materials for potential learners (Yang, 2007).

K-map helps an organization to realize how the loss of staff influences intellectual capital, to assist with the selection of terms, and to match technology to knowledge needs and processes. Benefits of k-map are as follows (Wikipedia, 2016):

1. To encourage reuse and prevent reinvention, saving search time and acquisition costs.
2. To get opportunities and restrictions for the knowledge flow.
3. To create knowledge structure for sharing and exchanging among the employees
4. To gather support for new knowledge plans to improve the knowledge assets.
5. To find financial benefit.
6. To detect the location of efficient learning communities of practice.
7. To give the guideline for the improvement in KM schemes.
8. To lessen the load on experts for finding critical information quickly.
9. To supply an inventory and valuation of rational and intangible assets.
10. To provide research for designing knowledge architecture or a corporate memory.

7.5. Disadvantages of K-Maps

Disadvantages for k-map users and k-map designers are as follows (Eppler, 2004):

- The danger of misinterpretation and the hard representation of active processes.
- The danger of using an outdated map and the difficult and long work of ergonomic visualization.
- The huge destructive effects if the map is found by illegitimate users.
- The fixation of one outline of location and the relatively high costs for production and updating.

8. KNOWLEDGE ACQUISITION

Knowledge acquisition (KA) is the procedure by which employees gain knowledge based on internal sources, that is, from their colleagues, from documentation, databases, and also getting the knowledge into the organization from external sources to its internal surroundings through using knowledge based resources to difficult problems (Al-Saiyd *et al.*, 2011). It is obtained by sharing experience, by observation and imitation (Hall and Andriani, 2002) which includes the elicitation, collection, analysis, modeling and validation of knowledge for KM projects. For KA, knowledge experts consult reference materials, databases, and human experts, sometimes with the help of a machine learning program (Yost, 1993). KA is a common expression that used for the progression of computational problem solving model to build program which will be used as advisory role which called expert systems (Duda and Shortliffe, 1983). To acquire expert knowledge through KA we need four steps: i) selecting a problem to be solved, ii) interviewing an expert, iii) codifying the knowledge using a suitable representation language which knowledge basis by testing it (Clancey, 1986).

There are several methods and techniques for KA are as follows (Vlaanderen, 1990; Patil *et al.*, 2009):

Manual methods: In these methods the knowledge engineers extract expert knowledge and then code them in suitable formats. Examples are, interviewing, process tracking, protocol analysis, observation, case analysis, critical incident analysis, discussions with the users, commentaries, and brainstorming.

Semi-automatic methods: These methods increase the output of cognitivians and experts. Some methods support exports in building a knowledge base, without cognitivians help and other methods support cognitivians in executing the specific phases of the KA quickly without others help.

Automatic methods: By these methods the activities of the experts are reduced or eliminated.

KA is an important issue in KM. Efficiency and effectiveness of KM depend on the KA phase (Bouthillier and Shearer, 2002). KA has developed methods for collecting and structuring knowledge which is useful for KM as follows (Milton *et al.*, 1999):

Laddering: Creating hierarchies of knowledge elements (e.g., processes and requirements).

Card sorting: Grouping of objects or concepts into classes, using the metaphor of sorting cards into piles.

Repertory grids: Using private construct theory to identify attributes in a domain and grouping objects or concepts according to how similar they are with respect to the attributes.

9. SHARING AND TRANSFERING OF KNOWLEDGE

The concept of knowledge transferring was first proposed by Teece and Nonaka, who believes that, technology transfer, may help organizations with the accumulation of valuable knowledge which is behavior to technical dispersion (Teece and Nonaka, 2001).

Knowledge transfer is given as “An exchange of knowledge in which the center is on structural capital (knowledge is built into processes, products, or services) between groups, within organizations and between organizations” (Schwartz, 2006).

Knowledge sharing is given as “An exchange of knowledge between two persons: one who communicates knowledge and one who absorbs it. Moreover, in knowledge sharing process, the focus is on human capital and the communication of individuals” (Schwartz, 2006).

Knowledge sharing is the procedure of mutually exchanging knowledge that jointly creates an advanced knowledge (Van and De Ridder, 2004). It is a movement by which knowledge is swapped among individuals and organizations. It promotes the professional skill and competence among employees (Park and Im, 2003; Semradova and Hubackova, 2014).

Since both terms (knowledge sharing and transfer) are recognized as critical at the same time as they sometimes are used synonymously (Paulin and Suneson, 2012). Sharing and transfer of knowledge are good techniques to exchange knowledge among the organizations which help organizations to explain their level of knowledge internally and externally (Alavi, 2000). Transfer of knowledge throughout people movement can be the best and effective way and it allows the adaptation of knowledge to adjust with the subsidiary’s business purposes (Boonyarith, 2012).

Research shows that we have five main elements in effective knowledge transfer as follows (Zarinpoush and Conn, 2006; Zarinpoush *et al.*, 2007):

Audience: Potential users of knowledge can differ widely with the backgrounds and needs of them. They may include community leaders, media representatives, academics, government officials, nonprofit organizations, and volunteers. To share one’s knowledge effectively, audience is essential and focus on how they will receive and use the knowledge.

Message: The message should be clear, concise, and actionable. It is basis on a body of knowledge, and not merely reporting the consequences of an individual study. It should be consistent with, or refer to, other available messages.

Messenger: The reliability of the messenger must be explained in order to increase the success of the knowledge transfer.

Activities: The knowledge share such as, face-to-face meetings, are very effective than others.

Effects: To realize the usefulness of knowledge transfer, one should identify the effects her wish to have on the audience and decide how she will measure the consequences.

9.1 Obstruction in Knowledge Transfer

The origin of knowledge may influence knowledge transfer due to its knowledge level, attitude, perceptions and techniques employed to transfer knowledge. If the foundation of knowledge is not seen to be reliable, trustworthy or knowledgeable, effective transfer may not occur. For example, the fear of losing ownership, privilege and lack of reward for sharing knowledge may obstruct knowledge transfer (Szulanski, 1996).

Knowledge transfer barriers can exist not only at individual levels but also exist at organizational levels. Individual barriers are mutual mistrust, lack of experience, and negative attitudes. Institutional barriers are unsupportive working culture, competing interests, top levels of workplace bureaucracy and short of the equipment and resources available for knowledge transfer (Mitton *et al.*, 2007).

Knowledge transfer barriers have been seen in the following three areas (Paulin and Suneson, 2012): i) lack of knowledge about something depending on barriers for knowledge transfer, ii) not enough knowledge depending on level of education in a certain area or about a particular topic, and iii) the short of sufficient information to use it and convert the information to knowledge.

Personality, language, attitude, work norms, vocational reinforces, organizational culture, policies and strategies are main barriers to knowledge sharing (Awad and Ghaziri, 2004). The short of experience and capacity of colleagues, the lack of equipment required performing tasks, unsupportive working culture, corruption and nepotism in the workplace and mistrusting from colleagues are restrictions to knowledge transfer (Kuschminder *et al.*, 2014).

Szulanski (1996) identified four categories in difficulties of transferring of knowledge as; i) tacitness, ii) complexity, iii) robustness, and iv) integrity.

Tacitness: When we observe knowledge as a whole uncertainty will increase along with an increase in the level of tacitness and then will be difficult to transfer knowledge (Szulanski, 1993).

Complexity: It is a great problem in knowledge transfer strategy, as recipient's ability of absorption is varied to transfer knowledge. Most of the cases complexity arises when we take attempts to transfer knowledge (Tyre, 1991).

Robustness: Knowledge is considered robust if it is insensible to distinction in the environment. Due to short of experience and an in-depth understanding among individuals becomes often unexplainable (Szulanski, 1993).

Integrity: If a transfer has integrity then it is complete and cohesive. Sometimes in the process the recipient is required to accumulate further new information, knowledge to understand the fill concept (Murray and Hanlon, 2010).

9.2. Benefit in Knowledge Transfer

Knowledge transfer has some beneficial sides. Individual benefits are creativity, flexibility, problem solving, high quality job performance, job satisfaction, and mental health (Amini *et al.*, 2014). Knowledge transfer brings immense benefits to the universities for higher education (Collins, 2012).

Knowledge transfer service has two benefits; immediate benefits which are realized at our structured workshops and long-term benefits which are realized by the implementation of high quality documentation or models. The advantages of knowledge transfer are as follows (Argote and Ingram, 2000; Wikipedia, 2016):

- New staffs become effective more quickly.
- New strategic capability related to the company.
- Increase in profitability and competitiveness.
- Existing workforce enhanced with sharing of knowledge and skills.
- Opportunity to create an impression in the organization.
- Protection from the threats linked with over dependence on individuals.
- Increased potential to outsource or off-shore work.
- Publish high quality research papers.
- Averting of long-term tie-in to the selected outsource/off-shore partner.
- Greater flexibility of resource pool.
- Quicker resolution of problems/issues.
- Greater understanding by staff making them active in their function.

10. CONCLUSION

We have discussed the concept of knowledge, knowledge creation, knowledge mapping, knowledge acquisition, and transfer of knowledge. At present knowledge becomes a very important and valuable asset of every organization. Hence, we have emphasized on the proper utilization of knowledge in institutions and have discussed the characteristics of knowledge with examples. Although the SECI model is prepared on Japanese management cultural practices, it is adjusted of course with western culture. Here we have given importance on both TK and EK. We have made an effort to show the relation between them. We also describe the conversions of TK and EK. We have discussed knowledge mapping with some details and it is a new way of representation of modern knowledge. In the present globalized world every organization should stress on knowledge management strategy for the progress of the sustainable economy.

REFERENCES

- Adler, P.S., 1995. Comment on I. Nonaka. Managing innovation as an organizational knowledge creation process. In J. Allouche and G. Pogorel (Eds.), *Technology management and corporate strategies: A tricontinental perspective*. Amsterdam: Elsevier. pp: 110-124.
- Al-Saiyd, N.A., A.H. Mohammad, I.A. Al-Sayed and M.F. Al-Sammarai, 2011. Distributed knowledge acquisition system for software design problems. *European Journal of Scientific Research*, 62(3): 311–320.
- Alavi, M., 2000. Managing organizational knowledge, In R. W. Zmud (Ed.), *Framing the domains of IT management: Projecting the future.....through the past*, pinnaflex educational resources. Cincinnati, Ohio: 15–28.
- Alavi, M. and D.E. Leidner, 2001. Knowledge management and knowledge management systems: Conceptual foundations and research issues. *MIS Quarterly*, 25(1): 107–136.
- Alston, W., 1989. *Epistemic justification, essays in the theory of knowledge*. Ithaca: Cornell University Press.
- Alvesson, M. and D. Kärreman, 2001. Odd couple: Making sense of the curious concept of knowledge management. *Journal of Management Studies*, 38(7): 995–1018.
- Amini, H., R. Imanzadeh, M. Rahmanian, N. Afravi, M. Bay and M. Sedaghat, 2014. The role of TK transfer in empowering the employees of physical education departments. *Biological Forum—An International Journal*, 6(2): 208–212.
- Argote, L. and P. Ingram, 2000. Knowledge transfer: A basis for competitive advantage in firms. *Organizational Behavior and Human Decision Processes*, 82(1): 150–169.

- Argote, L., B. McEvily and R. Reagans, 2003. Managing knowledge in organizations: An integrative framework and review of emerging themes. *Management Science*, 49(4): 571–583.
- Aristotle, 1928. Volume Analytical posterior. In the Oxford translation of aristotle: (Translated by G. R. G. Mure and W. D. Ross). Oxford: Oxford University Press, 1: 83–94.
- Awad, E.M. and H.M. Ghaziri, 2004. Knowledge management. Upper Saddle River, N.J: Prentice Hall.
- Badaracco, J.J.L., 1991. The knowledge link: How firms compete through strategic alliances. Boston: Harvard Business School Press.
- Baumard, P., 2001. Tacit knowledge in organizations. London: Sage Publications.
- Becker, J., R. Knackstedt, M. Matzner and J. Poepelbuss, 2008. The research map of hybrid value creation: A repository for research results. In: Proceedings of the RESER, Stuttgart.
- Blackler, F., 1995. Knowledge, knowledge work and organizations: An overview and interpretation. *Organization Studies*, 16(6): 1021–1046.
- Blomberg, J. and A. Werr, 2006. Boundaryless management-creating, transforming and using knowledge in inter-organizational collaboration: A literature review. SSE/EFI Working Paper Series in Business Administration: 1403–4433.
- Bock, G.W., R.W. Zmud, Y.G. Kim and J.N. Lee, 2005. Behavioral intention formation in knowledge sharing: Examining the roles of extrinsic motivators, social-psychological forces, and organizational climate. *Journal of MIS Quarterly*, 29(1): 87–111.
- Bonner, D., 2000. Knowledge from theory to practice to golden opportunity. *American Society for Training and Development*, September–October: 12–13.
- Boonyarith, S., 2012. The effect of HRM practices on MNC subsidiaries' knowledge transfer in Thailand. *Journal of Information & Knowledge Management*, 11(3): 1–24.
- Bouthillier, F. and K. Shearer, 2002. Understanding knowledge management and information management: The need for an empirical perspective. *Information Research Journal*, 8(1): 1–39.
- Brooking, A., 1999. Corporate memory: Strategies for knowledge management. London: International Thomson Business Press.
- Brown, J.S. and P. Duguid, 1991. Organizational learning and communities of practice: Towards a unified view of working, learning and innovation. *Organization Science*, 2(1): 40–57.

- Buzan, T. and B. Buzan, 1996. *The mind map book: the mind map book: how to use radiant thinking to maximize your brain's untapped potential*. Plume.
- Čavalić, A. and E. Ilguen, 2012. Knowledge maps & knowledge mapping: Literature review. 3rd International Symposium on Sustainable Development, May 31-June 01, 2012, Sarajevo. pp: 373–380.
- Chalmers, A., 1999. *What is this thing called science*. 3rd Edn., St. Lucia, Queensland, Australia: University of Queensland.
- Chini, T.C., 2005. *Effective knowledge transfer in multinational corporations*. Gordonsville, VA: Palgrave Macmillan.
- Cipriano, P.F., 2007. Celebrating the art and science of nursing. *American Nurse Today*, 2(5): 8.
- Clancey, W., 1986. Transcript of plenary session: Cognition and expertise. 1st AAAI Workshop on Knowledge Acquisition for Knowledge Based Systems, Banff, Canada.
- Collins, H., 1993. The structure of knowledge. *Social Research*, 60(1): 95–116.
- Collins, J., 2012. Perspectives from the periphery? Colombo plan scholars in New Zealand universities. *History of Education Review*, 41(2): 129–146.
- Cong, X. and K.V. Pandya, 2003. Issues of knowledge management in the public sector. *Electronic Journal of Knowledge Management*, 1(2): 25–33.
- Crowley, B., 2000. Knowledge management for the information professional. In K. Srikantaiah and M. Koenig (Eds.), *Tacit knowledge and quality assurance: Bridging the theory-practice divide*. Medford, N.J: Informational Today Inc.
- Davenport, T.H., 1997. *Information ecology*. New York: Oxford University Press.
- Davenport, T.H. and L. Prusak, 1997. *Working knowledge: How organizations manage what they know*. Boston, MA, USA: Harvard Business School Press.
- DeCarolis, D.M. and D.L. Deeds, 1999. The impact of stocks and flows of organizational knowledge on firm performance: An empirical investigation of the biotechnology industry. *Strategic Management Journal*, 20(10): 953–968.
- Drucker, P.F., 1989. *The new realities*. New York, USA: Harper-Collins Publishers.
- Drucker, P.F., 1999. Knowledge-worker productivity: The biggest challenge. *California Management Review*, 41(2): 79-94.
- Duda, R.O. and E.H. Shortliffe, 1983. Expert systems research. *Science*, 220 (4594): 261–268.

- Ekore, J.O., 2014. Impact of key organizational factors on knowledge transfer success in multi-national enterprises. *Management*, 19(2): 3-18.
- Empson, L., 2001. Introduction: Human relations. Special Issue on Knowledge Management in Professional Service Firms, 54(7): 811–817.
- Eppler, M., 2004. Making knowledge visible through knowledge maps: Concepts, elements, cases. In *Handbook on Knowledge Management, Part 1: Knowledge Matters*, Springer Science and Business Media B.V.
- Faucher, J.P.L., 2010. Reconceptualizing knowledge management: Knowledge, social energy, and emergent leadership in social complex adaptive systems. PhD Thesis, University of Otago, Dunedin, New Zealand.
- Gajda, J., 2015. The role of thrust in knowledge management organization. *Journal of Interdisciplinary Research*, 5(1): 19–21.
- Gill, P.J., 2000. On the trial of knowledge. *Knowledge Magazine*. Available from <http://www.destinationkm.Com/article/default:asp>.
- Gourlay, S. and A. Nurse, 2005. Flaws in the engine of knowledge creation: A critique of Nonaka's theory. In Anthony F. Buono and Flemming Poulfelt (Eds.), *Challenges and issues in knowledge management*. Greenwich, Connecticut, USA: Information Age Publishing. pp: 293–315.
- Grenon, P., 2003. Knowledge management from the ontological standpoint. Paper Presented at the Proceedings of the WM 2003 Workshop on Knowledge Management and Philosophy, Luzern.
- Grey, D., 1999. Knowledge mapping: A practical overview. Available from <http://kmguru.tblog.com/post/98920>.
- Gueldenberg, S. and H. Helting, 2007. Bridging 'the great divide: Nonak's synthesis of 'Western' and 'Eastern' knowledge concepts reassessed. *Organization*, 14(1): 101–122.
- Gupta, A. and N.T. Deotale, 2014. A mining method to create knowledge map by analyzing the data resource. *International Journal of Engineering Trends and Technology*, 9(9): 430–435.
- Haldin-Herrgard, T., 2000. Difficulties in diffusion of tacit knowledge in organizations. *Journal of Intellectual Capital*, 1(4): 357–365.
- Hall, R. and P. Andriani, 2002. Managing knowledge for innovation. *Long Range Planning*, 35(1): 29–48.

- Hasanali, F., 2004. Critical success factors of knowledge management. In E. Koenig and T. K. Srikantaiah (Eds.), *Knowledge management, lessons learned ...*, ASIST monograph series. Medford, NJ: Information Today. pp: 55–69.
- Hayes-Roth, F. and N. Jacobstein, 1994. The state of knowledge-based systems. *Communications of the ACM*, 37(3): 27–39.
- Hegel, G.W.F., 1977. *Hegel's phenomenology of spirit* (Translated by Miller AV). Oxford: Oxford University Press.
- Henderson, K., 1995. The visual culture of engineers, In S. Star (Ed.), *The cultures of computing*. Oxford, UK: Blackwell Publishers/The Sociological Review. pp: 196-218.
- Herschel, R.T. and N.E. Jones, 2005. Knowledge management and business intelligence: The importance of integration. *Journal of Knowledge Management*, 5(4): 45–55.
- Hildreth, P.M. and C. Kimble, 2002. The duality of knowledge. Information Research Paper No. 142, 8(1). Available from <http://informationr.net/ir/8-1/paper142.html>.
- Husserl, E., 1931. *Ideas: General introduction to pure phenomenology* (Translated by Royce Gibson WR). London: Allen and Unwin.
- Ichijo, K., 2004. From managing to enabling knowledge, In H. Takeuchi and I. Nonaka (Eds.), *Hitotsubashi on knowledge management*. Singapore: John Wiley & Sons (Asia) Pvt. Ltd. pp: 125–152.
- Ipe, M., 2003. Knowledge sharing in organizations: A conceptual framework. *Journal of Sage*, 2(4): 337-359.
- James, W., 1966. *Psychology: The brief course*, G. Allport (Ed.). New York: Harper and Row.
- Jashapara, A., 2004. *Knowledge management: An integrated approach*. London: Pearson Education Ltd.
- Jullien, F., 2000. *Detour and access: Strategies of meaning in China and Greece* (S. Hawkes, Trans.). New York, NY: Zone Books.
- Khan, A.A.A., T. Sharfudeen and P.S.A. Khader, 2013. Tacit knowledge codification for academic institutions. *International Journal of Research in Advance Technology in Engineering*, 1: 26–29.
- Kidwell, J.J., L.K.M. Vander and S.L. Johnson, 2000. Applying corporate knowledge management practices in higher education. *Educause Quarterly*, 4(23): 28–33.

- Kilian, D., R. Krismer, S. Loreck, A. Sagmeister and K. Sigl, 2006. Wissensmanagement. Aufl., Innsbruck: Werkzeuge für Praktiker. 2.
- Klicon, 1999. The role of information technology in knowledge management within the construction industry, project report of knowledge learning in construction group at the centre for research in the management of projects. University of Manchester Institute of Science and Technology.
- Kogut, B. and U. Zander, 1992. Knowledge of the firm, combinative capabilities, and the replication of technology. *Organization Science*, 3(3): 383–397.
- Koskinen, K.U., P. Pihlanto and H. Vanharanta, 2003. Tacit knowledge acquisition and sharing in a project work context. *International Journal of Project Management*, 21(4): 281–290.
- Kupers, W., 2005. Phenomenology of embodied implicit and narrative knowing. *Journal of Knowledge Management*, 9(6): 114–133.
- Kuschminder, K., G. Sturge and N. Ragab, 2014. Contributions and barriers to knowledge transfer: The experience of returning experts. Germany: CIM Paper Series No. 7, Centre for International Migration and Development (CIM).
- Lam, A., 2000. Tacit knowledge, organizational learning and societal institutions: An integrated framework. *Organization Studies*, 21(3): 487–513.
- Lambiotte, J., D. Dansereau, D. Cross and S. Reynolds, 1989. Multirelational semantic maps. *Educational Psychology Review*, 1(4): 331–367.
- Levine, M., 2003. Can the concept of enlightenment evolve? *Asian Philosophy*, 13(2-3): 115–129.
- Locke, J., 1987. *An essay concerning human understanding: Book II*. Oxford: Oxford University Press.
- Magnier-Watanabe, R., C. Benton and D. Senoo, 2011. A study of knowledge management enablers across countries. *Knowledge Management Research & Practice*, 9(1): 17–28.
- Mahmood, A., M.A. Qureshi and Q. Shahbaz, 2011. An examination of the quality of tacit knowledge sharing through the theory of reasoned action. *Journal of Quality and Technology Management*, 7(1): 39–55.
- Marx, K., 1976. *Capital*. Hammondsworth: Penguin.
- Maturana, H.R. and T.J. Varela, 1980. *Autopoiesis and cognition*. London: Reidl.
- McKenzie, J.S., 2001. The unwired classroom: Wireless computers come of age. *Educational Technology*, 10(4): 19–28.

- Milton, N., N. Shadbolt, H. Cottam and M. Hammersley, 1999. Toward a knowledge technology for knowledge management. *International Journal of Human-Computer Studies*, 51(3): 615–641.
- Mitton, C., D. Adair, E. McKenzie, S. Patten and P.B. Waye, 2007. Knowledge transfer and exchange: Review and synthesis of the literature. *Milbank Quarterly*, 85(4): 729–768.
- Mohajan, H.K., 2016. Sharing of tacit knowledge in organizations: A review. *American Journal of Computer Science and Engineering*, 3(2): 6–19.
- Mohamed, A.H., 2008. Capturing software-engineering tacit knowledge. 2nd European Computing Conference (ECC '08) Malta, September 11–13, 2008.
- Montazemi, A.R., 1999. Case-based reasoning and multi-agent systems in support of tacit knowledge. AAAI Technical Report WS-99-10.
- Mungai, G.C.N., 2014. Tacit knowledge management in public institutions in Kenya: A case of the Kenya institute for public policy research and analysis (Kippra). Nairobi, Master Thesis, University of South Africa.
- Murray, A. and P. Hanlon, 2010. An investigation into the stickiness of tacit knowledge transfer. 13th Annual Conference of the Irish Academy of Management, Cork Institute of Technology, 1–3 September, 2010.
- Myers, P., 1996. Knowledge management and organizational design. Oxford: Butterworth-Heinemann.
- Nasimi, M.H., S. Nasimi, M.S. Kasmaei, H.S. Kasmaei, F. Basirian and H. Musapour, 2013. Knowledge and competitive advantage for organizations. *Kuwait Chapter of Arabian Journal of Business and Management Review*, 2(5): 56–64.
- Nohr, H., 2000. Wissen und wissensprozesse visualisieren. Arbeitspapiere Wissensmanagement. Hrsg.: Fachhochschule Stuttgart– Studiengang Informationswirtschaft. Nr.1/2000.
- Nonaka, I., 1991. The knowledge-creating company. *Harvard Business Review*, 69(6): 96–104.
- Nonaka, I., 1994. A dynamic theory of organizational knowledge creation. *Organization Science*, 5(1): 14–37.
- Nonaka, I. and H. Takeuchi, 1995. The knowledge-creating company: How Japanese companies create the dynamics of innovation. New York: Oxford University Press.
- Nonaka, I., R. Toyama and N. Konno, 2000. SECI, Ba and leadership: A unified model of dynamic knowledge creation. *Long Range Planning*, 33(1): 4–34.

- Nonaka, I., R. Toyama and N. Konno, 2001. Emergence of Ba: A conceptual framework for the continuous and self-transcending process of knowledge creation. In I. Nonaka and T. Nishiguchi (Eds.), *Knowledge emergence, social, technical, and evolutionary dimensions of knowledge creation*. New York: Oxford University Press. pp: 13-29.
- Nonaka, I. and K.G. Von, 2009. Tacit knowledge and knowledge conversion: Controversy and advancement in organizational knowledge creation theory. *Organization Science*, 20(3): 635–652.
- Nozick, R., 1981. *Philosophical explanations*. Cambridge, MA: Harvard University Press.
- Okada, A., 2007. Technologies for open learning in collaborative communities technology. *Knowledge and Society Conference (TKS 2007)*, Cambridge University, January 2007.
- Park, H.S. and B.C. Im, 2003. A study on the knowledge sharing behavior of local public servants in Korea: A structural equation analysis. *Joint Conference of the Tenth International Conference on Advances in Management Korean Association for Public Administration, & Korea Institute of Public Administration*. pp: 50–63.
- Pathirage, C., D. Amaratunga and R. Haigh, 2008. The role of tacit knowledge in the construction industry: Towards a definition. *CIB W89 International Conference on Building Education and Research (BEAR)*, 11–15th February 2008, Sri Lanka, (Unpublished). pp: 204–217.
- Patil, S.S., B.V. Dhandra, U.B. Angadi, A.G. Shankar and N. Joshi, 2009. Web based expert system for diagnosis of micro nutrients' deficiencies in crops. *Proceedings of the World Congress on Engineering and Computer Science 2009, Vol. I, WCECS 2009, October 20-22, 2009, San Francisco, USA*.
- Paulin, D. and K. Suneson, 2012. Knowledge transfer, knowledge sharing and knowledge barriers—three blurry terms in KM. *Electronic Journal of Knowledge Management*, 10(1): 81–91.
- Payne, J. and T. Sheehan, 2004. *Demystifying knowledge management, a best practice guide for the construction industry*. UK: Constructing Excellence.
- Perrin, A. and N. Rolland, 2007. Mechanisms of intra-organizational knowledge transfer: The role of a global technology firm. *Management*, 10(2): 25–47.
- Plato, 1953. *Phaedo*. In *Plato I* (Translated by H. N. Fowler). Cambridge, MA: Harvard University Press/The Loeb Classical Library. pp: 117–124.
- Plotkin, H., 1994. *The nature of knowledge: Concerning adaptations, instinct and the evolution of intelligence*. London: Allen Lane.

- Polanyi, M., 1966. *The tacit dimension*. Chicago, Gloucester, MA: Peter Smith, University of Chicago Press.
- Polanyi, M., 1973. *Personal knowledge*. London, UK: Routledge & Kegan Paul.
- Probst, G., S. Raub and K. Romhardt, 1999. *Wissen managen. Wie unternehmen ihre wertvollste ressource optimal nutzen 3*. Frankfurt/Main: Aufl.
- Roberts, J., 2000. From know-how to show-how: Questioning the role of information and communication technologies in knowledge transfer. *Technology Analysis and Strategic Management*, 12(4): 429–443.
- Robertson, S.L., 2008. Producing? knowledge economies: The world bank, the KAM, education and development. In M. Simons, M. Olssen and M. Peters (Eds.), *Re-reading education policies: Studying the policy agenda of the 21st century*. Netherlands: Sense Publishers.
- Rodríguez, O.M., A.I. Martínez, J. Favela, A. Vizcaíno and M. Piattini, 2004. Understanding and supporting knowledge flows in a community of software developers. *International Conference on Collaboration and Technology*, Springer Berlin Heidelberg, 3198: 52–66.
- Scaruffi, P., 2003. A brief history of knowledge. From 3000 BC to 2001 AD. Available from <http://www.scaruffi.com/know/history.html>
- Schwartz, D.G., 2006. *Encyclopedia of knowledge management*. 1st edition. IGI Global. Hershey, PA: idea group publishing.
- Selamat, M. and J. Choudrie, 2004. The diffusion of tacit knowledge and its implications on information systems: The role of meta-abilities. *Journal of Knowledge Management*, 4(3): 195–203.
- Semradova, I. and S. Hubackova, 2014. Responsibilities and competences of a university teacher. *Procedia–Social and Behavioral Sciences*, 159: 437–441. DOI <http://dx.doi.org/10.1016/j.sbspro.2014.12.403>.
- Sensky, T., 2002. Knowledge management. *Advances in Psychiatric Treatment*, 8(5): 387–396.
- Serban, A.M. and J. Luan, 2003. *Overview of knowledge management*. New Directions for Institutional Research No. 113, Wiley Periodicals, Inc.
- Servin, G. and C. De Brun, 2005. *ABC of knowledge management*. NHS National Library for Health: Knowledge Management Specialist Library. Available from <http://www.library.nhs.uk>.
- Skyrme, D., 1999. *Knowledge networking*. UK: Butterworth-Heinemann.

- Spender, J.C., 1996. Organizational knowledge, learning and memory: Three concepts in search of a theory. *Journal of Organizational Change Management*, 9(1): 63–78.
- Suchting, W., 2006. Epistemology, historical materialism. *Academic Search Premier*, 14(3): 331–345.
- Sulaiman, R.V., L. Thummuru, A. Hall and J. Dijkman, 2009. Tacit knowledge and innovation capacity: Evidence from the indian livestock sector. United Nations University (UNU)-MERIT Working Paper No. 2009–058.
- Szulanski, G., 1993. Intra-firm transfer of best practice, appropriative capabilities and organisational barriers to appropriations. *Academy of Management Best Papers Proceedings*. pp: 47–51.
- Szulanski, G., 1996. Exploring internal stickiness: Impediments to the transfer of best practice within the firm. *Strategic Management*, 17(Winter Special): 27–43.
- Teece, D.J. and I. Nonaka, 2001. *Managing industrial knowledge: Creation, transfer and utilization*. London: Sage Publications Ltd.
- Teece, D.J., G. Pisano and A. Shuen, 1997. Dynamic capabilities and strategic management. *Strategic Management Journal*, 18(7): 509–533.
- Trucano, M., 2005. Knowledge maps: ICTs in education, infoDev: The information for development program. ICTs and the Education MDGS Briefing Sheet. ICT and education series.
- Tsoukas, H., 2003. Do we really understand tacit knowledge? In M. Easterby-Smith and M. Lyles (Eds.), *The Blackwell handbook of organizational learning and knowledge management*. Malden, MA: Blackwell. pp: 410–427.
- Tyre, M., 1991. Managing the introduction of new process technology: International differences in a multi-plant network. *Research Policy*, 20(1): 57–76.
- Van, D.H.B. and J.A. De Ridder, 2004. Knowledge sharing in context: The influence of organizational commitment, communication climate, and CMC use on knowledge sharing. *Journal of Knowledge Management*, 8(6): 117–130.
- Van Doren, C., 1991. *A history of knowledge: Past, present, and future*. New York: Ballantine Books.
- Varela, F., E. Thompson and E. Rosch, 1991. *Embodied mind, cognitive science and human experience*. Cambridge, MA: MIT Press.

- Varney, J., 2014. Applying knowledge flow analysis to create people enabled processes. Building Business Capability (BBC), Business Excellence Practice Lead, APQC.
- Venzin, M., G. Von Krogh and J. Roos, 1998. Future research into knowledge management. In G. von Krogh, J. Roos and D. Kleine (Eds.), *Knowing in firms*. London: Sage Publications.
- Vlaanderen, M.J., 1990. Automated knowledge acquisition for expert systems. PhD Thesis, Faculty of Philosophy, Erasmus University, Rotterdam.
- Von Krogh, G. and J. Roos, 1995. *Organisational epistemology*. New York: Macmillan and St. Martin's Press.
- Wackerhausen, S., 1996. Tacit knowledge and education in education of the 1990ies (Tavs Viden og pædagogik i 90'ernes pædagogik), In S. Hegstrup (Ed.). Denmark: Psika Publishing House. pp: 203–230.
- Wexler, M., 2001. The who, what and why of knowledge mapping. *Journal of Knowledge Management*, 5(3): 249–264.
- Wiig, K., 1993. *Knowledge management foundations*. Arlington, TX: Schema Press.
- Wikipedia, 2016. Wikipedia: Free encyclopedia.
- World Bank, 1998. *The world development report 1998/1999: Knowledge for development*. New York: Oxford University Press. Washington DC.
- World Bank, 2012a. Knowledge for development program (K4D). Available from <http://go.worldbank.org/8DG6O1FOI0>.
- World Bank, 2012b. *The world bank quarterly business and risk review quarter 4 FY12*. Washington DC: World Bank Group.
- Ya-Ping, Z. and W. Yan-Wei, 2012. Enterprise knowledge map: An essential technique for development. 2nd International Conference on Strategy Management and Research, Singapore, July 23-24, 2012.
- Yang, J.B., 2007. Developing a knowledge map for construction scheduling using a novel approach. *Automation in Construction*, 16(6): 806–815.
- Yoon, B., I. Park and K. Lee, 2014. Identifying promising research frontiers based on patent map. *International Journal of Advances in Science and Technology*, International Conference on Advances in Science and Technology (ICAST) held on February 15th 2014 at Pattaya, Thailand: 77–83.
- Yost, G.R., 1993. Knowledge acquisition in soar. *IEEE Expert*, 8(3): 26–34.

Zander, U. and B. Kogut, 1995. Knowledge and the speed of transfer and imitation of organizational capabilities: An empirical test. *Organisation Science*, 6(1): 76–92.

Zarinpoush, F. and L.G. Conn, 2006. Knowledge transfer imagine. Canada: Canada Volunteerism Initiative.

Zarinpoush, F., S.V. Sychowski and J. Sperling, 2007. Effective knowledge transfer and exchange for nonprofit organizations: A framework, imagine. Canada: Canada Volunteerism Initiative.