Knowledge Transfer in Organizations: A Review of the Literature

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要　旨

本稿は、企業の競争優位の源泉である知識とその移転・継承に関する研究をレビューし、既存研究の新たな傾向を踏まえつつ、いまだ十分に展開されていない研究領域を明らかにすることを目的とする。最初に、知識の定義、特性を明らかにした上で、知識の類型化について考察する。次に知識移転・継承に関する理論及び実証研究を分析し、知識の効果的移転を実現させる条件と知識移転を妨げる要因について検討する。最後に、知識移転は組織間、組織内のサブユニット間、個人間のレベルで存在することを示したうえで、個人レベルでの研究が不十分であることを明らかにする。

Keywords : knowledge, knowledge transfer, review

Introduction

Responding to such contemporary social and economic trends as globalization, information technology (Bartel, Ichniowski & Shaw, 2007), and the knowledge-centric view of the firm (Grant, 2002; Prusak, 2001) knowledge management and its transfer has become a crucial issue both in academic research and industrial practice (e.g.,Alavi & Leidner, 2001; Kogut & Zander 1992; Orlikowski, 2002).

Knowledge management embraces individual and organizational activities through which organizations develop their knowledge base (De Long, 2004). Knowledge transfer in its turn allows an organization to reap the leveraged benefits of knowledge. In this context, knowledge transfer refers to the process and outcomes by which one unit (individual, group, department, or organization) is affected by the experience of others (Argote & Ingram, 2000). Accordingly, this study adopts the Davenport & Prusak (2000) definition of knowledge that is understood as a fluid mix of framed experience, values, contextual information, and expert's insights. Given definition captures both highly intellective *know-why* and practical *know-what* and *know-how* facets of knowledge.

Increasingly, economists and industry and academia agree that a firm can best be seen as a coordinated

collection of capabilities (Teece, Pisano, & Shuen, 1997; Von Krogh & Grand, 2002), somewhat bound by its own history, and limited in its effectiveness by its current cognitive and social skills (Cohen & Levinthal, 1990; Simon, 1991). The main building block of these capabilities is knowledge, especially the knowledge that is mostly tacit and specific to the firm (Nonaka, Hirata & Toyama, 2008; Nonaka & Takeuchi, 1995; Teece et al., 1997).

Extensive research suggests that an organization's ability to transfer this knowledge effectively improves such range of activities as learning (e.g., Epple, Argote, & Devadas, 1991; Van der Krogt, 1998), competence (e.g., Boisot, Griffiths, & Moles, 1997), coordination (e.g., Ringberg & Reihlen, 2008), buffers the firm against disruptive effects from employee turnover, and eventually serves as a primary source for a firm's competitive advantage, growth and development (e.g., Argote & Ingram, 2000).

Knowledge in various forms, at different levels, as both dependent and independent variables has been discussed as a central construct in a broad range of management research fields (Minbaeva, Foss & Snell, 2009). Despite the voluminous literature exists, a lack of conceptual unity and mixed empirical evidence can still be observed (Inkpen, 2008). Such failures mislead the practitioners in their strides to establish somewhat solid grounds for practical guidelines.

This study aims to review both conceptual and empirical findings in the knowledge transfer area in order to define the core terms – knowledge, skills, and knowledge transfer– and systematize leading relevant theories. It is also targets at defining underdeveloped theoretical zone – aspects which are not explicitly covered by contemporary scholarly tradition. The study concerned with identifying the emerging tendencies in the realm of knowledge transfer.

In order to hit the target I firstly identify, describe, and typify sundry definitions of knowledge. I also explore some dominant and emerging epistemic foundations of knowledge transfer and describe principle knowledge and skills transfer models focusing on their commonalities as well as peculiar postulates. Further, deriving from empirically-based studies I scrutinize factors promoting or hampering knowledge transfer effectiveness. Finally, I endeavour to provide a narrative and graphical system of the process of knowledge movement within and between organizations, and systematize firmly established (macro) and in-the-making (micro as well as multi-level) levels of analysis. In the final section, I present some overview remarks, speculate about possible managerial implications and outline directions for the future research.

Pursuing to compose as complete picture of the knowledge transfer theory as possible, an extensive database search (ABI-INFORM, ERIC, Business Source Elite) along with a manual search of major journals

(e.g., *Academy of Management Journal, Strategic management Journal, Organization Science, Administrative Science Quarterly, Journal of Management Studies, Journal of Applied Psychology, Personnel Psychology*) has been conducted. For a better understanding of the most recent shifts, unpublished studies (*ProQuest* Digital Dissertations and conference proceedings) complemented by browsing the CiNii Scholarly and Academic Information Navigator, were also included. This work builds upon the findings of both narrative and quantitative studies.

Research Background

The Changing Nature of Workforce and Knowledge

Put in a Japanese landscape, globalization makes the survival of manufacturing industries heavily dependent on whether or not increasingly strict requirements for quality, time and costs are adequately addressed. In this respect, large-scale as well as small- and medium-sized industries directly rely and depend on employees' knowledge and skills for their productivity (Watanuki, 2007).

However, a labour shortage plagues Japanese manufacturing, and it is expected to worsen in the years ahead as two forces conspire to starve companies of their most valuable resource: various circumstances at the plant work-floor deter younger generation from considering a job in manufacturing, while experineced employees are heading towards retirement (Asai, Minaduki, Hayashi, & Kunifuji, 2006; Kubota, 2006). Consequently, less human resources available and stricter cost-down movements should be compensated by a higher individual productivity (Mori, 2005)[1].

Changing workforce demographics such as the staff aging, the outflow of talented people due to industrial restructuring etc., are only one part of the problem. Over the past 30 years industrialized world has experienced unprecedented advance in technology and scientific domain, made possible by the proliferation of IT. Organizations are put into a knowledge-intensive environment, where an every-day work often becomes interdisciplinary and requiring integration of a wide-range expertise. Whatever industry is, the cumulative knowledge gained throughout collective working with others in an environment integrating complex specialties creates kinds of expertise that are very hard not only to replicate but even to grasp (De Long, 2004). It means that veterans retiring from an organization these days are taking away work-related knowledge and skills that could not have been imagined a generation ago.

It is empirically evident that adoption of new types of work practices accompanied by the extensive use of new computer technologies yields a significant increase in shop floor skills demand (Bartel et al.,2007). Particular demand is demonstrated in terms of multi-skilling, problem-solving and engineering skills. Such critical to the production process knowledge is located in the workers' brains and not in the elements of management system. Hence, the difficulty of finding replacements for the experts by new recruits is only a small part of the challenge. The knowledge in its sophisticated context-specific form that resides with the veterans will unavoidably be lost once the worker retires and that will have an immediate although often hidden impact on productivity (De Long, 2004). It is thus not enough to replace retiring experienced worker physically, what is critically important is to have a newcomer fully equipped with a required context-specific expertise.

Research in cognitive psychology (e.g., Simon, 1991) understands human expertise as based on extensive knowledge. Following Simon (1991) and Ericsson (1996), other researchers concluded that no one becomes an expert with less than *ten years* of full-time dedication to learning (Matsuo, Hosoi, Yoshino, & Kusumi, 1999). Koike (1997) found that to be mastered fully every particular manufacturing skill takes from 3 to 15 years of the on-the-job training. At the same time, Autor, Levy and Murnane (2003) revealed that increased need for non-routine cognitive skills, which they coin an "expert thinking", goes along with lower demand for the routine machining skills. Paired with considerable attainment in automation demonstrated by manufacturing sites[2] it cuts the necessity for traditional manufacturing skills and deprives novice worker of the daily task practises, hence, taking those particular knowledge away.

Approaches to Industrial Knowledge Transfer

Extensive literature (e.g., Matsuo, 2006; Mori, 2005; Watanuki & Kojima, 2006) developed around the so-called "2007 problem"[3] describe 3 main approaches that modern manufacturing organizations are to take in order to cope with the strains and limitations briefly addressed above. Namely, 1) reemployment and extensive hiring approach[4]; 2) IT approach - to record as much individual-reside experience-based knowledge possessed by veteran employees as possible, while they are still employed; and 3) OJT training and human resource development approach - to enable direct process of skills and knowledge succession from veterans to novices.

Knowledge and skill digitalization and computerization aiming to pass on tacit knowledge in the

context of production found a vigorous support from the state, research and practitioner world (Mori, 2005). According to conventional understanding, about 70-80 percent of operations can be captured and transferred through such scientific approaches as industrial engineering (Yamamoto & Mori, 2002). Therefore, enormous effort from academia and practitioners from all around Japan is devoted to development of an interactive high-level skill transfer systems using multimedia and virtual reality technology (Mori, 2005; Watanuki & Kojima, 2006; Yamamoto & Mori, 2002).

However, recent findings have proved that digitalization approach has its discrepancies. A telling example is Asahi Glass Company's case reported by Nikkei Business[5]. Recording an experiment how an experienced employee identified a process problem by listening to a sound of melting glass, it became evident that the video-recorded "problematic" sound was not distinguished from the normal. Even after 70 percent of operation had been successfully grasped, captured and imbedded in computer-based technology transfer systems, the remnant of 20-30 percent – that same difficult for formalization – turned to be crucial and decisive in the situational judgment of the individual employee (Nonaka et al., 2008). This difficulty to be recorded or verbalized can be well explained by known dualism of knowledge per se, specifically by its explicit and tacit nature (Nonaka & Takeuchi, 1995; Polanyi, 1967).

Studies show that according to the difficulty in its transfer, tacit knowledge could be classified into easily explicated tacit knowledge and difficultly explicated tacit knowledge (Ambrossini & Bowman, 2001; Blumentritt &Johnston, 1999). A degree of knowledge's tacitness possessed by a veteran sets a waterline in an evaluation of whether the targeted skill can be successfully captured and made explicit in order to be acquired, or it is destined to be lost together with the master's leave from the floor.

Albeit conventionally on-the-job-training (OJT) is understood as the best mechanism to form skills[6] (e.g., Koike,1997), as a matter of fact, in the light of demographic situation discussed above the OJT has been losing its power due to the simple physical lack of both experienced and novice employees.

Tellingly, the other crucial factors hindering industrial knowledge transfer and succession (beyond labour shortage) are problems with the youth`s eagerness and volition (64.5 percent of surveyed organizations), and absence of the basic knowledge and conventional sense in the younger employees (41.9 percent). It thus becomes increasingly difficult to inbuilt the process of transfer and succession of precious industrial knowledge in an every-day normal work. Companies are faced with the severe and pressing need to ponder over new approaches.

Obviously, there is a contradiction between instruments organizations employ in order to have valuable

knowledge and skills transferred, namely computerization and traditional OJT, and the parameters of the work-force/ human capital per se disabling this very process of the knowledge transfer. The latter seems to be composing an underlying obstacle. The instruments are systemic, while hurdles are routed in individuals and the nature of targeted knowledge, difficult to transfer.

In order to address this contradiction properly and suggest an adequate theoretical and managerial solution it is essential to scrutinize existing body of knowledge about knowledge, skills and their transfer.

Perspectives on Organizational Knowledge

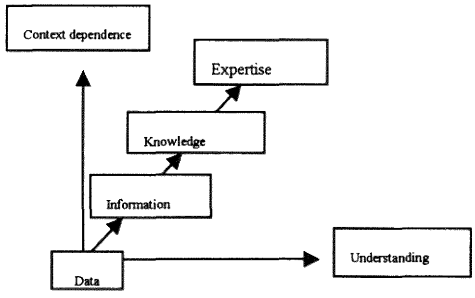
At the outset, to provide a definition of the key terms employed in this study is necessary. Multiple approaches to defining knowledge exist, and it deems relevant to touch upon some of them.

Knowledge management adopted much from information processing (Prusak, 2001). Thereupon, one of the most declared and widely used definitions draws from distinguishing knowledge from its elements, namely data and information. Davenport and Prusak (2000) state as follows. Data is a set of discrete, objective facts about events. In an organizational context, data is most usefully described as structured records of transactions. Data by itself has little relevance or purpose, and inherits no meaning. Data says nothing about its own importance or irrelevance, it is independent of context. But data is important to individuals and organizations, because it is essential raw building material for the creation of information.

Unlike data, information has meaning - the "relevance and purpose" as Drucker has once defined it (quoted in Davenport &Prusak, 2000, p.4). Not only does it potentially shape the receiver, it is organized into some purpose. Data becomes information when its creator adds meaning and values in various ways. However, it is the receiver, who decides if this information really valuable in the certain context.

Knowledge derives from information as information derives from data (refer to Figure 1). It is defined as *a fluid mix of framed experience, values, contextual information, and expert insights that provide a framework for evaluating and incorporating new experiences* (Davenport & Prusak, 2000, p.5).

Figure 1. Data, Information and Knowledge in the Context



Source: Composed by the author.

The knowledge-based theory of the firm defines knowledge is *the* asset distinguishing it from other traditional (hard or tangible) firm assets (Teece et al.,1997; Von Krogh &Grand, 2002). Inkpen (2008) provides the following systematization: Unlike assets such as raw materials, plant and equipment, and buildings, knowledge is not depleted (or does not depreciate) during production, so additional use will probably enhance its value. Knowledge can be wholly possessed by multiple "owners" simultaneously. It is embedded and cumulative. Knowledge transfer cannot easily be governed by contracts. The valuation of knowledge is problematic, and few companies have adequate knowledge measurement systems.

Representing more industry-oriented approach Hedlund & Nonaka (1993), define knowledge as constructed from cognitive perceptions as well as skills and expertise embodied in products or services. Inkpen (2008) labels know-how, or knowing how to do something, as the accumulated practical skill or expertise that allows one to do something smoothly and efficiently. Exactly knowledge shaped in skills, experience, and practical value and linked to a meaningful application within the organization is a focal subject/ object of this study.

Knowledge and Knowing – Polanyi's Epistemology

Continuous debates and varying opinions on the basic definitions of knowledge and skills and their hierarchy constitute one of the key problems for a researcher in this filed. For the purpose of this study I assumed that since the processes underlying acquisition, transfer, and retention of both knowledge and skills is largely the same, there is no actual need to develop a skill transfer theory separate from that on knowledge

transfer. This surmise found support in the Polanyi's theory of knowledge. Most relevant to the current study conceptions by this renowned scientist are recollected below.

According to Sveiby (1997), Polanyi holds that there is little difference between the non-scientists and scientists when it comes to actual work. Polanyi's concept of knowledge is based on three main theses: First, true discovery cannot be accounted for by a set of articulated rules or algorithms. Second, knowledge is public and also to a very great extent personal (i.e. it is constructed by humans and therefore contains emotions, "passion"). Third, the knowledge that underlies the explicit knowledge is more fundamental; all knowledge is either tacit or rooted in tacit knowledge.

The focal (knowledge about the object or phenomenon that is in focus) and tacit (knowledge that is used as a tool to handle or improve what is in focus) dimensions are complementary. The tacit knowledge functions as a background knowledge which assists in accomplishing a task which is in focus. That which is tacit varies from one situation to another. For instance, when reading a text, words and linguistic rules function as tacit subsidiary knowledge while the attention of the reader is focused on the meaning of the text (Polanyi, 1967).

Polanyi's theory is about how human beings acquire and use knowledge, and it is action oriented and about the process of knowing. Human knowledge is too complex a concept to be labeled solely by a noun, so in his earlier works he frequently uses the verb *knowing* and the noun *knowledge* as synonyms. In his later works (*Tacit Knowing*) he emphasises the dynamic properties, i.e. the verb: *Knowledge is an activity which would be better described as a process of knowing* (1967).

In contemporary literature when the dynamic properties are emphasised, such verbs like *knowing* or *learning* are used (Orlikowski, 2002). The dynamic properties describe how human beings strive for acquiring, coming to know new knowledge and they are for most interest to this study. The reality that in practice both the individual and dynamic properties of tacit knowledge are challenging knowledge managers is evident in the present choice of "labels" concerning knowledge and knowing. Such nouns like "intellectual capital" or "knowledge management" suggest a bias towards the static properties, which undermines penetration to the very nature of knowledge and underlying processes (Orlikowski, 2002; Sveiby, 1997).

Knowledge becomes possible to distribute, criticise and thereby increase by distancing the actor from the knowledge and articulating it in language or symbols. Because *we can know more than we can tell* it follows that what has been made articulate and formalised is in some degree underdetermined by that of which we know tacitly. Polanyi also emphasises the functional aspect of knowledge, i.e. he regards knowledge as a tool by which we either act or gather new knowledge. This tool is unreflected knowledge that we take for granted in a

certain situation. Polanyi maintains that craftsmen, "makers", use the same kind of methods as other practitioners "doers". They both follow rules and exemplars and they rely on experience for making judgements in their work. Polanyi makes no clear distinction between practical knowledge and other kinds of knowledge, like theoretical propositionary knowledge. Polanyi therefore makes no difference in principle between the analytical skills of different occupations (Sveiby, 1997).

Therefore, appropriating Polanyi's assumption, the present study concludes that the process-of-knowing is the same for the shop-floor employee or, say, a researcher. What diverges is their knowledge taken for granted - Intellectual tools. They differ from physical tools in that they are based in a social context. So the scientist's and the professional's tools and rules are more *intellective* than the craftsman's or the practitioner's more *agentive* tools and rules. Another important distinction is that experts working with physical tools can detach themselves from their tools, while intellective tools cannot be disposed of that easily (Polanyi, 1967).

Rooting in Polanyi's thought heritage Sveiby (1997) presents a hierarchy of knowing based on how the rules are followed:

Know What – Skill is the lowest level of knowing, the ability to act according to rules which depend on feedback from a non-social environment. Polanyi: ***Skills combine muscular acts which are not identifiable, according to relations that we cannot define*** (1967). The actor him/herself is able to judge whether the action has been successful or not.

Know-How includes skill and is the ability to act in social contexts. Outside actors, like a professional institution or the tradition (the fourth level) establish the rules. Know-how implies problem solving.

Expertise or competence is know-how plus the ability of reflection - being able to (and being allowed to) change the rules. Expertise is thus not a property but a relation between individual actors and a social system of rules. Each level contains both tacit and focal knowing.

Polanyi is mainly interested in transfer of a process-of-knowing from one person to another(s) and he identifies three tacit psycho-social mechanisms for this: *imitation, identification* and *learning-by-doing*. They are mechanisms for *direct* knowledge transfer. As it will be argued later, Japanese traditional arts and manufacturing provide wonderful examples of such direct transfer.

Noteworthy that the term being used through this paper - knowledge and skill "transfer" - is therefore a tribute to the "labels" wide-spread in the research community, since knowledge is not moved as goods. A knowledge receiver is rather *reconstructing* his own version of the supplier`s knowledge (Sveiby, 2001a).

Types of Knowledge

Typifying knowledge organizational research on knowledge transfer within and between organizations is particularly focused on the objective and measurable characteristics of the knowledge being transferred (Argote, McEvily, & Reagans, 2003). Among numerous existing knowledge typologies the best-known include simple versus complex (Zander & Kogut, 1995), codified versus procedural (Kogut & Zander, 1992) and tacit versus explicit (Nonaka, 1994; Nonaka & Takeuchi, 1995). Likewise, knowledge has also been described as existing in an individual or a group (Nonaka, 1994). Individual knowledge is created by and is inherent within the individual, whereas social knowledge is created by and exists within the collective.

Blumentritt and Johnston's (1999) framework for categorizing knowledge puts an emphasis on the degree of difficulty in transferring knowledge. They identify four different categories of knowledge, varying from 1 to 4 depending on the difficulty of transfer:

1. Codified knowledge - knowledge that has been made explicit and is in a readily transferable form;
2. Common knowledge - knowledge that is accepted as standard without being formally explicit;
3. Social knowledge - knowledge about cultural and interpersonal relationships; and
4. Embodied knowledge - tacit knowledge related to the background, skills, and experience of a person.

However, the conceptualization of knowledge relevant to this study can perhaps be best understood through a discussion initiated by the work by Polanyi and significantly furthered by Nonaka.

Tacit knowledge involves both cognitive and technical elements and is based on action, experience, and involvement in a specific context (Von Krogh, Ichijo, & Nonaka, 2000). The cognitive element refers to an individual's mental models consisting of schemata, beliefs, paradigms, and viewpoints, while the technical component consists of concrete knowhow, crafts, and skills that apply to specific contexts. As suggested by Nonaka, tacit knowledge represents a type that is often embedded within the individual and hence subjective, experiential, and hard to formalize and communicate. Tacit knowledge consists of insights and intuitions that come to a person from having been immersed in an activity for an extended period of time.

Appropriation and cross-appropriation of Polanyi's concepts of tacitness on various spheres of life gives a useful example of the issue for management (Nonaka et al., 2008). For learning organizations emphasis on tacitness means focusing on what the practitioners know and what kind of problems they counter in the field activities. However it is particularly tacit nature of knowledge, and especially experience-based skills that determines obstacles to its efficient transfer in all levels. For instance, Ambrosini and Bowman (2001)

attempt to clarify both the definition and the degree of tacit skill and make it more operational as follows (refer to Figure 2):

Figure 2. Degree of tacitness

A	Deeply ingrained tacit skills	high
B	Tacit skills that can be imperfectly articulated	
C	Tacit skills that could be articulated	
D	Explicit skills	low

Source: Ambrosini & Bowman, 2001.

Explicit knowledge represents the type of knowledge that is often captured in documents, libraries, written policies and procedures, files, manuals, and databases. It defines the identity, the competencies, and the intellectual assets of an organization independently of its employees; thus, it is organizational knowledge par excellence, but it can grow and sustain itself only through a rich background of tacit knowledge. It is formal knowledge that is easy to transmit (Choo, 1998; Nonaka, 1994).

Rather than representing tacit and explicit knowledge as dichotomous states, an increasing number of researchers prefer to suggest that they are mutually dependent and reinforcing qualities of knowledge (e.g., Alavi & Leidner, 2001; Nonaka & Takeuchi, 1995).

Albeit voluminous studies (e.g., Minbaeva, 2008; Szulanski, 2000; Tsai, 2001; Zander & Kogut, 1995) have argued that the ability to transfer knowledge is a primary source for a firm's competitive advantage, growth and development, it is still relatively little known about *how* to transfer it efficiently within and across organizational boundaries (Inkpen, 2008). Therefore a literature review with classification of leading streams in both theoretical and empirical research, and identification of their common and distinguished aspects is necessary for a better grasp of the issues at hand.

Organizational Knowledge Transfer

Philosophical Foundations

How can knowledge retained in individuals be best transferred to other individuals? This issue can be bravely named one of the most natural activities proliferating human life in every aspect. A daughter inheriting secrets of a home-made cake or a child learning how to behave are a sort of common illustrations.

However, an industrialization era with its standardized high-intense and high value-added conceptions made it necessary to create a scientific-based understanding of the process and means of its constant improvement in the work place. In a stride to address various aspects of knowledge transfer, the scientific results in many areas – philosophy, psychology, pedagogy, economics and management – are helpful.

Organizational knowledge transfer denotes the process whereby organizational actors - teams, units, or organizations – exchange the experience and knowledge. It is correct to see the process as an interaction wherein the actors are simultaneously contributing - enriching the receiver - and in turn are enriched by acquisitions from the contributor. The process of knowledge transfer includes various operations, i.e., data search and information seeking, problem solving, team activities, and training (Argote, Ingram, Levine & Moreland, 2000).

In addition to studies focusing explicitly on knowledge transfer (e.g., Argote & Ingram, 2000; Tsai, 2001), there are studies seeing knowledge transfer as processes of knowledge sharing (e.g., Hansen, 1999; Tsai, 2002), knowledge flows (e.g., Gupta & Govindarajan, 2000; Nonaka et al., 2008), knowledge exchange (e.g., Collins & Smith, 2006), and knowledge acquisition (e.g., Lyles and Salk, 1996). For the purpose of this study, all conceptualizations that indicate the movement of a body of knowledge from one place to another are considered relevant.

Philosophical foundations of knowledge-related research has been nurturing from various competing approaches that provide diverse methodological and theoretical views. Ringberg & Reihlen (2008) argue that to the economic theory of firm, the resource-based view of firm, and to the KBV the positivist perspective is central. It regards knowledge as an objective entity, which leads positivist researchers to treat knowledge as "a thing out there" that can be transmitted or exchanged without any intervention by a cognizing mind. Similarly, literature on organizational memory and learning implies that knowledge can be codified, stored, and later retrieved by anyone in the firm. Furthermore, positivists argue that knowledge consists of objective facts that can be measured independently of the inquiring, interpreting, creative mind (e.g., Gupta & Govindarajan, 2000). This assumption leads to the use of technology and texts as channels for knowledge transfer within and across organizations (Davenport & Prusak, 2000). In other words, meaning is embedded in the word or symbol rather than in the mind that perceives it.

In contrast to the positivist research approach, other scholars in the field of knowledge management embrace knowledge as socially constructed. This position assumes that knowledge is largely created by socio-cultural processes and becomes expressed symbolically and/or enacted in practices, activities (Orlikowski, 2002), shared thought worlds (Dougherty, 1992), collective knowledge, and/or discourses (Bechky, 2003).

The practice-based aspect of the social constructionist approach has become especially influential among researchers interested in understanding knowledge transfer and organizational productivity (Orlikowski, 2002). In this conceptualization, knowledge is constituted and transferred through practices and activities. It suggests that the appropriate focus for an analysis of knowledge work is not knowledge or knowledge workers but rather activity (practice). Similarly, practice is suggested to be a remedy in discussion of tacit versus explicit knowledge. Practice must be understood as a system of activities in which knowing is not separate from doing. As such, knowledge exists within the ephemeral fabric of organizational systems, routines, archives, memos, and so forth (e.g., Szulanski &Winter, 2002), and in some tacit fashion may resolve organizational conflicts, improve knowledge transfer, and increase organizational productivity (Orlikowski, 2002). Bechky (2003), for example, proposes that *shared* practices are required in order to bridge those various different tacit knowledge structures (i.e. local understandings) that emerge across different occupational communities (i.e. engineers and shop-floor workers).

Lately, socio-cognitive approach has been increasingly questioning the two dominant epistemic systems. It contrasts positivism highlighting that the meaning of information always depends on the mindful receiver. Ringberg & Reihlen (2008) quote Tuomi's (1999) argument that widely acknowledged step-by-step process, progressing from data to information to knowledge, actually should be reversed: knowledge (i.e. mental frameworks) must exist before information can be formulated (i.e. interpreted) or data measured to create information. The central conception here is that knowledge does not exist outside the knower (Alavi & Leidner, 2001) because words have no specific meanings, per se, apart from the idiosyncratic meanings existing in the heads of the people who use them.

As it will be expanded in a section on knowledge transfer models, positivist researchers address this "miscommunication" from a standpoint that problems in transfer are stemming from a lack of absorptive capacity, which is the ability to recognize the value of new knowledge and to assimilate and use that knowledge, rather than from divergent interpretive frameworks (Cohen & Levinthal, 1990).

Critique of the socio-cognitive approach towards both positivists and social constructionists however

comes from the notion that to equate practice with knowledge is to ignore the immense amount of pre-existing knowledge that both sender and receiver must have in common for the receiver to infer and categorize the intended meaning of a practice (Dougherty, 1992;Garud & Rappa,1994).

Bechky (2003), for instance, suggests that people in different professions (engineers, assembly workers, etc.) need to have objects in common that can mediate their varied thought worlds. It is somewhat disregarded that a profession by definition is based on a unique set of expertise. In described case an engineer needs to be shown a product (rather than a drawing) to make sense of an assembly worker's comments on it. Those "product showing activities" would be meaningless for a person not already well trained in this knowledge area (having other knowledge concerning this very product that could be obtained by various other practices - independent inspection, talk to a more articulate worker, inspecting production etc.).

That said, without pre-existing mental models that enable the inquiring engineer to decipher and conjecture the logics of an assembly sequence, there would be little transfer of understanding through practice. In other words, practice without the presence of relevant mental models with which to process the observed practice will merely consist of meaningless imitative processes (Ringberg & Reihlen , 2008).

Ringberg & Reihlen (2008) highlight that practice-based epistemology applies well with empirical examples that involve lower level unskilled work and/or standardized procedures whose implementation relies largely on automatic and imitative processes, such as highly standardized production systems where workers' sense making is not required as long as they can reproduce a sequential pattern of movements. However, they remind that ability to imitate is of a little value in knowledge-intensive organizations where much of the work is conceptual in nature. In such organizations knowledge transfer requires that people rely on their ability to identify the intended meaning through discursive turns and ongoing negotiation of the meaning of a particular practice.

As Orlikowski (2002) allegorises it, with the mind being a passive carrier of knowledge, knowledge transfer is relegated to the dark and tacit corners of the subconscious. Schön in his empirical study *The Reflective Practitioner* (1983, p.282) addresses this issue when stating that "when a practitioner does not reflect on his own inquiry, he keeps his intuitive understandings tacit and is inattentive to the limits of his scope of reflective attention".

In addition, socio-cognitive epistemology states that even the passing along of simple routines by sharing them in practice (e.g. how to make a cup of tea) rests on the presence of a large amount of pre-existing knowledge. As such, practice does not provide semantic codes for its own decoding (i.e. sense

making); those codes have to already exist in the mind of the interpreter. This conundrum is clearly evident in work of historians, archaeologists, and ethnographers when they struggle inferring the meaning of texts, artefacts, and ancient rituals (Ringberg & Reihlen, 2008).

For knowledge transfer to be meaningful, both sender and receiver must share a considerable amount of pre-existing knowledge structures. Any additional learning depends on such pre-existing knowledge and can only be incrementally build upon already internalized mental models (knowledge). The same is true and very important for practice, for instance OJT.

Current knowledge transfer research overlooks much of the interpretive work performed (and required) by the person as it objectifies meaning within disembodied structures. This is problematic since even people with similar education and training, and engaged in the same practices may end up producing different conceptualizations of a given phenomenon and/or activity due to unique mental models, cognitive dispositions and life experiences (e.g., Dougherty, 1992; Garud and Rappa, 1994).

It is worth putting off this theoretical narration for a while in an endeavour to illustrate social constructionists approach and socio-cognitive approach against the perspective of skill transfer and succession in Japan.

Japan, with its admirable heritage of numerous arts and traditions carefully carried through the history and existent until the last decade practice of life-long employment, has demonstrated superb expertise in many areas. In traditional industry the transfer of precious cultural and natural assets to future generations has mostly been carried out through apprenticeship. Trainees and craftsmen worked together, where trainees learned by watching their master and imitating his movements instead of being taught what to do and how to do it step by step. In Japanese language it is called to learn by "stealing" the master's skills by carefully observing him (Asai et al., 2005; Sakikawa & Narita, 2009).

The learning of skills discussed here are typical in artistic fields (traditional gardening, martial arts etc.), but these learning processes have been passed on in various industries (Asai et al., 2005). Experiential knowledge as passed on by master craftsmen is originally formed through long years of training. The presence of such a master craftsman acting as a kind of "coach" in the learning process is essential to the acquisition of experiential knowledge. This knowledge is acquired in an environment where work and life are unified, and where the student is immersed in the world of the craftsman, working, eating, and sleeping under the same roof *(onaji kamameshi wo kuu)*. The student experiences the sensations of this environment as fully as possible, learning not only physical skills such as how to use and maintain tools and how to identify

materials, but at the same time comes to imitate and absorb "situational knowledge", including cultural and historical context, and the relationships among people and things in that environment. It is therefore said that the number of years the student will spend in acquiring these skills will be equal to the number of years that the teacher spent in his own training process (Asai et al., 2005).

Such learning method requiring thorough imitation suits not only for simple well articulated skills, but for silent transmission of typically tacit knowledge either. For the purpose of acquiring a skill, a person is required to carry out a variety of *actions* to comprehensively understand how he ought to be, based on the *contextual knowledge* (e.g., Asai et al., 2005), which correlates to a social constructionist approach. As such, mental models (pieces of knowledge taken for granted) and every next layer of pre-existing knowledge have been constructed in the same physical and mental context and there is no need for a knowledge sender to adjust his knowledge.

However, when a transfer task gets complicated by a more sophisticated focal content and, as in case of nowadays' manufacturing industries in Japan, supplemented by the time-constraints (making skill "stealing" through life-long OJT knotty) socio-cognitive approach might provide the sought-for answer. Future researches and practitioners may benefit much from more extensive incorporation of both sender and receiver interpretive mind in the conscious time-efficient knowledge and skills transmission process.

As it has been demonstrated the disembodied notion of knowledge in positivism and social constructionism is increasingly being questioned (Garud & Rappa, 1994; Ringberg & Reihlen, 2008). Being criticized for ignoring the pre-existing knowledge of the transfer participants, the social constructionist and practice-based research is nonetheless well capturing and extensively building on the back-end of knowledge transfer that involves shared knowledge in the certain particular context (e.g., Nonaka & Konno, 1998; Nonaka et.al, 2008), therefore standing influential in the field.

Having discussed dominant epistemological approaches I proceed to a narrower, and more systematic expound of organizational knowledge transfer narrative and empirical literature analysis.

Knowledge Transfer Models

Given an enormous variety of possible organizational knowledge-transfer scenarios, majority of contemporary studies focuses on a specific case of knowledge and skills transfer and learning. Major research has concentrated on multinational corporations (Gupta & Govindarajan, 2000) and strategic alliances (Inkpen,

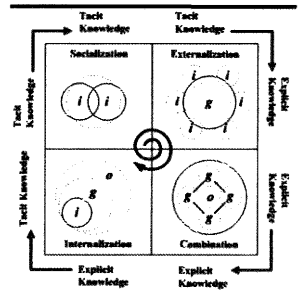
2008), knowledge transfer within the firm through social networks (e.g., teams, communities of practices) (Collins &Smith, 2006; Cross, Parker, & Prusak, 2000), and through wide-range learning (Goh, 2002).

McGill (2006) succeeded in sorting out the following four influential concepts of knowledge transfer: 1) Nonaka's knowledge creation model, 2) Szulanski's communication model, 3) Sveiby's knowledge transfer model, and 4) Dixon's knowledge transfer model. A description of each of these models and their analysis aimed at extracting respective common and distinguished postulations follows with all knowledge transfer concepts being summarized in Table 3.

Bresman, Birkinshaw, & Nobel, (1999) claim that the concept of knowledge transfer is difficult to capture, because there is no clear distinction between the transfer of knowledge and the creation of new one, thus encouraging the author to include work of Nonaka and Takeuchi, usually referred to as the knowledge creation cycle, in systematization of knowledge transfer theories.

Nonaka's (1994) knowledge creation model, often referred to as the SECI model, describes the knowledge transfer process in terms of the tacit and/or explicit knowledge that is being transferred (refer to Figure 3). In this model, knowledge transfer occurs in one of four forms: from tacit to tacit; from tacit to explicit; from explicit to explicit; or from explicit to tacit (Nonaka, 1994; Nonaka & Takeuchi, 1995). These forms are not isolated independent events. Knowledge transfer is a continuous and dynamic interaction between tacit and explicit knowledge (Nonaka et al., 2008; Nonaka & Konno, 1998; Nonaka, 1994).

Figure 3. SECI Model



Source: Nonaka & Konno, 1998 p.43.

As the SECI model illustrates, knowledge transfer depends on the *interrelationship* and describes four conduits for knowledge transfer.

Socialization is the process of sharing experiences. An example of socialization is the apprenticeship,

which embodies Polanyi`s *direct* knowledge transfer process among individuals (Nonaka & Takeuchi, 1995). Socialization implies sharing tacit knowledge among *individuals*, interfacing with co-workers and/or customers within the same context through physical proximity, observation, and imitation rather than through written communication or direct verbal instruction. This process emphasizes spending time together and comprehending partner's way of looking at the same situation by "putting oneself into another person's shoes" (Nonaka & Konno, 1998). Discussed above apprenticeship in traditional arts or OJT are vivid examples.[7]

Externalization is accomplished by using metaphors, analogies, concepts, hypotheses, models, and published writings that promote interaction between sender and receiver. This process is usually, but not exclusively, initiated through dialogue or reflection. The externalization process allows knowledge transfer among *individuals* within an organization (Nonaka & Takeuchi, 1995). Externalization is the expression of tacit knowledge and its translation into comprehensible forms that can be understood by others. This phase is well realized through the activities aimed at capturing veteran employees` knowledge in order to formalize it and make available to co-workers.

Combination involves the reconfiguration of existing knowledge through sorting, adding, and merging. Combination often involves conceptualizing new ideas. This process is usually accomplished by using media such as documents, databases, meetings, computer communications, and telephone calls. It involves combining different bodies of explicit knowledge (Nonaka & Takeuchi, 1995). The combination process allows knowledge transfer among *groups* across organizations. Combination is a process of assembling both existing and new explicit knowledge into other knowledge.

Internalization involves independent learning through learning-by-doing, formal training, and self-paced training, such as reading manuals and watching videos. This process involves an individual understanding and absorbing explicit knowledge into tacit knowledge forms. The internalization process transfers *organization* and *group* explicit knowledge to the *individual*, where individuals (e.g., factory workers, service engineers, customers) again accumulate tacit knowledge of know-how by producing, doing, or using the product and/or service (Nonaka & Takeuchi, 1995).

Szulanski's (1996, 2000) communication model depicts knowledge transfer as a process consisting of a series of stages. This transfer model focuses on the sequence of knowledge transfer between sender and receiver. The model starts with the sender (initiator) and progresses through a series of four stages (Table 3) as it is finally absorbed by the receiver (recipient).

Sveiby's (2001) model is based on knowledge transfers that are perceived to create value for the

organization. The model is derived from Sveiby's theory of intellectual capital, which referred to as an intangible asset. The transfers in this model take place among intangible assets areas of the organization. Intangible assets consist of three parts: people's competence (human capital), external structure (customer capital), and internal structure (organizational capital).

Dixon's (2000) model of five transfer methods is based on the similarity of task and context, nature of task (routine vs. non-routine), the type of knowledge being transferred (tacit or explicit) and the impact that knowledge has on the organization. Dixon`s model focuses on the transfer of knowledge between teams.

Table 3. Knowledge Transfer Models

Author, publication year	Mechanisms of Knowledge Transfer
Nonaka (1994)	(1) Socialization, (2) externalization, (3) combination (4) internalization.
Szulanski (1996)	(1) Initiation: all activities leading to the transfer decision, (2) implementation: knowledge begins to flow from sender, (3) ramp-up: recipient starts using transferred knowledge, and (4) integration: recipient folds knowledge into normal routines.
Dixon (2000)	(1) Serial transfer: a team gains knowledge performing a task and the team subsequently uses that knowledge in a new setting; (2) near transfer: knowledge gained by a team performing a routine task is transferred to another team doing similar work; (3) far transfer: knowledge from a team performing a non-routine task is transferred to another team doing a similar task; (4) strategic transfer: collective knowledge of the organization relating to strategic initiatives of the organizations is among teams; and (5) expert transfer: third party expertise is used to support a complex and infrequent team task.
Sveiby (2001)	(1) Between individuals, (2) individuals to external structure, (3) external structure to individuals, (4) individual competence into internal structure, (5) internal structure to individual competence, (6) within the external structure, (7) external to internal structure, (8) internal to external structure, (9) within internal structure.

Source: Adapted from McGill, 2006

Three of the presented above models, i.e. the Dixon model, the Sveiby model, and the Nonaka model, are common in emphasizing knowledge transfer channels, whereas the Szulanski model adds up understanding by the sending and receiving process analysis.

While the four knowledge transfer models provide a structure for explaining knowledge transfer, it actually can take place through formal or informal circumstances (Alavi & Leidner, 2001). Informal transfers such as unscheduled meetings, informal seminars, or coffee break conversations do not guarantee that the knowledge will be passed accurately from one member to another (Davenport & Prusak, 2000). Formal transfers, on the other hand, such as training sessions and plant tours, may ensure greater distribution of knowledge but may inhibit creativity (Alavi & Leidner, 2001). Some knowledge transfer channels may be more effective than others, which will be discussed in details in the following section.

Knowledge Transfer Enablers and Impediments

Davenport & Prusak (2000) postulate that merely making knowledge available is not transfer, and provide the following formula:

Transfer = Transmission + Absorption (and Use)

Stemming from psychology (i.e., Skinner concept that learning is a function of change in overt behaviour) organizational learning and knowledge management scientists state that even transfer and absorption together have no useful value if the new knowledge does not lead to some change in behaviour, or the development of a new idea leading to new behaviour (e.g., Davenport & Prusak, 2000).

Still, behaviour change is much rarer event than acquisition of new knowledge. Inkpen (2008) stresses that successful transfer of context-specific knowledge requires consensus building about the value, relevance, and potential uses of the knowledge. Until sufficient individuals accept that the knowledge has value and that old knowledge must be modified, the new knowledge will not have an impact on organizational action.

In addition, in *Wellsprings of Knowledge*, Leonard-Barton talks about *signature skills*, which she defines as the abilities by which a person identifies himself or herself professionally. People`s egos are bound up in these skills; their sense of competence and well-being at work depends on using them. People will resist any innovation that may require them to abandon their signature skills in favour of new ones. A human being can hardly be called a wholly rational creature, which in corresponding to learning was explained by the concept of bounded rationality (Simon, 1991). That is why resistance to change is powerful, even in the face

of indisputable objective evidence that a particular change makes sense.

However, besides ultimately human characteristics, success or failure in knowledge transfer as a process that requires dynamic interaction (Nonaka et al. 2008) depends on multiple factors. Since many studies analyze more than one outcome and more than one contextual variable (Argote et al., 2003) at once, instead of organizing them graphically I will rather discuss relevant findings from each study.

Voluminous empirical research explores the factors that drive or hamper knowledge transfer. In terms of the dependent variable, the majority of the empirical research has used "accomplished transfer" (von Hippel, 1994; Szulanski, 1996), rather than, say, product quality, or even performance effects (exceptions include e.g., Tsai, 2001). Accomplished transfer has been measured in different ways. Sometimes it is based on individual assessments about whether the transfer has been successful, requested through questionnaire surveys (Szulanski, 1996). In other studies, accomplished transfer has been measured in terms of whether routines have been improved, for instance whether labour cost per unit of output has been improved (Epple et al., 1991). For example, about 80 percent of the studies included in Van Wijk, Jansen, & Lyles, (2008) meta-analysis relied on various subjective assessments of knowledge transfer while the remaining studies relied on patent citations.

The explanatory factors are subject to greater variation. The nature of the transferred knowledge is often addressed as an important factor (e.g., von Hippel, 1994). For instance, the more tacit and complex, the more difficult it becomes to accomplish transfer (e.g., Argote et al., 2000). The more ambiguous the causes and effects of the knowledge, the more difficult it is to transfer (Szulanski, 1996, 2000). Besides the knowledge transferred itself, the cognitive abilities of both the source of knowledge and the recipient (Gupta & Govindarajan, 2000; Osterloh & Frey, 2000; Tsai, 2001) are key factors. Absorptive and retentive capacity of the recipient, i.e. how well equipped they are to take in, absorb, and apply the knowledge, is of course central in transfer situations (Alavi & Leidner, 2001; Szulanski, 1996; Cohen & Levinthal, 1990). Furthermore, the value of the stocks of knowledge at the source is a potential factor. The more valuable it is, the more likely it is that the recipient will attempt to use it (Gupta and Govindarajan, 2000; Inkpen, 2008).

Apart from cognitive factors, organizational context is addressed. Geographical or perceived proximity helps intensify communication between individuals in different units. Phone calls, meetings and personal acquaintances across units are normally associated with successful transfer (e.g., Ambrosini & Bowman, 2001). Intensive integrative practices, such as crossfunctional meetings and broad participation from multiple functions further increase the chances of transfer (e.g., Bechky, 2003).The richness of communication

channels (integrative mechanisms such as liaison positions, task forces and interpersonal familiarity) is another factor (Gupta and Govindarajan, 2000), as is the pre-existence of social subnetworks, referred to as the interrelations between organizational members, tools and tasks (Argote & Ingram, 2000). Unsurprisingly, the perceived trustworthiness of the source of the knowledge is reported to be a factor (Tsai, 2000).

A third group of distinguishable factors falls under motivation. However, the role of motivation appears debatable and is less clear, according to research. Relatively few empirical studies claim that motivation is important although such motivational problems, as unwillingness to absorb or share knowledge are addressed (e.g., Osterloh & Frey, 2000). Motivation was also found to drive source units to transfer knowledge (Gupta and Govindarajan, 2000), but not all studies have been able to corroborate this, either because they have not studied it, or because they found it to be unimportant. Szulanski (1996) studied a range of factors and found no link between motivation and transfer accomplishments. Cognitive and relational factors were more important and therefore, Szulanski suggested, it is better to stimulate learning capacities and relations than incentives. In a subsequent study (Szulanski, 2000) even elaborated upon the downsides of unnecessary high motivation.

Various factors hampering or enabling skill and knowledge transfer are briefly summarized in Table 4.

Table 4. Factors of Knowledge Transfer Effectiveness

Author(s)	Major Influences on Effectiveness
Szulanski (1995)	(a) Characteristics of the nature of the knowledge transferred, (b) characteristics of the source of knowledge, (c) characteristics of the transfer context, (d) characteristics of the receiver of knowledge, and (e) characteristics of the absorptive capacity of the receiver of knowledge.
Von Krogh et al. (2000)	(a) Mutual trust, (b) active empathy, (c) access to help, (d) lenience in judgment, and (e) encouragement.
Cross, Parker, and Prusak (2000)	(a) Knowledge - knowing what others know; (b) access – having access to other people thinking; (c) engagement - having people be willing to actively engage in problem solving; and (d) safety - having a safe relationship to promote learning and creativity.

Davenport and Prusak (2000)	(a) Relationships and trust; (b) culture; (c) availability of common meeting areas; (d) incentives or rewards based on sharing; (e) presence of absorptive capacity in recipients; (f) educating the understanding that knowledge sharing sources are all equally significant; and (g) tolerance for mistakes - no loss of status for not knowing everything.
Gupta and Govindarajan (2000)	(a) Value of the sender's knowledge (as perceived by others in the organization), (b) motivational disposition of the sender (the level of desire for the sender to transfer or share knowledge), (c) existence and richness of transmission channels (the presence of facilitators or absence of inhibitors), (d) motivational disposition of the receiver (receptiveness), and (e) the absorptive capacity of the receiver
Goh (2002)	(a) Leadership, (b) problem-solving/seeking behavior, (c) support structures, (d) knowledge sender/recipient relationship, and (e) types of knowledge
Inkpen (2008)	(a)Transfer of people, (b) training, (c) leadership commitment, (d) knowledge-oriented culture,(e!) consensus building about the value, relevance and potential uses of knowledge in order to solve the problem of novelty resistance

Source: adapted from McGill, 2006

It is noteworthy though that knowledge transfer itself can be seen not only as a desirable outcome, but also as a considerable risk-escorted activity. First risk factor, related to competitive advantage, is the uniqueness and inimitability of the knowledge. If knowledge transferred internally can also be transferred externally, to competitors, for instance through personnel migration or intelligence activities, there is a risk that the knowledge effects can be duplicated by competitors. If effects, for instance, were on costs, than knowledge duplication can lead to cost reductions across the industry, meaning there is a risk that price and profit levels are reduced overall. Here, the commonalty of knowledge across actors will determine the risks of failure (Zander & Kogut, 1996).

Another risk refers to drawbacks that result from the articulation of knowledge necessary in order to be able to transfer it. Articulation or making implicit knowledge explicit requires simplification, which means that finer and deeper aspects of the knowledge might have to be removed or be unintentionally lost (Boisot, et al., 1997). Some argue that the risks associated with articulating and transferring tacit knowledge are so high that it is more effective to avoid transferring such knowledge and accept the higher costs associated with

coordinating a diverse set of organizational skills (Grant, 2002).

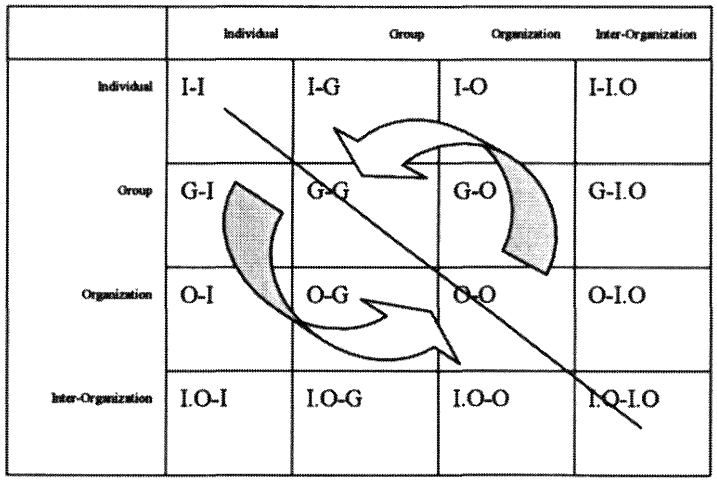
It can be concluded that knowledge transfer effectiveness is mainly explained by three factors: properties of a unit (be it receiver or sender), such as its absorptive capacity or human cognition; organizational context, including channels for transfer, properties of relationships between dyadic or multiple participants; and the nature of focal knowledge per se.

Exploring Level of Analysis

Any theoretical and empirical effort to explain phenomena in management has to make a choice that concerns the level(s) at which explanation takes place. A classic distinction in social science research is between the collective and the individual level, which in the context of organizational theory and knowledge management corresponds to a distinction between macro and micro (Abell, Felin, & Foss, 2008).

Extensive literature review of the previous sections revealed that knowledge transfer takes place at entire possible levels: between individuals, from individuals to groups, between and within groups, from groups to organizations, between and within organizations. Knowledge transfer channels can be informal or formal, personal or impersonal, and the whole diversity of possible transfer paths is presented in the Figure 4.

Figure 4. Paths of Knowledge Transfer



Source: Composed by the author based on Crossan & Hulland (1995) Learning Matrix, and Tong Sun P.Y. & Scott J.L. (2005) Paths of information transfer in an organization.

I share opinion close to the Polanyi's - that knowledge will exist simultaneously in multiple forms within individuals and organizations. For example, an individual within an organization needs to know how to perform a task for the first time, while others within the organization are experienced at performing the task. The knowledge exists in different parts of the organization in both explicit and tacit form. This new task performer can obtain knowledge to perform an unknown function from several sources, either verbally, or through direct demonstration from coworkers, from in-house manuals and reports, or most likely, through a combination of all knowledge sources. According to the SECI Model (Nonaka & Konno, 1998) this whole progression is dynamic and suggests that in the process of acquiring skill or knowledge required to execute a task, knowledge may be transferred from multiple sources in several directions. Figure 4 is an attempt to illustrate the entire sources and recipients of constant knowledge dynamism.

Reverberating emerging epistemological debate concerning more precise attention to the individual mind role in the process of knowledge transfer, applied knowledge management scholars also increasingly emphasize the need to bridge macro- and micro- perspectives (Felin & Foss, 2005; Minbaeva, 2008). Abell et al. (2008) argue that many phenomena of interest in the strategic management field are placed on a level of analysis that is above that of the individual. They state that *explananda* (i.e. the dependent variables) in strategic management are usually placed at the level of the firm. However, the *explanans* (i.e. the independent variables and the mechanisms that link them to the dependent variables) may involve other levels of analysis as well, such as the dyadic level, the industry level, or the level of individuals. A new wave in knowledge-concerned research argues that previous studies has too often located not only the dependent variables (which is entirely legitimate) on the collective or macrolevel, but also all of the independent ones which is stated problematic (Abell et al., 2008; Minbaeva, 2008; Ringberg & Reihlen, 2008).

Focusing on the behaviour of one party – only receiver or only source of knowledge - knowledge transfer can be analyzed at nodal level. Focusing on the joint behaviour of a pair – be it a pair of individuals, pair of units, or mixed pair – analysis is dyadic. And when focusing on the behaviour of a system consisting of providers and seekers analysis will be at systemic levels (Gupta & Govindarajan, 2000).

Dyadic level deems to be the most promising for the present and future research of veteran – novice skills and knowledge, since through the lens of the sender-receiver framework, it is possible to provide strategic implications at the individual level and to propose directions of improvement for designing mechanisms at the systemic (organizational) level.

Discussions

This study originates in issue-specific literature and at this stage is not supported by empirical testing that unavoidably gives the findings somewhat speculative character. Also, the analytical discourse of this study does not pretend to embrace all schools of thought on knowledge in strategy and organization theory; focus, rather naturally, was set on some cornerstone writing. Thus, completed literature review leaves several directions for future work, principal of which can be formulated as follows.

Research suggests that an organization's ability to transfer knowledge effectively improves such range of its activities as learning (e.g., Epple et al., 1991; Van der Krogt, 1998), competence (e.g., Boisot et al., 1997) and coordination (e.g., Argote & Ingram, 2000; Ringberg & Reihlen, 2008). All in all, yet being aware of risks (possible imitability and waste of most tacit connotations) knowledge transfer might evoke, it allows an organization to reap the leveraged benefits of knowledge.

The theory of knowledge transfer has emerged from competing approaches that provide diverse conceptual and methodological views (Ringberg & Reihlen, 2008;). Positivism and social constructivism are dominant in the field. A parallel between dominant epistemological positions is in the notion that knowledge is embedded in and determined by disembodied structures and routines that influence people's sense making.

Socio-cognitive model challenges aforementioned epistemologies and their descriptions of knowledge transfer suggesting that knowledge transfer is always endogenous to the mind and body[8]. This emerging perspective states that sense making necessarily takes place in the mind, and though influenced by environmental feedback mechanisms (i.e. media, social interaction, etc), the latter only gain meaning based on people's mental (private and cultural) models and need for cognition (i.e. categorical and/or reflective thinking) including acumen, memory, creativity, volition, emotions (Ringberg, & Reihlen, 2008).

Although this epistemological dimension is far from dominance in the field, it surely contributes to the extant literature by explaining disparate knowledge outcomes within a theoretical framework which point of departure is the mind of the individual (Yamamoto & Mori, 2002) rather than the social mind emerging from group thinking (Ringberg, & Reihlen, 2008). At the same time, a number of scholars standing on positivist (Abell, Felin, & Foss, 2008; Felin & Foss, 2005) and social constructionist (Bechky, 2003) approaches have recently been critical of conceptualizing knowledge at the level of the firm and have called for microfoundations for macroconstructs and macrocausal relations. Minbaeva (2008) concurs that scholars should base future research on knowledge transfer processes on the premise that a deeper understanding of

the concept implies theorizing the individuals (Von Krogh &Grand, 2002), individual heterogeneity (Felin & Hesterly, 2007), and individual interaction (Felin & Foss, 2005). Thus, further work on formulating theories about potentially latent mechanisms that can account for variations in knowledge transfer processes at the individual, group, and organizational levels is enthusiastically anticipated.

In a variety of entire possible paths of knowledge transfer within and between organizations, summarized in Figure 4, an area of individual level research has shown to be relatively underdeveloped. This assures the timeliness of the further endeavour to scrutinize the conundrum of industrial knowledge and skills transfer between employee generations.

Review of the existing literature revealed also challenges associated with empirical research on knowledge transfer that include lack of objective indicators for knowledge processes, and need for multilevel data (Minbaeva, 2008). It is noted also that various knowledge processes should not be unified into one performance variable in empirical models. Gupta & Govindarajan (2000) and van den Hooff & de Leeuw van Weenen (2004), for example, have pointed out the importance of distinguishing between receiving and sending knowledge. They insist that these two rather different behaviours have different underlying micromechanisms, such as motivation, thus demanding for distinguished theories and analysis. Future empirical research to address those topics is necessary.

Several important topics for the future investigation are emerging from the review. One theme is the role of social relations in understanding knowledge transfer. For instance, Hansen's (1999) study of product development teams indicates that strong ties are conducive to the transfer of complex knowledge, while weak ties aid in the search for new knowledge. Such dyadic approach can be directed at understanding how the closeness or strength of a relationship between two parties – a veteran and a novice - is related to the effectiveness of skills and knowledge transfer.

Future work could also explore how the degree of asymmetry among the members of a dyad affects knowledge outcomes. Research (Argote et al., 2003) shows that the members of a dyad frequently have differing perceptions of the strength, intensity, and anticipated value of their relationship. How might these inconsistencies influence the effectiveness of learning, transfer, and related activities?

Another theme is that knowledge transfer outcomes are affected by the fit between properties of knowledge, properties of participants, and characteristics of relationships between them. The managerial challenge for practitioners is to improve knowledge transfer within and across organizational units, yet such improvements require that managers proactively match knowledge transfer scenarios with the type of

outcome that corresponds to organizational requirements. However, which of the numerous knowledge transfer schemes should most benefit an organization will be likely depend on the situation, the people involved, and the complexity of the targeted knowledge transferred (Ringberg & Reihlen, 2008). For example, a high degree of social interaction and team building across organizational units may be counterproductive if the main desire is to create original ideas (Alavi & Leidner, 2001). Yet, such interaction may be useful if engineering and production personnel are to collaborate on product development (Bechky, 2003). Thus, it is up to future research and practice to match optimal knowledge transfer framework with certain organizational functions and tasks.

I began this paper emphasizing the practical need for Japanese manufacturing organizations to develop efficient means of veteran employees-embedded skills and knowledge transfer to the next generations. Complex conditions surrounding today`s manufacturing organization - be it demographic or economic - became increasingly tense and leave neither time nor room for complacency. Despite both large and small companies actively implement OJT, video libraries, technical documents and the like in their indoor-training programs, without new approaches these time consuming and often inefficient methods do not make it easy for the industries to obtain skilled workers or transfer high-level skills from veteran to novice employees (Watanuki, 2007).

I assume that bringing abovementioned emerging theoretical base to this pragmatic task could provide management with the tools they have been looking for. A key challenge for managers in today's knowledge-driven companies is to anticipate the continual knowledge deterioration as well as improvement of knowledge as it flows through people within an organization. It is suggested that assessing such plus-minus changes managers would become more attuned to identify individual employees' interpretive frameworks (micro-world) and match these with the desired knowledge transfer (macro-world) scenario. To put it simply, managers are encouraged to take into account and also propel desires, cognitive abilities, motives and volitions of every employee when incorporating him in the process of inheriting target organizational knowledge, experience and skills (Ringberg & Reihlen, 2008).

Such individual employee-attuned approach could presumably heighten both his understanding of one's own work and career-related assumptions (e.g., professional pride, competence seeking etc.), and understanding of the exterior assumptions (e.g., his closest supervisor or trainer needs and wishes, or broader organizational needs and expectations towards him). Eventually, it could enable better communication between parties involved in transfer (e.g., veteran and novice workers; employees and management) and ease

the process of obstacles' identification and improvement. This approach could adequately resolve the contradiction between instruments Japanese organizations employ in order to have valuable skills and knowledge transferred and the nature of underlying obstacles.

Endnotes

1 Albeit recent shifts relating to the overall employment policy and practices deserve a scrutiny as they directly affect the process of knowledge retention and transfer, they are left beyond the scope of this paper.
2 For example, with exception of assembly lines, where automation stays at 10-20 percent, robotization rates mountain up to 95 percent at such operations at automobile industry as welding and painting (Mitsubishi UFJ Research and Consulting Report, 2008)
3 The problem of Japan's first generation of baby boomers born between 1947 and 1949 and representing more than 8% of the country's workforce facing retirement at once.
4 63.4 percent of manufacturing organizations participated in the Basic Human Recourse Development Survey (2008) named extended employment or reemployment through the part-time contract of selected skilled workers as the first and speediest tool to maintain the necessary skill level. Increasing of mid-career hiring and university graduates recruitment continues the list of top measures.
5 AGC ga gembaryoku wo densyou suru houhou toha (1), (2). [How AGC Asahi Glass Transfers its Manufacturing Skills?]. Nikkei Business. Retrieved 2008.11.20. http://business.nikkeibp.co.jp/article/manage/20081117/177501/
6 Basic Survey on Human Resource Development (FY2008) reports that 59.4 percent of companies surveyed provided on-the-job training, showing an increase of more than 10 points from the previous fiscal year.
7 For more examples see Sakikawa & Narita, 2009.
8 An approach bridging micro and macro foundations is outspreading in strategic management research (see Rumelt, R. & Lippman, S. A. 2003. The Bargaining Perspective. *Strategic Management Journal*, 24: 1069-86; Takeuchi, R., Chen, G., & Lepak, D. P. 2009. Through the looking glass of a social system: Cross-level effects of high performance work systems on employees' attitudes. *Personnel Psychology*, 62: 1-29.), proving new tendencies in knowledge transfer theories to be opportune.

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