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Literature review on knowledge transfer models: From Shannon- Weaver (1949) to Kostova (1999).

Auteur 1 : ELHMAIDI Khadija
Auteur 2 : TIJANI Omar

ELHMAIDI Khadija, ph.D Student.
Abdelmalek Essaadi University/ Polydisciplinary Faculty of Larache

TIJANI Omar, Research Fellow and Professor.
Abdelmalek Essaadi University/ Polydisciplinary Faculty of Larache

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Abstract:

The mechanisms of knowledge transfer have always interested many researchers. Since it is an important element in the understanding of knowledge management. Based on theevolution of research work, this article reviews five typical models of knowledge transfer fromSchannon-Weaver (1949), Szulanski (1996), Nonaka and Takeuchi (1995), Boisot (1995), andKostova (1999). The purpose of this article is to analyze the relationship between these modelsof knowledge transfer, and concludes that the relationship is not a line but a network. The focus of future research is to make the models uniform and to conduct more empirical research.

Keywords: knowledge transfer, knowledge transfer models, knowledge management**.**

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Introduction

Knowledge transfer is a transversal concept, used in several fields, such as sociology, educational science, and psychology. Knowledge transfer is considered as "the exchange of organizational knowledge consist of exact or partial of a web coordinating relationship connecting specific resources so that a different but similar set of resources is coordinated by avery similar web of relationships" (Szulanski, 1996: 28).

According to the literature, several researchers in the field of knowledge management draw onthe mathematical and communication model in marketing to explain the knowledge transfer process (Rogers, 1982; Inkpen and Dinur, 1998; Gupta and Govindarajan, 2000). Multinational firms spend an average of 19% of the cost of knowledge transfer on a total cooperation project, and this can rise to as much as 59%. Teece (1977).

The major objective of this article is first to help researchers have a clear vision and synthesize existing models of knowledge transfer and to participate in establishing new, more scientific models of knowledge transfer.

The article will be in the following order: first, the literature on knowledge transfer models with these representative diagrams and at the same time an analysis of each model.

1-Theoretical models of knowledge transfer

1-1 The Shannon and Weaver model (1949)

In 1949, Claude Shannon and Warren Weaver proposed a model of a communication system, subsequently borrowed by the literature on knowledge transfer, to describe the entire process in which the signal leaves the source of information, via the transmitter, under the disturbance of noise, to arrive at its destination. This model can be considered the simplest and oldest.

The model is linear, with the signal having a single direction and no feedback. However, there is an innovation in the 'noise' element, which can distort the message. The model suffers from two main shortcomings: the decontextualized nature and linearity of the process, and even the content (the authors did not take into account the nature of the knowledge being transferred).

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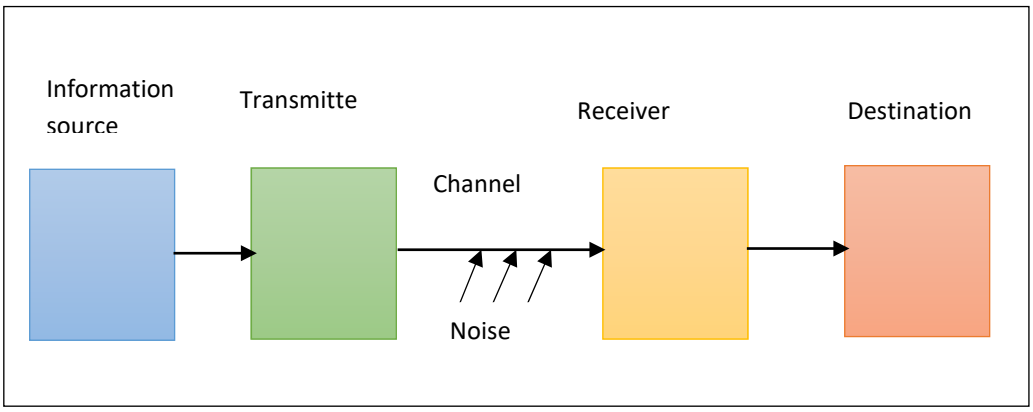
Figure 1: Shannon and Weaver's communication model



Source: Shannon-Weaver Model, Mathematical Theory of communication, Urbana: University of Illinois Press. 1949.

1-2 The Szulanski model (1996)

Years later, Szulanski (1996) based himself on Shannon and Weavear's communication model (1949) and proposed a model of the knowledge transfer process, empirically verified by a quantitative study of one hundred and twenty-two best practices within eight companies. This has led to a broad consensus among researchers, given its managerial and conceptual contribution.

Within the framework of a processual perspective of knowledge transfer, to present the main phases. The conceptual models share the same framework as marketing communication models, involving a dynamic exchange between sender and receiver. Szulanski's (1996) communication model is the most appropriate for a clear understanding of the phenomenon (Berthon, 2001). The author sees knowledge transfer as the transmission of a message from a sender to a receiver in a given context.

The model approaches the transfer process as the transmission of a message from the sender to the receiver, in a particular context. The author has divided the knowledge transfer process into four stages:

-The initiation stage: this is a stage where the organization identifies the knowledge that can meet the demand of a destination need, respond to a problem, or discover new knowledge seeking to improve existence effectively.

-The adaptation stage: During this, second stage, knowledge and material resources are transferred from the sender to the receiver and are adjusted to the receiver's context to meet the specific need. Social links are established during this stage with the aim of either anticipating or avoiding any problems at the time of knowledge transfer (Buttolp, 1992).

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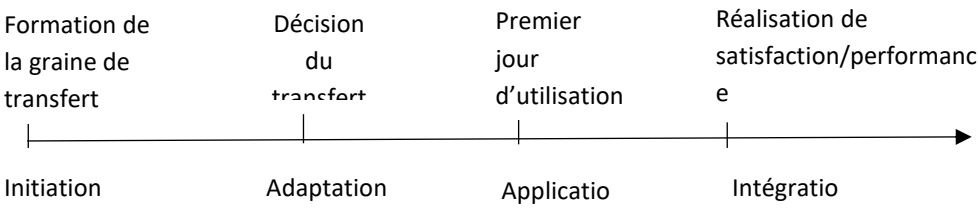
-The implementation stage (application): this stage begins with the actual use by the receiver ofthe new knowledge acquired. At the same time, the receiver adjusts his knowledge to adapt to the demands of the destination, which consequently requires a great deal of time and effort (Chew, 1991; Chew et al., 1991).

-The integration stage: the knowledge becomes "commoditized" and the destination makes thenew knowledge a system in itself and a routine of its own body of knowledge (March and Simon, 1958).

Figure 2: Diagram adapted from Szulanski (1996): stages in the transfer process



Source: Szulanski, 1996, Exploring internal stichiness: Impediment to the transfer of best practice writhin the firm. Strategic Management Journal

This model is characterized by: firstly, the sender and receiver involved in the knowledge transfer process should be active to absorb and use the new knowledge in the new context. Secondly, the model shows the important role of motivation in the knowledge transfer process. Then, the innovation of this model is that absorption capacity is a lasting process rather than an instantaneous act. Finally, the author deals with various difficulties in the model that make it difficult to transfer knowledge, such as factors linked to the nature of the knowledge, the sender, the receiver, and the context.

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1-3 The Nonaka and Takeuchi model (1995)

Szulanski's model (1996) has had great processes. However, the first two models are linear and do not take into account the types of knowledge transferred.

Nonaka and Takeuchi's (1996) model was given the name SECI (Socialisation, Externalisation, Combination, Internalisation). The authors believed that all knowledge is divided into two sections: tacit/explicit. Thus all knowledge is distributed according to 4 levels: individual, collective, organizational, and the different origins.

The model has undoubtedly become a benchmark in the field of knowledge management. SECI is not in the form of a line but takes the form of a circle. Moreover, knowledge transfer is not only horizontal (between two knowledge carriers of the same level) but can also be vertical (between two knowledge carriers of different levels).

Nonaka and Takeuchi focus on knowledge conversion; tacit/explicit knowledge can interact with each other, giving us four modes of conversion: socialization (from tacit to tacit), externalization (from tacit to explicit), combination (from explicit to explicit), and internalization (from explicit to tacit).

The four modes of knowledge conversion in the Nonaka and Takeuchi (1995) model are presented in the following section:

-socialization: this is the horizontal transformation of knowledge (from tacit to tacit). It is seen as the process of creating tacit knowledge and sharing experiences, such as know-how, mental schemas, and emotions through imitation, practice, and observation since it is difficult to codify. At the organizational level, socialization is linked to the organizational culture, to facilitate experience sharing as much as possible.

-Externalisation: this is the vertical transformation of knowledge (from tacit to explicit). It involves articulating tacit knowledge into explicit knowledge in a comprehensible form for all members of the organization. Other authors (Zack, 1995; Davenport and Prusak, 1998) have considered that this conversion is the very foundation of knowledge management practices. For the authors of the SECI model, this conversion is the starting point for knowledge creation.

- combination: this is the horizontal transformation of knowledge (from explicit to explicit). It is the combination of different explicit knowledge by mechanisms (meetings, documents, exchanges based on NICT, training, etc.) to give rise to other explicit knowledge. It is therefore a reconstruction of existing knowledge. The combination is based on a standard language so that the circulation of acquired knowledge is easy.

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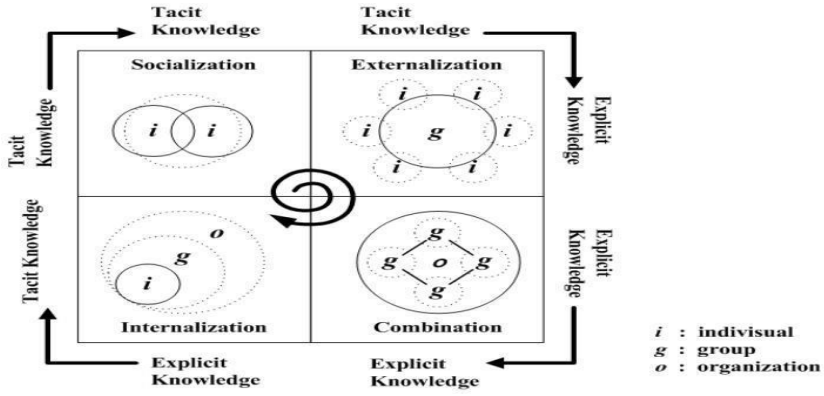
-Internalisation: this is the vertical transformation of knowledge (from explicit to tacit). This stage can be assimilated with organizational learning since it enables the behavior of individuals to be modified by the internalization of the knowledge and experience of other individuals making up the group. Internalization refers to the continuous adoption of knowledge through new organizational strategies, innovations, and tactics.

It can be concluded that the SECI model has taken into account the types of knowledge and thedifferent levels of the bearer within the company: (individual/individuals, individual/group, group/organization, individual/organization). On the one hand, the model divides all knowledgeinto two parts (tacit/explicit), which is not acceptable to researchers because it is too simple andsuperficial. On the other hand, knowledge can be transferred to a wider level, so we need a three-dimensional visual information space.

Despite the theoretical and dynamic aspects of the model, it remains incomplete because it only integrates the internal organizational context (organizational strategy, communication channels,etc.) and ignores the relational side between individuals, the external organizational context, culture, etc. so the model is not applicable in the case of inter-organizational transfer.

Figure 3: The knowledge creation and conversion process



Source: Nonaka and Takeuchi, 1995, knowledge-creating company, Oxford University Press.

1-4 Boisot's I-Space model

Knowledge cannot simply be divided into two parts: tacit/explicit. Instead, knowledge can be measured along three dimensions: abstraction, codification, and diffusibility (Boisot, 1995; Boisot and Cox, 1999). Abstraction enables the degree of structured knowledge to be reduced and captured. Codification or "encoding" is the speed and ease with which knowledge can be unambiguously attributed to a form. If the two elements (codification and abstraction) work together effectively, then the knowledge is highly diffusible.

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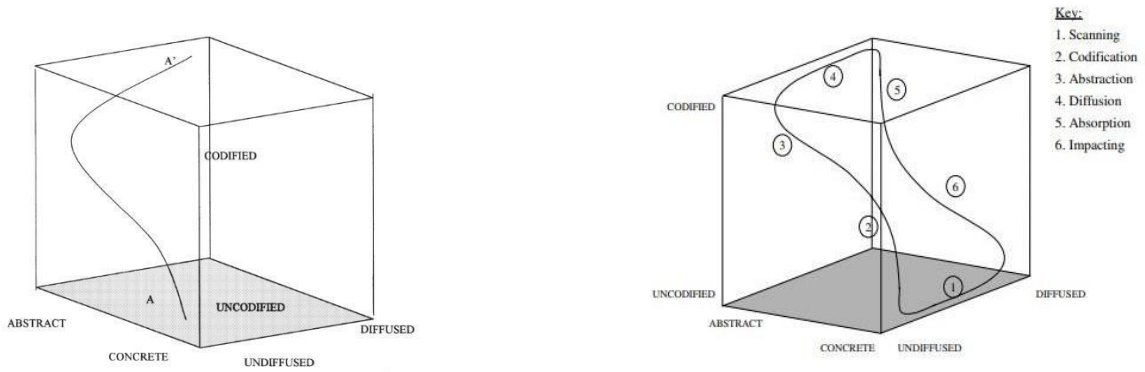
All knowledge has a different degree of codifiability, abstraction, and disseminability, so knowledge will find its place at different points in I-Space.

The I-space constructed by Boisot contains three main dimensions: codification, abstraction, and diffusion. According to the author, knowledge can be coded from non-coded, abstracted from concrete, and diffused from non-diffused if there is no resistance, called "informational friction", and the tendency is to move from point A to A'.

In the I-Space model, knowledge transfer is a circle. If the characteristics of the knowledge change, the knowledge starts to spread throughout the space, from personal knowledge to expert knowledge, to knowledge from Manuals, to common sense, to personal knowledge again, and so on.

The model has no boundaries, which justifies the possibility of transferring knowledge beyond the company.

Figure 4: Knowledge transfer in I-Space



source : Boisot, 1998, Knowledge Assets: Securing Cometitive Advantage in the Information Economy, Oxford: Oxford University Press.

source: Boisot, Cox, 1999, The I-Space: a framework for analyzing the evolution of social computing.

Boisot and Cox (1999) have defined six phases in the social learning cycle: beginning with

1- Scanning: this involves identifying threats/opportunities for data that is available but not clear.

2- Problem solving: this is giving structure to knowledge; i.e. codifying, at this stage, a given defined form, and much of the initially associated uncertainty is eliminated. Problem-solving begins in the uncodified region of I-Space and is likely to be conflictual.

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3- Abstraction: this is the generalization of the application of newly codified knowledge to a wide range of situations. This means reducing as much as possible to the essential features. Problem-solving and abstraction work together.

4- Dissemination: this is the sharing of newly created information with a well-defined population. The dissemination of codifiable and contextual knowledge is technically easier thanthat of non-codifiable and decontextual knowledge.

5- Absorption: applying new knowledge by "learning by doing/using". Over time, noncodifiable knowledge becomes codifiable and helps to solve problems in specific circumstances.

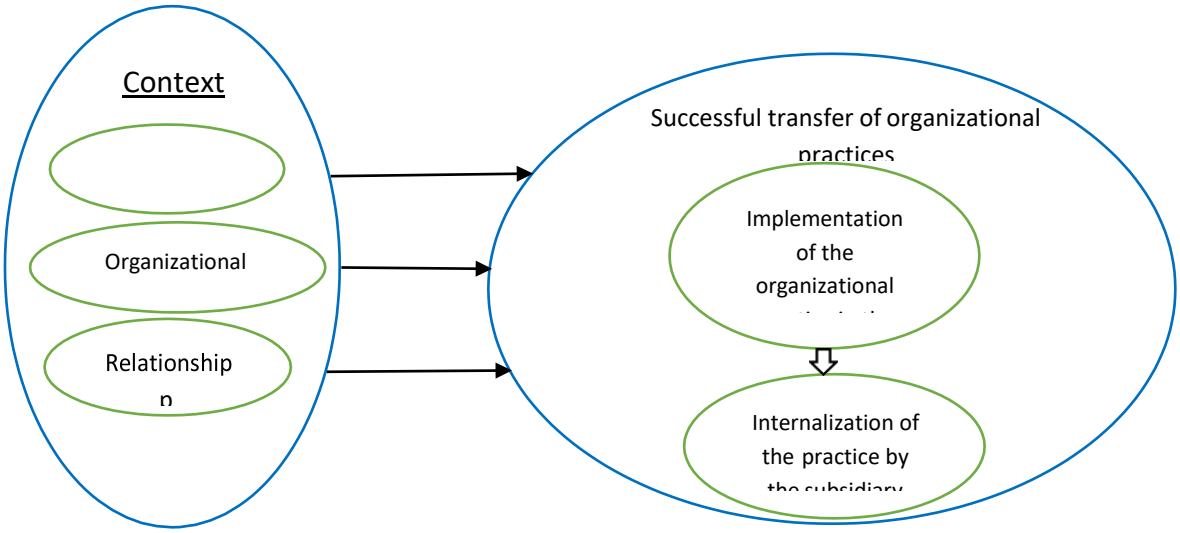
6- Impacting: this is the integration of abstract knowledge into concrete practices. This integration can take place through technical, organizational, and practical rules. These last twoelements work in parallel.

1-5 The Kostova model (1999)

Kostova's model (1999) studies knowledge transfer in an international context (social, relational, organizational). Thus, the analytical framework covers the individual, the organization, and the country.

Despite this, the model deals with concepts that have been widely used in the literature. The problem remains its purely theoretical aspect. We have summarised the model described by Kostova (1999) in the diagram below.

Figure 5: The organizational practice transfer model according to Kostova (1999)



Source: Kostova, T., 1999, transnational transfer of strategic organizational practices: acontextual perspective.

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The following table summarises the knowledge transfer models discussed in this article.

Table1: Knowledge transfer models

Authors	**Type of knowledge**	**Conceptualizing transfer**	**Contributions**
Shannon and Weaver (1949)	Sender/receiver message	4-phase process	Empirical Conceptual Managerial
Szulanski (1996)	Good practice	4-phase process	Empirical (quantitative) Conceptual Managerial
Nonaka and Takeuchi (1995)	Tacit/Explicit	Knowledge spiral	Theoretical
Kostova (1999)	Strategic organizational knowledge	Process of combining international between context and analytical framework	Theoretical
Boisot (1995) Boisot and Cox(1999)	Circle knowledge	3-phase process (1995) after 6 phases (1999)	Theoretical

Source: Adapted by the author

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Conclusion

Knowledge transfer models begin with the Shannon-Weaver model, which is characterized by pure linearity, a single signal direction, and no information feedback. Szulanski's knowledge transfer process model divides the process into 4 stages and makes knowledge transfer more complicated than the previous model. SECI reflects the different methods of knowledge transfer. The I-Space model inspects knowledge in 3 dimensions and gives us a living model of knowledge transfer. Finally, Kostova's model adds context to its analysis with more complexity in the knowledge transfer process. We can conclude from the sequence of knowledge transfer models that there is continuous improvement. The relationship between the models takes the form of a network rather than a staircase.

Limits

The above models of knowledge transfer show certain shortcomings like any other previous research work and there is still work to be done in the future.

Firstly, research on knowledge transfer models should be normative. The main objective of this research is to answer the question "How can managers find the right and appropriate direction for these different models? Secondly, empirical research is expected. Empirical research and the modeling of a new modelwill be the focus of future research. Thirdly, management science research, particularly knowledge transfer, needs more mathematical methods in practice if research is to be more scientific.

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