THE NEW LATIN
THE LANGUAGE OF DIGITALIZATION IN LOGISTIC COMPANIES

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Abstract

There was a time that Latin ruled the world. Now it is a forgotten language, used only by doctors and botanists. In its heydays, it was the vehicle of progress. Mastering this language was a precondition for access to scientific knowledge. Nowadays, digitalization is a major challenge for logistic companies. To perform the digital transformation, companies need new knowledge. However, they find it difficult to identify, transfer and apply this knowledge in their organization. New (periphery) knowledge, is usually difficult to translate and integrate into their communication. In this paper we explore specific, language related knowledge barriers, that cause these problems and how to overcome them, which accelerates logistic companies to digitalize.

In the literature review we discuss knowledge and its types (tacit & explicit, core & periphery), knowledge management and its strategies (regenerative and anticipatory), knowledge barriers and their types (syntactic, semantic and pragmatic). From the literature review we conclude that companies that have mastered the basic syntactics (the words) have fewer difficulties explaining knowledge (semantic mode) and taking the next steps to effectively use this knowledge (pragmatics). This can be explained with the analogy of learning a natural language; first the words then the meaning. Companies that are highly efficient, have learned to communicate within their network using digital knowledge. In order to digitalize, companies need a knowledge management strategy for which there are different possibilities depending on the organization's characteristics. Which specific tools are effective for digitalization needs further research.

1.   Introduction

Digitalization is a sociotechnical process in which digital tools are implemented in a broader social and institutional context (Heilig et al., 2017). Implementing the digital transformation is a process of transformation of, strategy, governance and leadership and communication in an organization (Kumar, Boesso, Favotto, & Menini, 2012). Dutch SMEs lag behind on the field of digitalization, while it is essential for them. For example the transition to a more circular economy has consequences for them and their innovation strategy. Furthermore, circular economy asks for more regenerative economic- and organizational models. These models require the involvement of different actors in order to reduce waste and take more responsibility (Seebode, Jeanrenaud, & Bessant, 2012). A digital ecosystem can support these models in the field of supply chain logistics (Pagoropoulos, Pigosso, & McAloone, 2017). Data science and advanced analytics have a direct relevance for logistics; in recent literature different tools and techniques to make data driven supply chain management decisions have been proposed (Govindan, Cheng, Mishra, & Shukla, 2018). Better use of data could make better tracking of products possible, which could be used for slow steaming to apply ships as floating warehouses (Herold et al. 2021). If successful digitalization can contribute in creating these ecosystems, at the same time competitive advantages for SMEs by reducing costs through the integration and implementation of new digital knowledge to be used for tools, applications- and product development is facilitated (Greif, Kühnis, & Warnking, 2019)(Love & Roper, 2015). This way, digitalization can make both individual organizations and supply chains more efficient by using data for effective matching of supply and demand between different stakeholders. However, digitalization requires new knowledge on processing, storing and implementing digital technologies.

However, the implementation of new digital knowledge is usually slow, especially at smaller SMEs (Panagiotis, Zou, Lehmann, & Berger, 2019). One reason for this is that in SMEs have high exploitation pressure (Bianchini & Kwon, 2021), especially in these times of disruptions and the lack of human capital. This high exploitation pressure effects exploration capacity (Teece, Pisano, & & Shuen, 1997). Exploration is expensive and time consuming and takes a lot of capacity (Tsoukas, 2009) (Chu, 2014). Furthermore, the more complicated the required new information is, the more capacity it takes form an organization to acquire and implement it (Leiponen & Helfat, 2011).

If the information is found to be useful, it asks for a systematic approach of the organization to further transform this knowledge for exploitation. Specifically, knowledge on digitalization requires specialized 'know how' to convert digital knowledge into useful information (H, Kühnis, & Warnking, 2019). In this process the capabilities of humans are a major factor (Kalitanyi & Goldman, 2020). As the digital transformation requires effective communication within and between organizations, language plays an important role. Here, we focus on the syntactic, semantic and pragmatic aspects of language.

In this paper in Section 2 we present a literature study on the following topics: knowledge and its types, such as tacit and explicit, core and periphery knowledge, knowledge management and its strategies

namely, regenerative and anticipatory, and knowledge barriers and their types, syntactic, semantic and pragmatic knowledge barriers. In Section 3 we draw conclusions from the analysis of the literature and give advice on further research.

2.   Literature Study

In this section the most important definitions from the literature are described, knowledge, types of knowledge knowledge management and knowledge strategies.

2.1. Knowledge

State of the art knowledge is a key asset for SMEs in terms of a competitive advantage, however, knowledge is also volatile, vulnerable and fluid. Furthermore, new knowledge becomes continuously obsolete. So, keeping up requires continuous mining for new knowledge, facilitated by existing organizational systems (Sadath, 2013). This is a predetermined process: whenever new knowledge emerges, also some knowledge becomes obsolete at a high rate (Powell & Snellman, 2004). In a stable environment with few competitors there is less need for change. Risks emerge, when the lack of knowledge effects the processes and daily routines of the organization. The solution most often used by SMEs is further exploitation of routines, in other words exploitation innovation. However, this process of exploitation innovation demands a lot from smaller organizations and often results in a race to the bottom, causing even more exploitation pressure (Jashapara, 2004). In the following section a typology of knowledge is given as it helps the further analysis.

2.2. Types of Knowledge

Knowledge can be divided into tacit and explicit and core and peripheral knowledge. Tacit knowledge is often practical, informal, personal knowledge, embedded in a specific work process and -context in a specific work environment. Tacit knowledge is enhanced by its user through experience. Learning and sharing these experiences take place through emulation or instructing. Explicit knowledge on the other hand is formal, often registered in writing, for example procedures and protocols. A great advantage of explicit knowledge is that is can be stored for example in databases, exchanged and disseminated within the organization and, most of all, it is detached from its original context and user. Therefore, it is manageable, since it describes information on processes in a specific manner. Furthermore, explicit knowledge can be converted into procedural knowledge, which explains how things work, in procedures or protocols (Nonaka & von Krogh, 2000).

Core knowledge is the organization's knowledge, explicit or tacit, and is directly related to the core competitiveness of an organization and is based on its available resources (Li & Wang, 2021). Periphery knowledge is critical new knowledge that comes from new developments and technologies and could be part of the core knowledge. Periphery knowledge can be found outside the organization, through customers, suppliers or competitors. As a result of a changing environment and new technologies the

periphery knowledge may increase. As a result of strong competition and knowledge becoming rapidly obsolete core knowledge may shrink or change. Core knowledge can be different combinations of tacit and explicit knowledge. Knowledge on digitalization is an example of periphery knowledge is. For an overview of the different kinds of knowledge see Figures 1 and 2
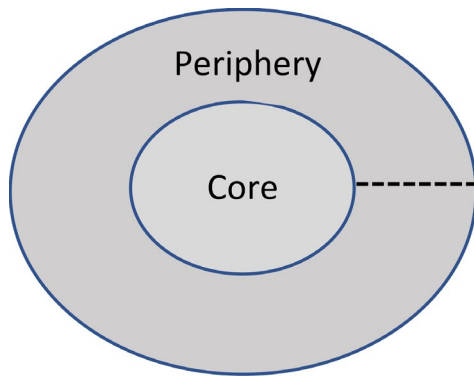

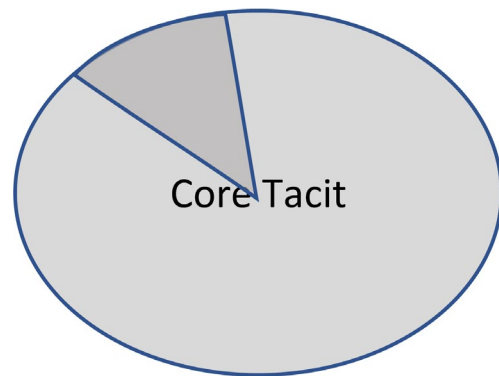Figure 1 Core and Periphery Knowledge Wiersma 2022

Figure 2 Tacit or Explicit Core

2.3. Knowledge Management

Knowledge management can be described as a learning process through exploration and exploitation and sharing of both tacit as explicit knowledge in order to enhance the organization's intellectual capital (Jashapara, 2004). Managing can take place in order to (re)combine internal existing knowledge with new (periphery) knowledge in order to create new meanings and learning capacities and applications (Verganti, 2009). Knowledge management can be used as an instrument for the identification of critical knowledge for the organization, (Brown & Duguid, 1998) (Nooteboom & W.P.M. Vanhaverbeke, 2005) (Williams P. , 2011) (Kousgaard, Joenson, & Thorsen, 2005) (Weerts & Sandmann, 2010) (Pryso & Henley, 2017). Furthermore, knowledge management is also a strategy for selecting people, based on theire capacities and capabilities (Scarbrough, 2003) (Runhaar & Sanders, 2015) (Campbell E. C., 2012). Knowledge risks can be defined as 'a likelihood of any loss resulting from the identification, storage or protection of knowledge that may decrease the operational or strategic benefit of a company (Perrot, 2007). If knowledge becomes obsolete, it becomes irrelevant to the organization. Obsolete or outdated knowledge can affect the organization in many different ways, varying from productivity to cybersecurity risks to customer satisfaction (and therefore even legal liabilities) (Tan, et al., 2007).

In order to avoid knowledge risks, in terms of storing and or replacing knowledge, organizations need the knowledge flow going on continuously, at a speed required by the environment (Szulanski G. , 2000). When this is done, the knowledge flow guarantees that the organizational core knowledge is up to date. The knowledge flow is managed in steps, which determine the maturity of an organization. These steps can be divided in four categories. The organization belongs to the first category, when it is knowledge-intensive and it exchanges internal and external knowledge easily; it is able to recognize and use relevant knowledge systematically. The organization belongs to the second category, when it

is a learning organization, which systemically organizes both external and internal knowledge, aiming at improvement of both operational knowledge for solving problems as strategic knowledge. The organization belongs to the third category, when it develops a business model for new ideas and applications and moderates its actual knowledge base on the basis of constraints and knowledge barriers that are constantly monitored. An organization in the fourth category regenerates is core knowledge and knows to integrate peripheral knowledge based on its organizational and human resources capacity and capability. Companies should strive for the fourth category in order to profit optimally from knowledge.

2.4   Knowledge management strategies

In general a strategy is based on an organizations' capability and capacity, its core knowledge and the need for periphery knowledge. On this basis we determined two archtypical extreme positions: a regenrative strategy and an anticipatory strategy.

Regenerative knowledge management strategy.

For organizations in this archetypal position new knowledge is highly practical. The core knowledge is more tacit than explicit. This strategy is based on the fact that new periphery knowledge is difficult to acquire as a result of high costs and limited capacities and (dynamic) capabilities. Dynamic capabilities are the organizations abilities to combine, develop and modify internal and external resources in a rapidly changing environment (Teece, Pisano, & & Shuen, 1997). Although these SMEs understand that knowledge is a critical resource for their organization, as well as for their workforce, in order to rearrange 'internal and external competencies', for them merely lack of money, time and people to acquire new knowledge cause the inefficiencies. (ATW, 2014) (WRR, 2013). Knowledge management instruments are present and used for for continuous improvement of core knowledge. This knowledge is meant for long-term applications (Orlikowski, 2002).

Anticipatory strategy

Organizations in this archetypal position integrate their strategy, connectedness and knowledge management support systems to (re)combine them into new meanings and learning capacities for creating and absorbing new knowledge (Verganti, 2009). Organizations experience advantages through dynamic capabilities of both human resources and the organizational systems (Teece, Pisano, & & Shuen, 1997) (Haas, 2015) (Fallon-Byrne & Harney, 2017). The exploitation of new external knowledge is a process of refinement and extension of existing capabilities by incorporating acquired and transformed knowledge into the operations of the company (Zhixiong & Yuanjian, 2010) (Bianchini & Kwon, 2021). For an overview of the archetypal positions and types of management strategies, see Figure 3
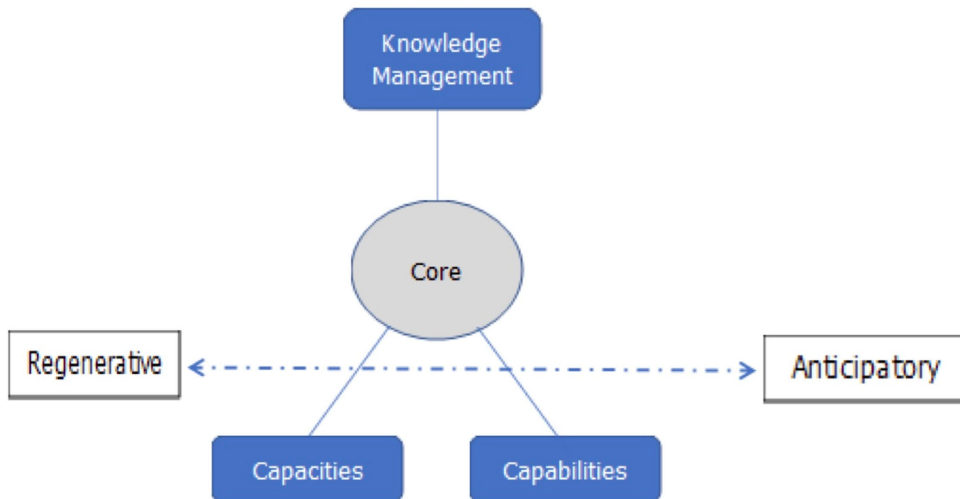
Figure 3 An overview of the archetypal positions and types of management strategies

3.   Communication barriers for innovation

In this paper we focus on communication barriers. These barriers emerge when employees are confronted with high novelty problems that they cannot solve because of their limited expertise or knowledge (Carlile, 2002). More traditional barriers are related to avoid complexity (Ridely, 2017), limited reciprocity in collaboration (Connelly & Kelloway, 2001), high costs and limited availability of high skilled human resources (Schartinger, Schibany, & Grassler, 2001), the lack motivation of employees (Jacoby, 2001), the absence of learning culture (Gurteen, 1999), the protective behaviour toward intellectual property and the lack of trust (Ternouth, P; Garner,L; Wood, L;Forbes,P., 2012).

Barriers are also created by path dependency, long existing rules and behaviours, also create barriers (Crespi & Scellato, 2014). This means that employees tend to find solutions based on previous experiences, instead of looking for new knowledge (Westeley & Antadze, 2010). This may hinder the development of the routines or the exploration of new periphery knowledge (Chu, 2014). The most basic barriers are syntactic barriers.

3.1. Syntactic barriers

Syntactic barriers are concerned with recognising different cultures, knowledge types language types, and vocabularies within a system. People work together sometimes for a long time and therefore may develop a specific cultural language. This language supports their actions and behaviour. This causes a mental pathway, which is resistant to change (David, 2000). Framing new problems requires reframing old mental models with a different language. Organizations can learn from these models, in order to develop new capabilities. This process of learning is effectuated when aligned with external technology bases and context (Loree, Bapuji, & Crossan, 2011). Therefore, employees working in a specific context with specific routines usually develop a specific syntax (jargon). When confronted with a different syntax, for example formal versus informal language, or digital versus analogue language, a specific

syntax may hinder information exchange. This syntactic barrier, refers to the incapability of employees to identify new critical external knowledge which can be used by the company to address new problems. A useful solution for these knowledge barriers is to develop syntactic capabilities. Syntactic capabilities can be improved with the help of digital tools. Identifying the syntactic knowledge barriers provides a chance for innovation. The second most common type of barriers are semantic barriers.

Semantic barriers

Semantic barriers exist when there is a same syntax, but a difference in interpretation. This is a significant barrier and difficult to overcome because even if there is a common syntax, there is no common understanding. This causes difficulties at articulation of constraints and possible solutions. Thus, communication problems can take place between individual, teams and in networks. Especially in case of interpreting complex problems between different social worlds and practices a common framework of understanding of new knowledge of digitalization is important (Nowotny, Scott, & Gibbons, 2003). In collaborative innovation processes all parties also take their own cultural interpretations with them, which makes it hard for them to articulate new periphery knowledge. Articulation of periphery knowledge is a process of splitting and (decomposition) and reassembling (integration) of knowledge. The articulation of more latent questions requires specific language, knowledge and competencies of different users. In collaboration between individuals, teams or organizations often different languages (tacit -explicit) are involved. The production of informal knowledge in innovations (tacit knowledge) Polanyi, 1967) (Nonaka & Takeuchi, 1995) is an important obstacle because it is often personal as well as context-specific. Converting this knowledge to another context, for example a system with a knowledge mode with more formal descriptions, is problematic, complex and time-consuming (Schoffelen & Huybrechts, 2013) (Collins, 2010) (Kabir, 2013).

Semantic barriers can be overcome by replacing language with representation, for example visualizations or other kinds of semiotics. Recently more attention has been made to socio-materiality, which means that research is done in a way in which social and the material are combined (Doolin & McLeod, 2012).

Pragmatic barriers

The third kind of barriers discussed here are pragmatic barriers. Bakker and Akkerman refer to these pragmatic knowledge boundaries as socio-cultural and cognitive differences that lead to discontinuity (Akkerman & Bakker, 2012). Reducing these discontinuities can take place through 'negotiating knowledge' (Tempelaar & Rosenkranz, 2017). While semantic barriers refer to the intentions of message, pragmatic barriers deal with conflicts of interest. The use or development of knowledge in one domain may be in conflict with another domain. Also, there may be a different interests in goals , for example the development of an individual organization versus network benefits. Pragmatic barriers are often hard to dismantle when employees heavily rely on prior knowledge and skills (Carlisle, 2002) (Star S. L., 2010) (Jacoby, 2001).

Pragmatic barriers can be overcome by continuously updating knowledge, as cherishing old knowledge causes pragmatic barriers in the first place. A collaborative attitude and ambition is therefore an important condition for success in open innovation (Chesbrough, 2003) (Weggeman M. , 2000), as is reciprocity (Fiske, 1991) (Cohen W & Levinthal, 1990) the development of new skills, e.g. reconceptualization, critical thinking and analytical skills are also important.

4. Conclusion

In this paper we explore specific, language related knowledge barriers, that cause problems for organizational development, especially for digitalization. Furthermore, we discuss how to overcome these barriers, using knowledge management strategies. Overcoming these barriers accelerates logistic companies to digitalize.

We conclude that knowledge is a key asset for organizations, which becomes rapidly obsolete. In order to prevent that companies should carefully manage their knowledge base. SMEs have a major problem doing so by their high exploitation pressure. There are different kinds of knowledge, tacit, explicit, core and periphery. This distinction is essential for understanding how knowledge barriers emerge. There are different knowledge management strategies, from which two extreme archetypes are discussed regenerative and anticipatory, however there are more gradations of it. A company should choose a strategy, which fits its capacity and capabilities in order reduce obsolete knowledge. Companies should strive to reach the highest maturity level when they regenerate their core knowledge and know how to integrate peripheral knowledge based on their organizational and human resources capacity and capability.

This paper discusses three knowledge barriers which are conneced to language and are important for the adaption to and the adoption of digitalization, syntactic, semantic and pragmatic barriers. Syntactic barriers are related to the structure of communication, while semantic barriers are related to the interpretation. Finally pragmatic barriers explain the differences of the use of knowledge between different stakeholders. Pragmatic barriers are closely related to domains specific skills. The solution for syntactic barriers is to develop syntactic capabilities. Syntactic capabilities can be improved with the help of digital tools. Semantic barriers can be solved is the use of semiotics, for example visualization, which circumvents language. Finally pragmatic barriers can be solved by by regularly updating core knowledge by perifery knowledge.

From the literature review we conclude that companies that have mastered the basic syntactics (the words) have fewer difficulties of explaining knowledge (semantic mode) and taking the next steps to effectively use this knowledge (pragmatics). This can be explained with the analogy of learning a natural language; first the words then the meaning. Companies that are highly efficient, have learned to communicate within their network using this knowledge. In order to digitalize, companies need a knowledge management strategy for which there convert different possibilities depending on the organization's characteristics. Which specific tools are effective for digitalization needs further research.

Finally we conclude that the language of digitalization both tacit and explicit should be developed by developing companies' knowledge absorption capacity. For companies it is necessary to learn the new Latin, the language of digitalization, its syntax, semantics in order to overcome pragmatic barriers and be apple to implement digitalization in their companies.

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