Knowledge Dynamics and Expert Knowledge Translation: A Case Study

Constantin Bratianu[1] and Alexeis Garcia-Perez[2]
[1]Bucharest University of Economic Studies, Bucharest, Romania
[2]Coventry University, UK

constantin.bratianu@gmail.com
alexeis.garcia-perez@coventry.ac.uk

Abstract: Knowledge dynamics means variation of knowledge in time and space. Over time, knowledge levels can increase through accumulation, or decrease through loss. Also, knowledge may change its quality through transformation from one form into another. In space, knowledge can move from one place to another one, generating a flow (i.e., knowledge flow). The present paper aims at analyzing the knowledge dynamics associated to the process of expert knowledge translation, present in almost all life domains. Knowledge translation is based on communication and transformation of knowledge. Among many models used to explain knowledge translation, we present in this paper the expert knowledge translation that is used whenever an expert is sharing his expertise with one or several individuals interested in that knowledge. We analyze the whole process of expert knowledge translation from a conceptual perspective and then we present a case study describing expert knowledge translation. Knowledge translation is necessary because the source and the receiver of the messages have different semantic domains and levels of understanding based on their education, background and their analytical skills. The main barrier in knowledge translation is the absorptive capacity of the receiver. If the absorptive capacity is rather small, the translation efficiency is very small. This situation can be improved if the translation process is broken into several smaller knowledge translation processes like in a cascade. The paper presents the model of such a cascade for expert knowledge translation showing how to construct it. As an application, the paper presents a case study focused on a company manufacturing gas turbines (GTM). The company is a global supplier of gas turbines and we show how engineering expert knowledge is translated in a cascade from design to manufacturing, automation, testing, installing and commissioning turbines to end users.

Keywords: Knowledge dynamics, Knowledge translation, Expert knowledge, Absorptive capacity

1. Introduction

Knowledge dynamics is a complex concept that reflects the variation of knowledge in time and space, i.e. the transformation of knowledge (Bratianu & Bejinaru, 2020; Carlile, 2004; Nissen, 2006; Nonaka & Takeuchi, 1995). The concept of knowledge dynamics implies variation in time in any kind of its manifestation, but the focus on the variation in time appears when we consider knowledge or knowledge capital as a stock in an organization or a network (Bolisani & Oltramari, 2012; Kianto et al., 2007). Variation in space is generically known as *knowledge flow* (Nissen, 2006; Nonaka, Toyama & Hirotaka, 2008). Knowledge flow is possible when there is gradient in the knowledge distribution within a given organizational context. The most complex of knowledge dynamics is the transformation of knowledge from one form (i.e., explicit and tacit or rational, emotional, and spiritual) into another form of knowledge (Bratianu & Bejinaru, 2020; Nonaka & Takeuchi, 1995, 2019).

Knowledge translation (KT) is a generic process of transferring knowledge from one person to another, or to a group of people. Although it is based on a communication process, knowledge translation is much more than communicating knowledge because it implies knowledge transformation such that the target can understand the messages received from the source (Carlile, 2004). Although knowledge translation has been developed almost exponentially in the last years in the healthcare sector, it is a generic process that can be found in almost all domains of human activity (Dal Mass, Garcia-Perez et al., 2020; Dal Mass, Cobianchi et al., 2021). Knowledge translation was conceived initially as an all-encompassing process between research and applications in the healthcare sector, creating value by embedding research findings in practical procedures and best practices (CIHR, 2016). As research into knowledge translation evolved, it became apparent that knowledge translation takes place in all processes of communications at micro, mezzo, and macro scales in any social context. The performance of knowledge translation is influenced by the knowledge dynamics in multiple forms, depending on the complexity of the domain of human activity. However, this correlation is lacking in the literature. It is a knowledge gap we try to discuss in the present paper.

2. Literature Review

2.1 Knowledge Dynamics

Knowledge dynamics influences the process of KT through different forms, from a simple variation of knowledge level over time, to knowledge transformations. As mentioned earlier, knowledge varies over time at both individual and organizational levels due to the learning and unlearning processes, as well as to knowledge loss from organizations through different forms (Bratianu et al., 2011; DeLong, 2004). That change in knowledge levels leads to a changing gradient in the knowledge field, which leads to a change in the force driving the flows of knowledge contributing to KT. Nissen (2006) asserts that knowledge flows is more than a metaphor. It is a phenomenon that happens in any organization, illustrating knowledge dynamics over time and in space, like in fluid mechanics. Knowledge flows induce changes in the knowledge distribution that lead to changes in the knowledge entropy within an organization (Bratianu, 2019). From another perspective, Blacker (1995) presents a categorization of five different types of knowledge: embrained, embodied, encultured, embedded, and encoded. They result from knowledge processing and contains in different proportions rational, emotional, and spiritual knowledge (Bratianu & Bejinaru, 2020).

From a practical point of view, knowledge can flow between two points in space within an organization if, and only if, there is a knowledge difference between the initial and the end points of the flow. By understanding knowledge flows we can understand knowledge sharing as an intra- and inter-organizational process (Balle et al., 2019; Nonaka & Takeuchi, 1995, 2019). Knowledge sharing is governed by both the knowledge deficit of the user and the willingness of the source to share their experience with other people. At the individual level, the most important factor influencing knowledge sharing is knowledge hiding, while at the organizational level it is intellectual property (Bratianu, 2022; Ruparel & Choubisa, 2020). Thus, knowledge flows are governed by the knowledge deficit and the dynamics between knowledge sharing and knowledge hiding.

The Theory of Knowledge Fields (TOKF) introduces the idea that knowledge is not a fluid but an intangible field that manifests in three basic forms: rational, emotional, and spiritual knowledge (Bratianu & Bejinaru, 2020). *Rational knowledge* is the result of our thinking and it is an explicit knowledge because it can be expressed by using natural or symbolic languages. Rational knowledge is what Aristotle (1999) called *episteme*. It is an objective knowledge about the world we are living in (Davenport & Prusak, 2000; Nonaka & Takeuchi, 1995). Rational knowledge can be easily codified and used extensively in the organizational procedures, regulations, databases, and communications. *Emotional knowledge* is created by our emotions and feelings and it is wordless (Damasio, 2012; LeDoux, 1999). Emotional knowledge is the result of experiential learning and it is about *how-to* do things. Emotional knowledge is similar to what Aristotle (1999) called *techne*. Emotional knowledge constitutes the most important component of tacit knowledge that is so important in the Japanese companies (Nonaka & Takeuchi, 1995). Emotional knowledge can be transformed into rational knowledge using natural language and metaphorical thinking. Emotional knowledge is linked to emotional intelligence (Goleman, 1995) and together influence the process of decision making (Hill, 2008). Emotional knowledge integrates in time resulting experience that is at the core of any know-how and the root of intuition and intuitive thinking (Shotter & Tsoukas, 2014). Gladwell (2005) considers intuition as valuable as any rational analysis "the task of making sense of ourselves and our behavior requires that we acknowledge there can be as much value in the blink of an eye as in months of rational analysis" (p. 17). *Spiritual knowledge* refers to the meaning of our existence, our work, and the expected happiness. Spiritual knowledge is linked to what Aristotle (1999) called *phronesis*, or practical wisdom (Pinheiro & Rocha, 2020; Rocha & Pinheiro, 2021; Rocha et al., 2021; Shotter & Tsoukas, 2014). By integrating spiritual knowledge at the organizational level we get *spiritual capital* that is "our shared meaning, our shared purpose, our shared vision of what most deeply matters in life – and how these are implemented in our lives and in our behavioral strategies. It is the capital that is increased by drawing on the resources of the human spirit" (Zohar & Marshall, 2004, p. 27).

In the TOKF knowledge dynamics means transformation of knowledge from one field into any other form of knowledge (Carlile, 2004). It is an irreversible and nonlinear transformation like in thermodynamics (Chaldize, 2000). Kahneman (2011) illustrates this influencing mechanism with a very simple psychological experiment done in a British university. In the tearoom of that university, the tradition was for students to pay according with the price list hanged on the wall just above a "honesty box". One day, next to that price list appeared a poster with many eyes staring at you, without any explanation. After one week, the eyes poster was replaced with another one showing beautiful flowers. These two types of posters were alternating for ten weeks. By the end of each day, the professor who created this psychological experiment counted the money dropped by students into the "honesty box". The daily values were higher when the students faced the eyes poster than

when they were looking at the flowers. The emotional knowledge generated by the staring eyes was transformed into rational and spiritual knowledge, and their dynamics influenced the decision to pay the right amount of money, as indicated by the price list. A very simple but convincing psychological experiment showing that decision is not a purely rational process. It is influenced by the dynamics between emotional, spiritual, and rational knowledge. This idea is supported by Shotter and Tsoukas who explain *phronesis* in relation with the ways which determine "how we see, how we hear, perceive and value particular events and experiences occurring in our surroundings" (Shotter & Tsoukas, 2014, p. 381).

2.2 Knowledge Translation

Knowledge translation (KT) is considered by Davidson (2009) "as the practice, the science, and the art of bridging the know-do gap, or the gap between the accumulation of knowledge and its subsequent use or application" (p. 75). KT originates in linguistics, as a written or spoken process of translating texts or spoken phrases from one language into another one. In this original model, KT represents a mapping function of a certain message from the source semantic domain (SSD) onto the recipient semantic domain (RSD). Thus, KT implies a combination of communication with an act of interpretation performed by the translator.

The Canadian Institute of Health Research (CIHR) scaled up the process of KT to suggest a bridge between the research domain and practice domain in healthcare. The definition formulated by CIHR (CIHR, 2004) based on this interpretation became one of the most cited definitions of KT. According to CIHR (2004), KT is "The exchange, synthesis and ethically sound application of knowledge with a complex system of interactions among researchers and users – to accelerate the capture of benefits of research for Canadians through improved health, more effective services and products, and a strengthening health care system" (p. 2). The same Canadian Institute produced a new formulation that was accepted by most of the researchers working in healthcare systems. KT is the process that "includes knowledge dissemination, communication, technology transfer, ethical context, knowledge management, knowledge utilization, two-way exchange process between researchers and those who apply knowledge, implementation research, and development of consensus guidelines" (CIHR, 2016). However, we have to remark that from a logical point of view and from the perspective of knowledge management this cannot be accepted as a definition because it demonstrates a misunderstanding of the knowledge translation and knowledge management processes. For instance, knowledge dissemination, communication, ethical context and knowledge utilization represent components of knowledge management, and knowledge management is not a component of knowledge translation (Nonaka & Takeuchi, 1995). On the contrary, knowledge translation is a component of knowledge management.

To understand the process of knowledge translation we consider a generic model composed of a knowledge source, a communication channel, a knowledge receiver, and a certain cultural context. The assumption is that the level of knowledge of the source is higher than that of the receiver. The receiver is characterized by a semantic field (RSF) that may be different to that of the source semantic field (SSF). For instance, the source and the receiver may belong to different cultures and speak different languages. To make communication possible, it is necessary a translator or an international language known by both the source and the receiver. In the case of a high knowledge difference between the two ends of the communication channel, the problem is how much knowledge can be absorbed by the receiver. Thus, knowledge absorptive capacity of the receiver becomes a limitation of the knowledge that can be transferred from the source to the receiver. The concept of *absorptive capacity* was introduced by Cohen and Levinthal (1990) as a measure of the organizational capacity to assimilate external knowledge, but it can be applied as well at the individual level. According to Carlile (2004), knowledge translation is a complex process that involves crossing the pragmatic, semantic, and syntactic boundaries. Crossing the syntactic boundary results in knowledge transfer. Crossing the semantic boundary means knowledge translation, but based on knowledge transfer. Crossing the pragmatic boundary results in knowledge transformation, based on its translation and transfer. Expert knowledge translation is successful if it is possible to cross all these boundaries.

Expert knowledge represents a high level of understanding with respect to a certain domain of activity and it is acquired after years of study and research in that domain. It is the knowledge that can be delivered by experts and consultants from consulting and research companies, by university professors, by medical doctors after many years of practice, or by engineers manufacturing complex equipment (Evers & Menkhoff, 2005). Trying to communicate that knowledge as it is directly to the end users is meaningless because the receivers cannot understand it. Their semantic universe does not contain the necessary concepts and ideas for accepting and integrating the new knowledge. The end users have a very low absorptive capacity when compared to the experts. The solution is for experts to translate their knowledge for a lower level of understanding, which

means a degradation of its initial quality as a result of increasing the process entropy (Chaldize, 2000). However, many times that expert knowledge cannot be conveyed directly without losing its meaning, and it is necessary to break it down into several translation sequences like the water flowing through a series of cascades. Thus, we propose in this paper a *cascade knowledge translation model* that can be applied in any expert knowledge translation. The model requires a knowledge source, one or several intermediary knowledge translators and a knowledge receiver as an end-user. Expert knowledge is processed by a serial translation phases, each phase decreasing the level of understanding according to the absorptive capacity of each intermediary translators, and finally with that of the end-user. This is a generic expert translation model but it can be found in many practical situations with some specific details given by the context. In order to analyze in practice how this model is operationalized, we performed a case study of expert knowledge translation within a large industrial company for manufacturing gas turbines from UK. We follow the chain of activities from manufacturing to selling and providing service to the end users of gas turbines.

3. Methodology

3.1 Rationale and Methodological Approach

We applied our generic model of *expert knowledge translation in cascade* to a complex case study that is hereby reported in a simplified manner, in line with the constraints of the conference paper. We considered a large international company manufacturing gas turbines, referred to as GTM in this paper, which has its headquarters in the United Kingdom.

Having collaborated in Knowledge Management projects with GTM over a decade (2008 to 2018), the authors had been able to identify the importance of the translation of engineering knowledge in all engineering processes at GTM. Their management board had referred to terms such as 'understanding customer needs', 'communicating product capabilities', and 'learning from customers' as some of the key issues having an impact on both costs and innovations. It had been agreed that knowledge translation was at the heart of most of those issues and it therefore affected –both directly and indirectly, all GTM efforts to reduce costs and increase their potential for innovation.

Between the September 2015 and July 2018 –the last part of their formal engagement with GTM, one of the authors held discussions with engineers to understand their methods of translating knowledge along the chain of operations through to their end-users. In our experience, both the theoretical foundations imposed by the research context and the practicalities of its implementation imposed significant challenges, including the collection and analysis of a consistent set of data relevant for the purposes of this research, as well as demonstrating the reliability, replicability and validity of our research findings. Those challenges suggested that the data collection would be an iterative process involving the authors in their role of researchers and GTM engineers, in their role as practitioners, both acting together on a particular cycle of activities that included problem diagnosis, action intervention, and reflective learning. This was later found to be in line with the principles of Action Research as defined by Tracy (2020), Yin (2018) and Avison et al. (1999). The latter argue that in order "*to make academic research relevant, researchers should try out their theories with practitioners in real situations and real organizations*".

3.2 The context to Knowledge Translation in the GTM Ecosystem

GTM designs, manufactures and commissions gas turbines. The company also provides supports to its customers in the service of the products that are being used in the field. GTM has many thousand employees including professionals from a range of engineering disciplines, and thousands of customers throughout the world with a variety of operational requirements. In their interaction with actual and potential customers, GTM engineers have developed significant expertise in the design, manufacturing and operation of gas turbines over decades. The ultimate aim of the translation of engineering knowledge in this project was the use of such knowledge for the benefit of all stakeholders within the complex GTM ecosystem.

GTM's employees and stakeholders form a large chain of actors who own and act upon different pieces of knowledge about their gas turbines. Their knowledge of gas turbines is determined by their own different roles, projects, experiences and requirements. In this context, GTM engineers' knowledge of gas turbine operation not only helps organizational actors with their design and manufacturing activities, but also helps customers' business and operations. Simultaneously, knowledge of the health and usage of gas turbines in the field (i.e. customers' knowledge) helps GTM improve existing turbine designs and innovate in the design and manufacturing of new products and services. There is therefore a need for continuous translation of knowledge of gas turbines between GTM and its customer base, with knowledge moving in both directions. In

this context, knowledge translation plays a vital role allowing knowledge to be interpreted and applied at least at three levels:

- Between GTM and its potential customer base, with sales engineers acting as the interface between them. Knowledge is captured by sales engineers in the form of customer needs. Customer needs are then translated into sets of engineering requirements. GTM sales engineers become a key stakeholder in this continuous series of spontaneous knowledge translation initiatives.
- Within GTM, with employees from different departments collaborating during a period of months in a trusted environment toward the development of a unique product that meets the business needs of a particular customer. Engineering knowledge is continuously translated as it flows between teams to enable its use within the engineering processes.
- Between GTM and is actual customers, with customer service engineers acting as knowledge translators. Customer service engineers capture knowledge from customers, turn that knowledge into engineering decisions and feed these back to GTM engineering (e.g. manufacturing, automation) teams.

3.3 The Process of Knowledge Translation Within the GTM Ecosystem

Knowledge of gas turbines flows within the company and in both directions between GTM and their customers. In the process, there are changes in the format, language and dynamics of the knowledge structures in motion, as shown in figure 1.

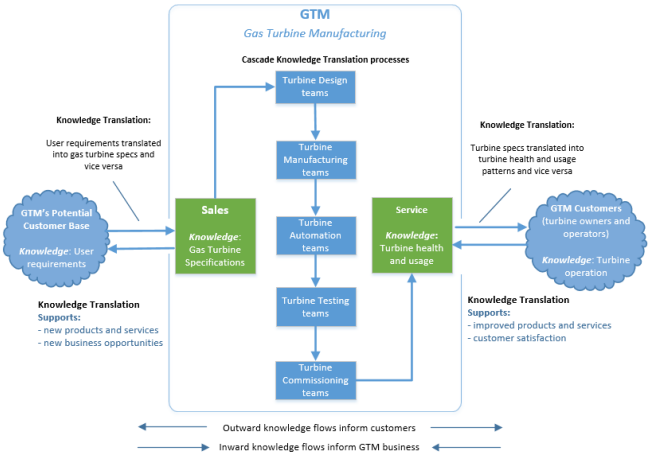

Figure 1: Knowledge Translation Within the GTM Ecosystem

The research identified two main types of knowledge translation processes within the GTM ecosystem, described by the arrows in figure 1:

- Knowledge translation between the company and its environment (double arrows) follows the approach that has been evolving over the last decades driven by research in the healthcare sector (Dal Mass, Garcia-Perez et al., 2020; Dal Mass, Cobianchi et al., 2021). Based in a significant knowledge difference between the company and its customer base, the process brings significant benefits to both the company and its potential and actual customers. Thus, knowledge from the customers is translated into turbine design requirements by the design team. The result of this translation is the input for the internal expert knowledge cascade, from the design team toward the commissioning team going through manufacturing, automation and testing cascades.
- Cascade knowledge translation within the company (single arrows). Although all teams within GTM experience of gas turbine manufacturing, each team has its most significant degree of expertise on a particular stage of the overall engineering process. As such, a cascade of knowledge translation processes allows each team to receive the knowledge that is required for the implementation of its main task (e.g. design, manufacturing, automation, testing etc.). On completion of such task, the team produces the knowledge that is required for the next phase of the project to be effectively implemented, and communicates such knowledge to the team responsible for its implementation. Finally, there is another crossing border cascade, from the commissioning team to the service team and the end user.

3.4 Results

A direct collaboration between the researchers and GTM's management board had a direct impact on the strategy of the organization.

First, it raised awareness of the importance of knowledge translation as an area for strategic development for GTM. Whilst the management board were concerned about a knowledge problem that seemed fuzzy at the time, this project reduced the complexity of the issue by providing GTM with a theoretical background and a concrete line of action. Knowledge translation became part of the vocabulary of the management board, and specific actions were put in place for the facilitation of this process.

Secondly, the research provided a justification to engage the wider GTM knowledge community into a new value co-creation strategy of the organization. By understanding the nature of engineering knowledge and where such knowledge resides, GTM created and funded new opportunities for collaborations across their value chain, including GTM engineers, customers and suppliers.

Finally, we argue that this project played a key role in preparing GTM for its transition into the knowledge economy. With this project, their management board formally started having open discussions about types or forms of knowledge, such as emotional knowledge, that had not been considered before. New collaborations with academic institutions in the region have been established and GTM is now part of a growing number of research and development initiatives with focus on engineering knowledge.

4. Discussion

Engineers working at GTM have developed over decades a valuable knowledge base encompassing all types of activities, from tendering to design, from the conceptual phase to the production one, from selling to commissioning and service. Whilst every team within GTM have access to the overall knowledge base of the product or project if required, continuous cascade knowledge translation processes make the manufacturing of gas turbines a manageable process, enabling specialization within the different GTM functions. The cascade of expert knowledge translation is based on knowledge dynamics and on the correlation between knowledge deficit and the absorptive capacity of the receiver. Cascade knowledge translation within the organization relies on every team understanding the knowledge, background and requirements of other teams. Such an understanding, combined with a common purpose across the company, leads the different teams to produce new knowledge in a format that is accessible to others over the project lifecycle. For example, turbine design teams produce turbine drawings and plans, to be used by manufacturing teams. Manufacturing teams produce hardware specifications, later used by automation teams to develop software. These knowledge outputs later inform the work of the testing and commissioning teams, and ultimately the knowledge of the customer service engineers, who represent the interface between GTM and their customers.

Although GTM has a standard diversified offer of gas turbines, it is frequently necessary to make some adaptations for each turbine to meet specific requirements coming from the customers. The context enabled by cascade knowledge translation allows specific changes to be made to original designs in an efficient and controlled way.

5. Conclusions and Limitations

This research has explored ways in which knowledge of a particular domain evolves over time and in its movement between teams. A manufacturing organization has provided the context for the study, in a 12-month action research project. The project had initially an exploratory nature, with the researchers working directly with representatives of every team to understand the gas turbine manufacturing process from the knowledge perspective. Such background helped the authors move from an understanding of communication within the organization to a perception of translation of engineering knowledge between different parts of the organization. Later on, the analysis of knowledge needs and knowledge outputs from different stages of the gas turbine manufacturing process led to a perception of a cascade of smaller knowledge translation initiatives. Interviews to different teams showed that the cascade knowledge translation processes provided both the focus and the knowledge outputs required by the different teams, which would be complemented by a wider knowledge base only when required. Alternative sources of knowledge were sought by engineers only if the outputs of the smaller translation process were not enough for their function. This perspective had become engrained in the culture of the organization, and was found to lead to closer links between specific teams and, with it, more knowledge alignments creating a knowledge chain across the gas turbine manufacturing process.

The experience from practice of knowledge translation in manufacturing contributes to the current theories on knowledge dynamics. It also confirms that knowledge translation is an increasingly relevant field within the knowledge management domain, with applications and developments beyond the healthcare sector. Despite opening new avenues for research, our focus solely on a manufacturing case study can be perceived as a limitation of the research. The main limitation of the present paper is its focus on a single case study, but it is a complex one capable to explain the model of cascade expert knowledge translation that is the contribution of the present paper. The authors encourage future research in other knowledge-driven domains, in an effort to develop appropriate theories and frameworks that enable the effective flows of knowledge within and between teams, organizations and sectors.

References

Aristotle (1999). *Nicomachean Ethics*. Second Edition. Hackett Publishing Company, Indianapolis.

Avison, D., Lau, F., Myers, M. & Nielsen, P.A. 1999. Action research. *Communications of the ACM*, Vol. 42, pp. 94–97.

Balle, A.R., Steffen, M.O., Curado, C. & Oliveira, M. (2019) "Interorganizational Knowledge Sharing in a Science and Technology Park: The Use of Knowledge Sharing Mechanisms". *Journal of Knowledge Management*, Vol.23, No. 10, pp. 2016-2038.

Blacker, F. (1995) "Knowledge, Knowledge Work and Organizations: An Overview and Interpretation". *Organization Studies*, Vol. 16, No. 6, pp. 1021-1046.

Bolisani, E. and Oltramari, A. (2012) "Knowledge as a Measurable Object in Business Context: A Stock-and-flow Approach". *Knowledge Management Research & Practice*, Vol.10, No. 3, pp. 275-286.

Bratianu, C. (2019) "Exploring Knowledge Entropy in Organizations". *Management Dynamics in the Knowledge Economy*, Vol. 7, No. 3, pp. 353-366.

Bratianu, C. (2022). *Knowledge Strategies*. Cambridge University Press, Cambridge.

Bratianu, C. and Bejinaru, R. (2020) "Knowledge Dynamics: A Thermodynamics Approach". *Kybernetes*, Vol. 49, No. 1, pp. 6-21.

Bratianu, C., Agapie, A., Orzea, I., and Agoston, S. (2011) "Intergenerational Learning Dynamics in Universities". *Electronic Journal of Knowledge Management*, Vol. 9, No. 1, pp. 10-18.

Carlile, P.R. (2004) "Transferring, Translating, and Transforming: An Integrative Framework for Managing Knowledge Across Boundaries". *Organization Science*, Vol. 15, No. 5, pp. 555-568.

Chaldize, V. (2000). *Entropy Demystified: Potential Order, Life and Money*. Universal Publishers, New York.

CIHR (2004) *The CIHR Knowledge Translation Strategy 2004-2009: Innovation in Action*. Canadian Institute of Health Research, Ottawa.

CIHR (2016) *Knowledge Translation*. Canadian Institute for Health Research, Ottawa.

Cohen, W.M. & Levinthal, D.A. (1990) "Absorptive Capacity: A New Perspective on Learning and Innovation". *Administrative Science Quarterly*, 35(1), 128-152.

Dal Mass, F., Garcia-Perez, A., Sousa, M.J., Lopez da Costa, R. and Cobianchi, L. (2020) "Knowledge Translation in the Health Care Sector: A Structural Literature Review". *The Electronic Journal of Knowledge Management*, Vol. 18, No. 3, pp. 198-211.

Dal Mass, F., Cobianchi, L., Piccolo, D. and Barach, P. (2021) "Knowledge Translation During the COVID-19 Pandemic. In: Lepeley, M.T., Morales, O., Essens, P., Beutell, M.J. and Majluf, N. (Eds.). *Human Centered Organizational Culture Global Dimensions* (pp. 139-150). Routledge, New York.

Damasio, A. (2012). *Self Comes to Mind: Constructing the Conscious Brain*. Vintage Books, New York.

Davenport, T.H. and Prusak, L. (2000). *Working Knowledge: How Organizations Manage what They Know.* Harvard Business School Press, Boston.

DeLong, D.W. (2004). *Lost Knowledge: Confronting the Threat of an Aging Workforce*. Oxford University Press, Oxford.

Evers, H.D. & Menkhoff, T. (2005) "Expert Knowledge and the Role of Consultants in emerging Knowledge-based Economies". In: Menkhoff, T., Evers, H.D. & Chay, Y.W. (Eds.). *Governing and Managing Knowledge in Asia*. World Scientific, Singapore.

Gladwell, M. (2005). *Blink: The Power of Thinking Without Thinking*. Back Bay Books, New York.

Goleman, D. (1995). *Emotional Intelligence*. Bantam, New York.

Hill, D. (2008). *Emotionomics: Leveraging Emotions for Business Success.* Revised Edition, Kogan Page, London.

Kahneman, D. (2011). *Thinking, fast and slow*. Strauss, Giroux and Farrar, New York.

Kianto, A. (2007) "What Do We Really Mean by the Dynamic Dimension of Intellectual Capital? *International Journal of Learning and Intellectual Capital*, Vol. 4, No. 4, pp. 342-356.

Kianto, A., Inkinen, H., Ritala, P. and Vanhala, M. (2017) "A Temporal Perspective to the Intellectual Capital in Finnish Firms from 2013 to 2017. In: Tsui, E. and Cheung, B. (Eds.). *Proceedings of the 14th ICIKM, 7-8 December 2017*, The Hong Kong Polytechnic University, pp. 134-138. Academic Conferences and Publishing International, Reading.

LeDoux, J. (1999). *The Emotional Brain: The Mysterious Underpinnings of Emotional Life*. Phoenix, London.

Nissen, M.E. (2006). *Harnessing Knowledge Dynamics: Principled Organizational Knowing & Learning*. IRM Press, Hershey.

Nonaka, I., and Takeuchi, H. (1995). *The Knowledge-creating Company: How Japanese Companies Create the Dynamics of Innovation.* Oxford University Press, Oxford.

Nonaka, I., and Takeuchi, H. (2019). *The Wise Company: How Companies Create Continuous Innovation*. Oxford University Press, Oxford.

Nonaka, I., Toyama, R. and Hirotaka, T. (2008). *Managing Flow: A Process Theory of the Knowledge-based Firm*. Palgrave Macmillan, New York.

Pinherio, P., & Rocha, R. (2020) "Knowledge Sharing: A Link between Organizational Wisdom and Organizational Spirituality". In: Garcia-Perez, A., & Simkin, L. (Eds.). *Proceedings of the 21st European Conference on Knowledge Management* (pp. 639-647). Coventry University, UK, 2-4 December 2020.

Rocha, R., & Pinheiro, P. (2021) "Can Organizational Spirituality Contribute to Knowledge Management?" *Management Dynamics in the Knowledge Economy*, Vol. 9, No. 1, pp. 107-121.

Rocha, R., Pinheiro, P., d'Angeles, M., & Kragulj, F. (2021) "Organizational *Phronesis* Scale Development". In: Garcia-Perez, A., & Simkin, L. (Eds.). *Proceedings of the 22nd European Conference on Knowledge Management* (pp. 631-638), Coventry University, UK, 2-3 September 2021.

Ruparel, N. & Choubisa, R. (2020) "Knowledge Hiding in Organizations: A Retrospective Narrative Review and the Way Forward". *Dynamic Relationships Management Journal*, Vol. 9, No.1, pp. 5-52.

Shotter, J., & Tsoukas, H. 92014) "Performing *Phronesis*: On the Way to Engaged Judgment". *Management Learning*, Vol. 45, No. 4, pp. 377-396.

Tracy, S.J. (2020). *Qualitative Research Methods: Collective Evidence, Crafting Analysis, Communication Impact*. Second Edition. John Wiley & Sons, Hoboken.

Yin, R.K. (2018). *Case Study Research and Applications: Design and Methods*. Sixth Edition. SAGE, Los Angeles.

Zohar, D. & Marshall, I. (2004). *Spiritual Capital: Wealth we Can Live By*. Berrett-Koehler Publishers, San Francisco.