

COMPUTER-BASED KNOWLEDGE MANAGEMENT FOR FUTURES LITERACY

Joanna LABEDZKA ^{*}, Beata POTERALSKA , Katarzyna BROZEK 

*Department of Management, Jan Kochanowski University of Kielce,
Żeromskiego 5, 25–369 Kielce, Poland*

Received 21 March 2022; accepted 04 April 2022

Abstract. Contemporary business is characterized by increasing levels of turbulence, complexity, and uncertainty. Organizations that can adapt quickly to changing circumstances and navigate through a new environment have a competitive advantage. This complex array of uncertainty and ambiguity creates opportunities for foresight that empowers the imagination, enhances the ability to prepare, and recover and invent as changes occur. The paper discusses the modern challenges for knowledge and information management in relation to future literacy and explores its importance for modern logistics and supply chains. The role of the knowledge management system and foresight is emphasized in this context. Finally, the concept of a computer-based knowledge management system on the example of logistics is presented. The main goal of the proposed expert system is to reduce uncertainty, improve efficiently share and use knowledge to help one to better navigate the future in order to create flexibility and adaptability to change.

Keywords: knowledge management, future literacy, foresight, computer system, uncertainty, logistics.

JEL Classification: D80, O32.

Introduction

Decision-making and forecasting future trends for the needs of modern organizations take place in an environment characterized by high uncertainty, complexity, and presently unknown dynamics. Only a business that is able to flexibly adapt to new circumstances as they arise, maintains a competitive advantage. Disruptive changes (e.g., new technologies, services, and business models) present a variety of opportunities and risks for companies (Wiener et al., 2020). Nevertheless, it is not a trivial task for business to recognize the potential of disruptive changes and to react simultaneously.

In this context, computer-based knowledge management is indicated in the article as a promising approach to create future-ready organizations, in other words “futures literate” organizations. The complex array of uncertainty and ambiguity also creates opportunities for foresight that empowers the imagination, enhances the ability to prepare, and to recover and invent as changes occur.

Moreover, the link between knowledge management and foresight cannot be omitted, as it is of long-standing interest and has taken on a structuring role in a context of knowledge-based economy (Bootz et al., 2019).

Thus, the purpose of this paper is to discuss contemporary challenges for knowledge and information management in relation to their role in supporting the process of exploring the many possible futures. Then, the importance of foresight in discovering signals of the future in the present, recognizing implications of certain global developments, and building the resilience of the system, i.e. an organization, a company, an industry, etc. The paper explores the importance of futures literacy for modern logistics and supply chains in particular, and it emphasizes the role of the knowledge management system and foresight in this context. Finally, we present the concept of a computer-based KMS that supports decision making by reducing the uncertainty of selected future paths of development of logistics. The system with a KM approach and Dempster-Shafer-based algorithms used in business is supposed to contribute in creating “futures literacy” and could ensure the resilience against upcoming changes.

The research problem investigated in this paper is related to the lack of readiness of many companies to cope with the uncertainty and turbulent environment. There is a great need to continually search for effective methods that could better prepare business for future challenges

* Corresponding author. E-mail: joanna.labedzka@ujk.edu.pl

and protect companies and employees from disruptive events in the future. The dynamics of changes is particularly visible in the logistics industry that is influenced by, among others, technology development, changing consumer preferences, and new business models. The logistics and supply chain industry will see a massive surge in R&D, technology, and future modelling, as companies prepare to improve their supply chains' resiliency. Therefore, building futures literacy seems critical in the context of gaining a competitive advantage.

The main objective of this paper is to congregate and synthesize a literature review of issues related to the area of KM, foresight and their linkages, and to propose a computer-based KM that reduces uncertainty that influences future-oriented decision-making. The computer-based KM supported using the foresight approach is focused on creating futures literate organizations.

Thus, the research question is: How can we improve the decision-making process and build resilience against future changes?

The first stage of the research includes identifying the literature by searching the selected databases and on-line resources. For this work, the authors carried out a systematic review of the most commonly-used databases that contain the greatest and most authoritative collections of journals, books, and research resources, i.e. Web of Science and Science Direct. Moreover, documents and reports from reliable sources such as European Commission OECD, Global Centre for Public Service Excellence were also analysed.

According to the objectives and intention of the research, the selected keywords were "knowledge management", "foresight", "futures literacy", "logistics", and "computer system", which were then combined and explored in some databases.

At first, few theoretical bases about knowledge management (KM) which include a definition, challenges, trends, and its importance for an organization have been summarized and analysed. Then, a comprehensive review about the role of foresight in futures literacy and in building the resilience of the system/logistics system/industry has been conducted. We accomplish this task by a series analysis approaches, such as literature bibliometrics and desk research.

At last, our main contributions can be related to the design of a computer system to support the knowledge management processes and foresight for logistics and supply chains. Based on the above, in this research, we aim to justify that the application of a knowledge management system and foresight approach can help to better operate in uncertain and turbulent dynamical environment.

1. Knowledge management capacity & current challenges

One of the first and probably still the most adequate and succinct definitions states that "Knowledge Management

(KM) it is the process of capturing, distributing, and effectively using knowledge" (Davenport, 1994). That most of what it is called KM is actually information management (Marchand & Davenport, 2004). Knowledge Management (KM) is a part of the field of management studies, but it is also closely integrated with information and communication technologies (Mihalca et al., 2008).

The reason for the increased importance of knowledge in recent years lies in the fact that KM boosts the efficiency and speed of an organization's decision-making ability, improves learning efficiency, delivers strategic results related to organisational survival, competitiveness and capacity enhancement; therefore, it plays a fundamental role in the success of an organization's activities and strategies, and helps to navigate the globalised world (Chua, 2009; Giampaoli et al., 2019; Antunes & Pinheiro, 2020). Nowadays, organisations no longer compete solely on the basis of financial capital and strength, rather knowledge is the new competitive advantage in business (Omotayo, 2015; Zhang et al. 2020).

The knowledge management process has certain positive associations with product innovation (i.e. knowledge transfer and knowledge application) and process innovation (i.e. knowledge acquisition and knowledge application). Moreover, transformational leaders are defined as those who positively envision the future scenarios (Birasnav et al., 2013).

To facilitate the implementation of knowledge management, operational knowledge management system (KMS), supporting communication and information flows using ICT (information and communication technologies) should be designed and applied (Semertzaki, 2011). KMS assists processes of utilizing others knowledge and, as a result, provides better solutions in terms of decision-making support system which fosters better decisions (Abubakar et al., 2019).

Business including logistics and supply chains face a plethora of challenges, which have given rise to the need for a future-oriented knowledge management system (KMS). That would enable one to recognize short-time goals and long-term vision, deal with the future uncertainty, and it provides support in navigating the future in both the personal and professional dimensions. Contemporary challenges of KM and KMS include (Mothe et al., 2000; Mesh 3.0, 2020):

- Difficulties with gathering, analysing and using the unstructured data;
- The lack of IT solutions that can extract valuable information from unstructured data;
- Data becoming increasingly distributed;
- Obsolete technology;
- Changing set of skill requirements for "the new age" that involves a shift to soft skills, team skills, and problem-solving skills; and,
- The lack of skills to select, interpret and use new knowledge and information.

Emerging trends in KM include, among others, the application of artificial intelligence to improve knowledge

discovery, the rise of mobile technologies, the need for integrated “one-stop-shop” digital platforms, cloud-based solutions, customization, and extension, specialization (i.e., adaptation and repurposing of KM), and reconceptualization (Handzic, 2017).

2. Foresight in building the resilience of the system

Exploring the future is of particular importance at present times that enables organisations, business, industries, and R&D to better deal with the environment dynamics and build the resistance to unexpected and wild card events. Foresight enables leaders to navigate today’s “TUNA” conditions – Turbulence, Unpredictable Uncertainty, Novelty and Ambiguity, embrace uncertainty and shape better decisions by better understanding, anticipating, and preparing for change (Wilkinson, 2017).

Foresight is a systematic participatory process, creating collective intelligence about the medium- to long-term future that is aimed at informing present-day decisions (Störmer et al., 2020).

The main purposes of the foresight are as follows (Foresight Manual Empowered Futures for the 2030 Agenda, 2018):

- To “predict” the future and the impact of current trends;
- To identify alternative futures and create new strategies for reducing risks and developing resilience;
- To create preferred futures and focus on changing the present to nurture conditions for such future to emerge;
- To support a broader participatory dialogue by broadening existing perspectives about the future;
- To develop future literacy and forward-looking attitudes; and,
- To identify opportunities for innovation.

Foresight enhances classical strategic planning and strengthens anticipatory and adaptive capability. Foresight looks at how desired currents in the future could influence present changes in direction for companies, societies, or the world at large. Thus, the primary goal of foresight is to identify the full range of possibilities, not a limited set of illusory certainties.

The European Commission has also recognized foresight as an appropriate tool to build resilience for the future (Eamonn, 2020). Its implementation makes classical planning more resilient in the unfolding future and infuses classical planning with a manageable dose of uncertainty and unpredictability. Foresight is a tool which is aimed to help organizations frame the future, develop a coherent forward view, and to imagine, explore, and assess a range of possible futures. It is not about prediction, but it is about informing strategy (Conway & Voros, 2003).

Resilience becomes a key element for the competitiveness of a company/industry, and it involves, not simply the maintenance of existing systems, but enables business

to absorb uncertainty, recover critical functionality, and thrive in altered circumstances. Resilience is defined as a system’s ability to cope with and recover from shocks or disruptions, either by returning to the steady-state or by transforming itself to adapt to the new reality (Buijn et al., 2017). Resilient systems view change as inevitable and failure as opportunities to learn from (Foresight Manual, 2014).

The dynamic changes can also be observed in the logistics companies that seek for the resilience. Deregulation, globalization, changes in consumer behaviour, COVID-19, technological advances, etc. affect logistics and global supply chains. Resilient supply chains could add significant value in a normal environment as well as during major crises. Foresight is one of such tools that develops futures literacy and helps to deal with unknown.

In the next section, links between foresight and knowledge management have been investigated in order to propose a future-oriented knowledge management system for resilient logistics and supply chains.

3. Foresight and KM for futures literacy

Managing and using knowledge effectively is vital for both organizations and individuals to take full advantage of the value of knowledge (Gao et al., 2018). Future orientation is also considered as an activity of significant importance that helps organisations to build resilience to change by exploring and preparing for a range of possible future scenarios, and influencing and shaping those futures.

The existence of a strong linkage between foresight and knowledge management has already been recognized. Foresight thinking processes have sustained important changes in terms of methods, devices and tools in order to consider the creation, distribution and sharing of knowledge within foresight activity (Bootz et al., 2019).

It is also stated that making sound decisions and plans in turbulent socio-environmental settings is a future-oriented activity that requires knowledge of the future. Therefore, the current knowledge creation practices should be improved by reforming the network of concepts used when talking about futures, and by understanding foresight as a continuous dynamic capability (Pouru et al., 2019).

Rapid changes make business more fragile than ever. The cure to this could be foresight to frame the future and make present decisions taking into account foreseen possible scenarios. On the other hand, KM also have a key role to play when enhancing business performance and increasing efficiency and competitiveness, and looking forward into future demands.

A literature review on the state-of-the-art reveals that KM and foresight supplements each other and share common elements they focus on, i.e. strategy, environments, knowledge, processes, technologies, and methods (Pozdnakova, 2008). Foresight is a tool for the improvement of

knowledge flows (Webster, 2002) that can be used for the future exploring, and KM also provides opportunities to frame enterprise future and create innovations using KM system's elements to identify future needs of organization and develop appropriate strategy (Pozdnakova, 2008). Moreover, issues related to the extent to which knowledge management supports and improves the technology forecasting (Henselewski et al., 2006), and the framework that uses Future-oriented Technology Analysis (FTA) and KM to improve processes (Junior et al., 2019) were also addressed in the literature.

Both KM and foresight methodologies can contribute to building futures literacy of the organisation, industry, and business, because they help in developing a futures-thinking mindset. The use of tools and methods for continuous scanning the external environment helps to open up the understanding of the underlying mechanisms, forces, drivers, and influences that arise from drivers. As a result, changes and desired future scenarios can be driven intentionally and we can have an influence on it within a certain range.

On the other hand, global social and economic development, and the new wave of technological innovation generate the demand for new competences, such as futures literacy that helps to appreciate change, nuance and new emerging potentialities.

In order to navigate well in the foresight-base knowledge management system, it is extremely important to raise awareness and develop competences of futures literacy in organisations, and businesses, such as logistics. To manage future-oriented tasks, competences including flexibility, critical thinking, creativity, inductive reasoning, system analysis, thinking, making decisions and solving problems (Kazemier et al., 2021) are required. In this aspect, it is principal to provide methods, tools, computer systems that help to use knowledge efficiently and gain or improve listed competences.

4. Conception of computer-based KM for logistics

In this new era characterised by a complex and dynamic environment and a competitive business marketplace, digitalisation has emerged as a new phenomenon that affected several aspects of life over the world. Logistics and supply chain processes have also been greatly affected by digitalisation, and it is obvious that the shift from a traditional supply chain to a digital supply chain (DSC) appears as a competitive advantage creating sustainable value for organisations (Ageron et al., 2020). Competitive advantages are short-lived in a global economy, and supply chains must adapt to turbulence (Kilpi et al., 2021). Rapid changes and unforeseen events such as new technologies, politics, economics, pandemics, and innovations impact the entire business, rapidly changing how supply chains operate and causing the fragility of global supply chains and logistics companies. Other factors impacting this sector are the proliferation of the Internet,

artificial intelligence, and digitisation, which are already making big waves in supply chain logistics.

Supply chains operate under the conditions of uncertainty and increased risk, and only early diagnosis of impending changes can prevent the loss of competitiveness at the level of enterprises and supply chains (Ejdys, 2016).

It is crucial to share and explore well-organized and accurate information and knowledge for increasing the competitiveness of logistics companies. Successful knowledge management in logistics depends on the efficiency of the Knowledge Management Systems and competences of employees.

In an uncertain world, it is not recommended to take the major business decisions without using the extrapolation of present knowledge to the possible future scenarios, and foresight can immensely help in this task. Therefore, an equally fundamental task as exploitation of knowledge is to use foresight for shaping futures literacy for logistics and global supply chain requirements. The convergence between foresight and logistics and its importance was confirmed by the literature review (Koniuk, 2018; Kückelhaus & Heutger, 2016; Meyer et al., 2021).

Contemporary logistics requires future-oriented knowledge management and competencies that will help to manage future-oriented professional tasks and create a desirable future. Applying foresight methods to traditional knowledge management in logistics represents an opportunity to address responsiveness to change and gain resilience by being not only adaptive to the current changes, but also active towards possible changes.

Vast amounts of data, information noise, turbulent changes causes that supply chain logistics is evolving at a rapid rate, resulting in problems with the integration of information from various sources and uncertainty. Upcoming challenges cause difficulties in providing up-to-date, consistent, and complete knowledge regarding the development of logistics. Rules and relations will be captured within a computer-based expert system for knowledge management for logistics future literacy.

The computer-system will play a second-tier role in supporting the KM management; expert knowledge, information, and data will be the core that will enable one to draw conclusions and support decisions. Decision makers ultimately have to rely on intuition and judgment, and the system gives a justification by revealing the mathematical representation of uncertainty of certain visions.

Having studied the findings of the above-mentioned research on KM and foresight capacity and logistics needs, it becomes apparent that, it is the necessary to include very large data sets that link different aspects of the logistics evolution in the future-oriented system. The main goal of the proposed computer-based knowledge management system is to reduce uncertainty, and efficiently share and use knowledge to help one to better navigate the future.

A schematic representation of the system specifically designed for logistics and global supply chain is presented in Figure 1.

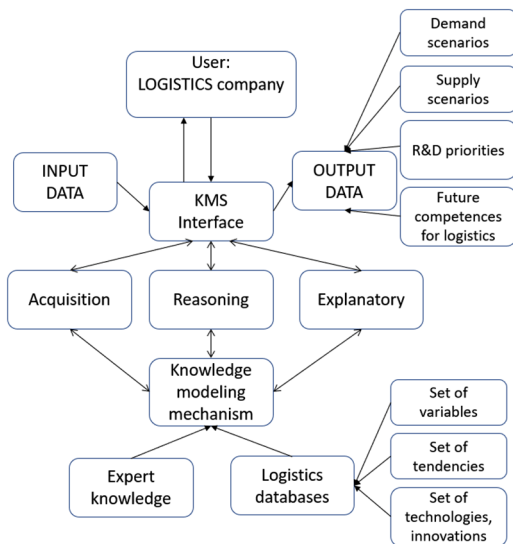


Figure 1. Knowledge base within the expert supporting futures literacy for logistics (source: The Author)

The project of the expert system includes databases, analytical modules, and a user interface enabling communication, acquisition and processing of knowledge. The proposed system is based on the concept of KM and foresight and includes the following functional modules: algorithmic modules to support the identification of key variables that influence logistics development; a knowledge acquisition module, knowledge base, databases; and reasoning mechanism to determine the probability of output scenarios or visions depending on the quality of expert knowledge.

The computer system provides the following necessary information regarding logistics data for instance: demand and supply scenarios, inventory levels, transportation equipment, delivery performance, policies, technologies, ICT infrastructure, innovations, etc. That information is useful in devising a plan for logistics companies' response and management using knowledge management system. Then based on *if-then* rule scenarios are created by different experts and stakeholders to expand in all directions.

Complete, certain, and exact data concerning future scenarios is relatively rarely used in foresight. Human knowledge is in its nature uncertain, inexact, and partial (Monk, 1999), it is therefore necessary to consider the possibility of drawing conclusions on the basis of expert knowledge, which may be incomplete, uncertain or inexact. The underestimation of the expert knowledge quality when creating the basis for decision-making, may lead to erroneous analysis results. The computers system includes algorithms that would enable to reduce uncertainty of created scenarios of future development of logistics and global supply chains.

Alternative to traditional probabilistic theory for the mathematical representation of uncertainty algorithms

could be used to select scenarios for future-based decisions. The Dempster-Shafer theory has primarily been directed at applications in artificial intelligence and expert systems (Curley, 2007) and allows for the allocation of a probability mass to sets or intervals and does not require an assumption regarding the probability of the individual constituents of the set or interval. This is a potentially valuable tool to reduce scenario uncertainty and make decisions to create a resilient environment for companies. Armed with this information, evidence-based decisions could create futures literate logistics companies.

The logistics management knowledge base is systematically actualized, so it expands and stores accurate and current information. The previous responses to the change and management strategy can then be studied for possible reuse or adaptation, if necessary.

A presented, a general scheme of a computer system for KM that supports creating futures literacy mindset in logistics would enable the following knowledge processes: creating, acquiring, and distributing. The expert system would support existing logistics knowledge, store information about past events, and help identify what kind of knowledge would be necessary in the future.

The usage of the expert system may strengthen knowledge management by actualizing, using, and applying a holistic analysis of the internal and external environment. The importance of future literacy cannot be underestimated in helping to meet the challenges in the process of improving the supply chains as the implementation of the computer system would help one to foresee the possible scenario of the futures and take appropriate decisions, frame strategy, and vision.

Moreover, the systematic use of the system, supplying data and expert knowledge, will contribute to the improvement of the competences of the expert system, especially those related to futures literacy.

5. Discussion

The presented analyses show that knowledge management is of great importance for an organisation and has a significant impact on efficiency, competitiveness, and speed of a decision-making ability. Because of the fact that contemporary business, for example logistics and global supply chains, is characterized by increasing levels of turbulence, complexity, and uncertainty, it faces challenges that justify the need for a future-oriented knowledge management system. That would enable one to deal with the future, and maintain the resistance against the impact of uncertainty on organisational well-being.

However, the literature review shows numerous difficulties that must be overcome in order to create efficient, future-oriented KM, such as insufficient and changing set of skills, problems with data distribution and sharing, and lack of IT tools. Foresight-based approach might be a remedy to this issue as it enables leaders to navigate today's "TUNA" conditions – Turbulence, Unpredictable Uncertainty, Novelty and Ambiguity. Foresight, gives

increased power to shape the future, even in the most turbulent of times.

The conducted research confirms the existence of a strong linkage between foresight and knowledge management. Therefore, connecting the knowledge management together with foresight could help to prepare organisation for future, to embrace uncertainty and shape better decisions and eventually develop a proficiency in futures literacy.

Analysed scientific papers and documents prove that logistics requires future-oriented approach and applying foresight methods to traditional KM in logistics creates an opportunity to address responsiveness to change and to gain resilience.

Moreover, many scholars and practitioners highlight that the importance of Information technology in the future-oriented KM cannot be omitted. The process of identifying, organizing, storing and disseminating information within an organization and using the data, information and knowledge to better prepare for future challenges, wild cards events etc., requires specialised tools. Therefore, the authors proposed the scheme for computer-based knowledge management system oriented at strengthening futures literacy, dedicated to logistic and global supply chains.

Conclusions

Information technology plays an important role to support the knowledge management processes, like the processes of acquisition, conversion, sharing, utilization, and application. Therefore, the scheme for a computer-based knowledge management system oriented at strengthening futures literacy in logistic and global supply chains was proposed.

The alignment of KM and foresight within the computer system could bring the following benefits to the logistic and supply chains in particular:

- To create synergic linkage between knowledge and its use for future-oriented purposes;
- To ensure the uptake of insights visions and scenarios in decision making;
- To enable decision makers to make justified and prudent long-term decisions;
- To create awareness about future literacy and importance in enhancing a company's competitiveness;
- To improve the competences of the future of logistics and global supply chain's workforce;
- To prepare strategies to react to the possible future developments, challenges, wild cards events, etc.

Literature review proved that knowledge management is a key driver of organisational performance and competitiveness. It is crucial to establish and cultivate a knowledge-sharing, knowledge-driven culture for both short- and long-term benefits. KM linked with foresight approach builds the future literate organisations that are proactive in future creation and anticipation of change. The computer-aided process of effective management of

knowledge is a critical ingredient for organisations seeking to ensure a sustainable strategic competitive advantage and the resilience to change.

Funding

This research was supported by the Jan Kochanowski University of Kielce [grant number SUPB.RN. 22.036 entitled "Human Resources Development for the Needs of the Future"].

References

- Abubakar, A. M., Elrehail, H., Alatailat, M. A., & Elçi, A. (2019). Knowledge management, decision-making style and organizational performance. *Journal of Innovation & Knowledge*, 4(2), 104–114. <https://doi.org/10.1016/j.jik.2017.07.003>
- Ageron, B., Bentahar, O., & Gunasekaran, A. (2020). Digital supply chain: Challenges and future directions. *Supply Chain Forum: An International Journal*, 21(3), 133–138. <https://doi.org/10.1080/16258312.2020.1816361>
- Antunes, H. de, & Pinheiro, P. G. (2020). Linking knowledge management, organizational learning and memory. *Journal of Innovation & Knowledge*, 5(2), 140–149. <https://doi.org/10.1016/j.jik.2019.04.002>
- Birasnav, M., Albufalasa, M., & Bader, Y. (2013). The role of transformational leadership and knowledge management processes on predicting product and process innovation: An empirical study developed in Kingdom of Bahrain. *Tekhnē*, 11(2), 64–75. <https://doi.org/10.1016/j.tekhne.2013.08.001>
- Bootz, J.-P., Durance, P., & Monti, R. (2019). Foresight and knowledge management. New developments in theory and practice. *Technological Forecasting and Social Change*, 140, 80–83. <https://doi.org/10.1016/j.techfore.2018.12.017>
- Bruijn, K. de, Buurman, J., Mens, M., Dahm, R., & Klijn, F. (2017). Resilience in practice: Five principles to enable societies to cope with extreme weather events. *Environmental Science & Policy*, 70, 21–30. <https://doi.org/10.1016/j.envsci.2017.02.001>
- Chua, A. Y. K. (2009). The dark side of successful knowledge management initiatives. *Journal of Knowledge Management*, 13(4), 32–40. <https://doi.org/10.1108/13673270910971806>
- Conway, M., & Voros, J. (2003). Foresight: Learning from the future. *Journal of Institutional Research*, 12(1), 1–15.
- Curley, S. P. (2007). The application of Dempster-Shafer theory demonstrated with justification provided by legal evidence. *Judgment and Decision Making*, 2(5), 257–276.
- Davenport, T. H. (1994). Saving IT's soul: Human centered information management. *Harvard Business Review*, 72(2), 119–131.
- Eamonn, N. (2020). *Foresight for resilience: The European Commission's first annual Foresight Report*.
- Ejdys, J. (2016, May). Foresight applications for future oriented supply chain and logistics management. In *21st International Scientific Conference Economics and Management* (pp. 523–532). Brno, Czech Republic.
- Foresight manual: Empowered futures for the 2030 agenda*. (2018). UNDP Global Centre for Public Service Excellence.
- Foresight: The manual*. (2014). UNDP Global Centre for Public Service Excellence.

- Gao, T., Chai, Y., & Liu, Y. (2018). A review of knowledge management about theoretical conception and designing approaches. *International Journal of Crowd Science*, 2(1), 42–51. <https://doi.org/10.1108/IJCS-08-2017-0023>
- Giampaoli, D., Aureli, S., & Ciambotti, M. (2019). Knowledge management, strategic decision-making, intuition and planning effectiveness. *Proceedings of the 20th European Conference on Knowledge Management*. <https://doi.org/10.34190/km.19.156>
- Handzic, M. (2017). The KM times they are A-Changin'. *Journal of Entrepreneurship, Management and Innovation*, 13(3), 7–27. <https://doi.org/10.7341/20171331>
- Henselewski, M., Smolnik, S., & Riempp, G. (2006, January). Evaluation of Knowledge Management Technologies for the support of technology forecasting. In *Proceedings of the 39th Annual Hawaii International Conference on System Sciences (HICSS'06)* (pp. 154c–154c). Kauai, HI, USA. IEEE. <https://doi.org/10.1109/hicss.2006.163>
- Junior, H. J., Barbosa, C. E., de Lima, Y. O., & de Souza, J. M. (2019, May). Approaching future-oriented technology analysis strategies in Knowledge Management Processes. In *2019 IEEE 23rd International Conference on Computer Supported Cooperative Work in Design (CSCWD)* (pp. 99–104). Porto, Portugal. IEEE. <https://doi.org/10.1109/cscwd.2019.8791886>
- Kazemier, E. M., Damhof, L., Gulmans, J., & Cremers, P. H. M. (2021). Mastering futures literacy in higher education: An evaluation of learning outcomes and instructional design of a Faculty Development Program. *Futures*, 132, 102814. <https://doi.org/10.1016/j.futures.2021.102814>
- Kilpi, V., Solakivi, T., & Kiiski, T. (2021). Maritime sector at verge of change: Learning and competence needs in Finnish maritime cluster. *WMU Journal of Maritime Affairs*, 20(1), 63–79. <https://doi.org/10.1007/s13437-021-00228-0>
- Kononiuk, A. (2018). Strategic foresight in logistics – possibilities of application. *Research in Logistics and Production*, 8(1), 77–89. <https://doi.org/10.21008/j.2083-4950.2018.8.1.6>
- Kückelhaus, M., & Heutger, M. (2016). *Logistics trend radar. Delivering insight Today. Creating value Tomorrow*. DHL. Retrieved March 7, 2022, from <https://www.dpdhl.com/content/dam/dpdhl/en/trends-in-logistics/assets/dhl-logistics-trend-radar-2016.pdf>
- Marchand, D. A., & Davenport, T. H. (2004). *Dominando a gestão da informação* [Mastering information management]. Porto Alegre, Bookman.
- Mesh 3.0. (2020). *The future of knowledge management: Trends for 2021*. Retrieved March 8, 2022, from <https://meshintranet.com/blog/knowledge-management-trends-2021/>
- Meyer, T., Gracht, H. A., & Hartmann, E. (2021). Technology foresight for sustainable road freight transportation: Insights from a global real-time Delphi study. *Futures & Foresight Science*, 4(1), e101. <https://doi.org/10.1002/ffo2.101>
- Mihalca, R., Uta, A., Intorsureanu, I., & Andreescu, A. I. (2008). Knowledge management in e-learning systems. *Informatica Economica Journal*, 12(2), 365–369.
- Monk, R. (1999). Cambridge Philosophers IX: Russell. *Philosophy*, 74(287), 105–117. <http://www.jstor.org/stable/3752096>
- Mothe, J., Niosi, J., Landry, R., & Gertler, M. (2000, September). *Knowledge management the new challenge for firms & organizations*. OECD. Retrieved March 7, 2022, from <https://www.oecd.org/education/innovation-education/2667427.pdf>
- Omotayo, F. O. (2015). Knowledge management as an important tool in organisational management: A review of literature. *Library Philosophy & Practice (e-journal)*, 1238.
- Pouru, L., Dufva, M., & Niinisalo, T. (2019). Creating organisational futures knowledge in Finnish companies. *Technological Forecasting and Social Change*, 140, 84–91. <https://doi.org/10.1016/j.techfore.2018.06.048>
- Pozdnakova, A. (2008). Knowledge management and foresight elements for small and medium enterprises. *Computer Science*, 34, 126–137.
- Semertzaki, E. (2011). Implementation of a knowledge management centre at a special library. *Special Libraries as Knowledge Management Centres*, 187–247. <https://doi.org/10.1016/b978-1-84334-613-5.50004-2>
- Störmer, E., Bontoux, L., Krzysztofowicz, M., Florescu, E., Bock, A.-K., & Scapolo, F. (2020). Foresight – using science and evidence to anticipate and shape the future. In V. Šucha & M. Sienkiewicz (Eds.), *Science for Policy Handbook* (pp. 128–142). <https://doi.org/10.1016/b978-0-12-822596-7.00012-7>
- Webster, A. (2002, April). Foresight as a tool for the management of knowledge flows. In *Proceedings of the Strata Consolidating Workshop*, Session 5. Brussels, Belgium.
- Wiener, M., Gattringer, R., & Strehl, F. (2020). Collaborative open foresight – a new approach for inspiring discontinuous and sustainability-oriented innovations. *Technological Forecasting and Social Change*, 155, 119370. <https://doi.org/10.1016/j.techfore.2018.07.008>
- Wilkinson, A. (2017). *Strategic foresight primer*. Publications Office.
- Zhang, H., Zhang, X., & Song, M. (2020). Does knowledge management enhance or impede innovation speed? *Journal of Knowledge Management*, 24(6), 1393–1424. <https://doi.org/10.1108/jkm-08-2019-0460>