

Preface

Organisations aspire to improve competitiveness and performance through digitalisation. This sentiment is shared with many companies that have demonstrated significant interest in I4.0 for several years. Digital transformation in any context requires not only a substantial change management plan but equally, the two essential components of Knowledge Management (KM): knowledge sharing and knowledge transfer. In a recent policy paper, Dittrich (2016) proposes that to implement a successful transition to a digital environment, the European Union “is bound to ...the mass upgrading of the digital skills of European workers.” To complete this formidable undertaking, knowledge is central.

In a recent report entitled, *Digital Transformation Monitor Czech Republic: Průmysl 4.0* (2007), the European Commission identifies that a threat to the Czech national strategy rests with the extant gap between industry needs and resources. Successful KM implementation in the Czech Republic is rare. One cause of this situation is that successful KM implementation at the organisational level depends on the condition and status of other levels where the attention to knowledge is significant. Bureš and Čech (2008) identify four knowledge levels: supranational, national, organisational, and management of knowledge. Each level describes the overall environment in which knowledge-related activities are performed. Each differs from the other in many aspects. An increase of the resolution of any one of the above permits further levels to be discovered. Exemplars of this refinement are economic sectors such as tourism, engineering, telecommunications, and education, or clusters that have different knowledge needs, utilisable tools, techniques, and procedures. They are frequently uncovered between the national and the organisational level demonstrating that the demarcation between levels is ambiguous.

SUPRANATIONAL LEVEL

This level is both the broadest and the most general. It operates by means of concepts of the Knowledge Economy (KE) and Knowledge Society (KS) wherein tangible knowledge does not play a role. Supranational corporations and institutions shape this level, for example the World Bank, the OECD, and the United Nations.

Within a Czech context this level is recognised particularly through the numerous strategic documents issued by the European Union (EU). The Lisbon Strategy published by the European Council emphasises the KE as a strategic and primary objective. The document states that the EU desires to become a world-leading economy that is competitive and knowledge-based. Although this strategy has been revised and objectives modified several times, it continues to influence EU members and their

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partners. In this vein, KE and knowledge-based competition are no longer theoretical concepts limited to academicians or manuscripts in scholarly journals (Drucker, 1993; Nonaka, 1995). Subsequently, the position of the Czech government reflects the EU initiative.

NATIONAL LEVEL

With globalisation, there exists a remarked increase in the flow of goods and services, and the migration of people, ideas, and wealth on an international basis. The advantages both tangible and intangible of this movement are numerous and significant. Companies of a national character must compete with international enterprises in their domestic market. In the Czech environment, former privately or state-owned corporations are now controlled by management boards located outside national borders. Companies must remain vital in the current highly competitive and trans-border environments. The lack of critical knowledge on an appropriate mix of personnel, technology, intellectual assets, and physical assets may lead to the demise of indigenous businesses and significantly influence organisational and national culture. The advent of the fourth industrial revolution that incorporates both guidelines and directives from the EU and the Czech government, augments the stress to remain competitive and profitable.

At the national level, KE and KS exhibit a Czech dimension that reflects the nation's historical, cultural, economic, legislative, and geopolitical specifics. KE and KS are associated with authentic conditions and the needs of the organisation in the country. Government support for KM is referenced in several ministerial publications that comprises the Strategy of the economic growth of the Czech Republic, and the Strategy of the Government of the Czech Republic in the EU framework to cite a few. Institutions outside the public domain also exercise a pertinent role. The Association for Information Society publication "Manifest of Knowledge Society" (SPIS, 2007) summarises the current situation and outlines the tasks to be undertaken to succeed in this new global context.

ORGANISATIONAL LEVEL

Genuine KM is practiced at this level. KM encompasses a knowledge-based and knowledge-orientated organisational management irrespective of the organisational mandate or nature. Therefore, KM can be introduced in business organisations, educational institutions or even, civil administration. Many Czech institutions including commercial interests realise that traditional assets are no longer the sole resources managed during the transition to KE and KS. In doing so, prominence to knowledge resources and knowledge processes is highlighted. Knowledge resources are of particular concern in this circumstance wherein labour force skills are compatible with or surpass industry requirements and experience.

Many problems exist at this level in the Czech Republic. The transition to KE and KS must be performed in parallel with other changes. Prior to its current economic successes, the Czech economy had been transitory and in flux given its historical past of sixty years of oppressive regimes. Cultural aspects, including social and individual barriers, contribute significantly (Bureš, 2003). KM is perceived in different ways that in turn create additional communication and cooperation problems. The perceptions are usually formed by substituting a KM system with off-the-shelf solutions of software-based applications. Although necessary in the overall scheme as implementation or deployment tools, KM in both theory and

concentrates more on the human dimension. Lastly, there is a lack of KM implementation methodology available in and specific to the Czech Republic. Case studies of successful KM implementation tend to deal mostly with larger concerns outside the Czech borders (Ahmed, Lim & Loh, 2002). Many Czech companies are small or medium size enterprises. Subsequently, available models are not applicable to the Czech environment that contribute to the lack of successful KM implementation. For these reasons there exists a compelling need for further research and model- development to address the distinct Czech reality. Without the appropriate “Home-Made” tools, Czech organisations revert to services provided by consultancy companies that due to cost often render KM out of reach. In other instances, foreign-developed methodologies are sought. In both cases, the organisation is confronted with methods and procedures created in different settings that ignore the intercultural dimension. Moreover, they lack sufficient detail and guidelines and are seldom available in the Czech language.

MANAGEMENT OF KNOWLEDGE (MOK) LEVEL

Characterised by research in such fields as Artificial Intelligence and other I4.0 components, and knowledge-based systems, this level operates with tangible knowledge. MoK is an established technological discipline that embodies the lowest and the most basic level in which proper attention to knowledge is exercised. Methods, techniques, and principles of research work within fields such as pedagogy, psychology, sociology, and other cognitive sciences are also incorporated at this fundamental level. A relationship between managers and MoK exists. KM achieves its goals by utilising MoK outputs within the scope of its own activities. Managers are not usually cognisant of the principles on which the products of MoK are based. This is not an unusual situation and is comparable to other work activities in which the operations behind the result are tacit. However, MoK products or services require a degree of awareness and intent. Although many tools and applications are perceived as “easy-to-use” and quickly implemented, for example, wikis, discussion forums, videoconferencing, and document management systems, other applications that entail expert systems or multi-agent technologies require an awareness of knowledge acquisition, or knowledge storage.

RELATIONSHIP AMONG AND BETWEEN SINGLE LEVELS

The levels produce one coherent system that possesses its own considerable relationships. If MoK does not operate properly or efficiently, activities at higher levels will not be composite and complete, as MoK represents the basis for all knowledge related activities. Its subsequent products are applied at the organisational level. Regardless of the strong technological base at the MoK level, it neither supports a technological approach to KM, nor stresses its technological origin. It does draw the necessary attention to the notion that modern technologies catalyse change. Hence, the organisational level constitutes the basis of the KE both at the national and supranational level.

The higher the level, the lower is the significance of specific knowledge. While MoK operates with real knowledge and develops instruments and procedures, no matter how this knowledge is acquired, processed, distributed or exploited, at the organisational level it is not feasible to manage knowledge but rather to create the appropriate conditions for successful knowledge manipulation. Consequently, manag-

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ers concentrate on the schematic and content (knowledge resources (Holsapple & Joshi, 2001). At the national and supranational levels, the objective of all activities remains the creation of an environment and framework wherein lower levels can operate successfully.

One component that forms a relationship between the national and the organisational level is culture. Heier and Borgman (2002) study the impact of national culture on the development, rollout, and usage of KM-based projects. Once identified and categorised the attributes of the research are validated against a conceptual framework substantiated by Hofstede's (2001) cultural dimensions. Although much criticism has been levied against Hofstede over the past decades, recent research not Hofstede based has equally justified this position (Brunet-Thornton & Bures, 2012). In a similar vein, Gulev (2005) seeks to develop two criteria to evaluate the cultural impacts on knowledge flows and knowledge sharing in four European countries. Although material prevalent to the Czech Republic is lacking, these two examples represent only a meagre sampling of the available and abundant current research. KM must be embedded into the context of a greater vision and by doing so, substantial relationships at any single level or among levels is not only preserved, but also emphasised.

KNOWLEDGE INTENSITY

Managers, Czechs are not an exception, require motivation for its deployment and experience the desired changes. Therefore, it is necessary to establish a concept of organisational knowledge intensity and to confirm the positive influence of a KM programme to this intensity.

It is understandable that the knowledge intensity of nations, industries, organisations, or departments is of crucial importance to the whole knowledge hierarchy. While measuring the benefits of KM implementation or of intellectual capital development in organisations is quite common today at the organisational level, overall organisational knowledge intensity quantification including both static and dynamic aspects of KM is rare. Autio, Sapienza and Almeida (2000) define knowledge intensity as the extent to which a firm depends on its knowledge as a source of competitive advantage. Davenport and Smith (2000) assert that knowledge intensive companies will allocate more resources to knowledge management. However, the criteria enabling the classification of organisations according to their knowledge intensity are not elaborated. Moreover, knowledge intensity may not be associated with KM programmes whatsoever. Every organisation possesses knowledge resources and realises knowledge processes, but few recognise such consciously.

In general, the concept of knowledge intensity is widely known. It consists of minimally four factors: involvedness of knowledge and understanding required to perform assignments; expertise necessary for the competent handling of work-related unpredictability; severity of consequences of potential work inaccuracy, and swiftness of action. However, there is not a generally accepted methodology that measures organisational knowledge intensity from the managerial perspective.

This view enables managers to view their organisations from a different standpoint. Firestone (1999) considers the organisational information and knowledge infrastructure to consist of two models. The first represents the organisational and human components and their continual interaction. The model is not determined by design, but emerges from the dynamics of the enterprise process and its activities. Thus, this model is natural. The second model is a conceptually distinct and integrated system that arises from the former. It includes computers, software, or electronic components. This model is artificial and

developed by design. The resulting information-knowledge processing infrastructure is often a blend of the two. Since organisations are complex systems, humans are not able to fully design the infrastructure leaving one natural phenomenon to propagate an unexpected and emergent behaviour (Čech, 2005). Monitoring of the organisational knowledge intensity assists managers to evaluate how the models are interrelated, and developed.

RESEARCH PERSPECTIVE

From the research perspective, the entire knowledge hierarchy involves many scientific disciplines such as economics, international trade theory, management science, political science but also informatics, sociology, and psychology. One current problem is that these disciplines usually analyse at a single stratum without deep consideration or linkage to other levels. The more one escalates in the hierarchy, the more evident are the research problems related to economics or management; whereas, in the opposite direction research problems related to informatics or psychology are evident. This perspective must be considered when conducting research at the organisational level and organisational knowledge intensity respectively.

Therefore, the application of a systems approach and thinking is necessary to study organisational knowledge intensity in the context of the whole hierarchy. Moreover, a systems approach is applied when thinking about organisational knowledge intensity and using it as a practical indicator. However, most managers are not prepared as management education centres on a mechanism rather than a systems approach.

Increased knowledge and insight originate from interdisciplinary and multidisciplinary research. The proposal emphasises the multidisciplinary to explore organisational knowledge intensity. Knowledge economy development (Chen, 2005), knowledge intensive industries, cross-cultural management, knowledge management, modern managerial measurement systems (Kaplan, 1996), organisational culture, human resources, and knowledge technology applications (Mikulecký, Ponce & Hynek, 1997) are only some of the facets considered. Throughout the proposed study attention focuses on the possibilities of the further development of organisational knowledge intensity, the performance of organisations in knowledge management activities and on the general indicators of their performance.

PRACTICAL SIGNIFICANCE

Practical value is ensured through the methodology design enabling organisations to quantify their knowledge intensity and benchmark their performance from a knowledge perspective with others at an international level. The applied implication evolves from the composition of the research team. Moreover, the project benefits include not only the methodology but an amelioration to the existing body of knowledge. The theoretical results enhance managerial familiarity of the relationship between KM and organisational knowledge intensity. Organisational knowledge intensity is closely related to KM, wherein it can serve as a tool for the justification and substantiation of related initiatives. Therefore, the project output supports and facilitates managerial decision-making. KM-related decisions are strengthened by the managers' knowledge and awareness of processes, and resources. Equipped with this information,

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management takes efficient and more effective decisions as to resource allocation, financial budgeting, and in other day-to-day tasks. Incorporating cultural aspects within the total problem ensures an undisputable relationship between the proposed project and practice.

CONCLUSION

Knowledge oriented activities are viewed at several levels of the knowledge hierarchy. At the supranational level, objectives are interpreted as guidelines for national and organisational development. The Czech Republic is not an exception as Czech enterprise strive to improve their performance and competitiveness. Unfortunately, systematic KM is not envisioned as a viable option. Several reasons previously cited contribute to this condition. Previous efforts demonstrate that there is no “turnkey” solution available to meet the special circumstances of most companies in the Czech Republic.

To support further development on KM the proposed project focuses on the organisational knowledge intensity. Its ultimate result – a methodology for monitoring organisational knowledge intensity – provides managers with an appropriate tool for the justification of a KM programme and monitoring of its development. Once this tool is deployed, managers who lack system thinking ability should avoid the seemingly straightforward solutions that are obviously insufficient to implement KM.

ORGANISATION OF THE BOOK

The first segment of the book, “Country and Region Specific,” discusses Industry 4.0 from a national or regional perspective. Chapters 1 and 2 provide the reader with in-depth analyses along with an appropriate case study on recent and future developments in China. Chapter 3 examines the challenges of the automotive industry in Malaysia, whereas, Chapter 4 delves into the opportunities possible for developing nations. “Management, Strategy, and Performance” investigates the Industry 4.0 impact on the way that business is conducted. Chapter 5 concentrates on management challenges in a digital age; whereas, Chapter 6 centres on logistics and risk management. The following Chapter, 7, delivers a detailed examination of logistics and supply chain. Chapter 8 discussed leveraging for sustainable performance. Corporate strategy forms the basis for Chapter 9. Lastly in this segment, Chapter 10 assesses issues relative to cybersecurity risk management in a specific industry. The third section, “Frameworks,” comprises two chapters: 11 proposes an alternative holistic framework. Chapter 12 provides an assessment framework to gauge manufacturing maturity. Section 4, “Knowledge Transfer and Education,” entails a five-step methodology to introduce Industry 4.0 (Chapter 13) and the challenges to teach cultural theory in the context of the digital era (Chapter 14). “Process and Value” presents the last segment of the book. Chapter 15 explores how corporate-specific to legacy devices transitioned to cyber-physical systems. Chapter 16 investigates synergies between process excellence and Industry 4.0.

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