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From the Editor

Knowledge management (KM) has become an evolving discipline since the early 1990s, when organizations started perceiving knowledge as a valuable resource. This field of research has its origin in many disciplines, such as: information and IT management, computer science, enterprise management, organization science, human resource management and even philosophy, offering many potential research perspectives and approaches. For more than three decades, organizations of various types have been undertaking efforts to apply knowledge management, in order to benefit from a competitive advantage. Researchers and practitioners from diversified industries, and with different backgrounds, have tried to answer the question how to successfully manage knowledge, knowledge work and knowledge workers, still leaving much space for further research avenues.

Now, after all those years of research, some old questions have still not been answered and some new ones have arisen. During the pre-conference workshop on "The future of KM: short-time goals and long-term vision", organized in Barcelona before the European Conference on Knowledge Management 2017 and conducted by myself and my colleague, Dr Sandra Moffett from Ulster University (UK), we asked the participants what their idea of the future of KM was. We could observe many different voices and approaches: some very pessimistic that KM is probably coming to an end, but mostly very promising that there are still many unexplored aspects of KM we should focus on and there is still a plethora of issues related to knowledge management that should be examined.

Similar voices can be detected in the flagship article written by Meliha Handzic, who claims that KM definitely has a future, although it may not be without some challenges and obstacles to overcome. This paper links the past (three evolutionary stages of KM called fragmentation, integration and fusion) with the future of KM (three new trends named extension, specialization and reconceptualization). The author also suggests that KM should embrace different approaches under the "KM Conceptual Umbrella", highlighting the possibility of addressing many themes, ideas or tools linked with knowledge. All the past and future evolutionary stages of KM are described in detail, together with the challenges that the KM field might face in the future.

In the second paper, by Philip Sisson and Julie J. C. H. Ryan, the authors present a mental model of knowledge as a concept map being an input to KM research. The authors used qualitative methods, together with system engineering and object analysis methods, to collect various concepts and relate them. The issue of knowledge is elementary in knowledge management and showing the links between particular knowledge terms is of very high value to all KM researchers. Although the length of this article may constitute a challenge, it is definitely worth the effort as it illustrates many multifaceted, multilayered and multidimensional aspects of knowledge.

The third paper by Karl Joachim Breunig and Hanno Roberts discusses another valid issue of value creation in the context of knowledge flow. The authors try to answer the question: How can we express knowledge in such a way that it can be monetized and made accessible to specific managerial interventions? Building on the previous extant studies and authors' ideas, the paper points out that boundary spanners play a focal role in the monetization efforts of knowledge.

In the fourth paper by Regina Lenart-Gansiniec one can read about crowdsourcing and the virtual knowledge sharing taking place in this process. The phenomenon of crowdsourcing is still under-researched and not much is known about the virtual exchange of knowledge in crowdsourcing and its benefits, such as co-creation, participation or gaining new ideas, and potential sources of innovations. Apart from the examination of the potential benefits of virtual knowledge sharing, the author also analyses ways of measuring virtual knowledge sharing in the process of crowdsourcing.

The fifth paper by Kaja Prystupa concerns knowledge management processes in small entities and the role played by organizational culture. As the aim of this paper, the author set the examination of organizational culture in small Polish companies with the application of a symbiotic-interpretive perspective. Interesting outcomes of this study are: the confirmed role of organizational culture in KM initiatives, the importance of the founder and the industry, and the threat posed by organizational growth, which should be well-managed from the perspective of organizational culture so as not to hinder organizational performance.

The sixth and the final paper, by David Mendes, Jorge Gomes and Mário Romão, deals with ways of creating intangible value through the use of a corporate employee portal. The authors undertake the effort to explain how such a portal fosters the creation of organizational values built on intangible assets. As the research confirms, an employee portal can be considered as a strategic tool for promoting organizational culture and cooperation, through information and communication fluxes and through the teamwork of collaborative functionalities.

This issue of JEMI integrates contributions from Bosnia and Herzegovina, the United States, Norway, Poland and Portugal. I would like to express my gratitude to all the authors who contributed to this special issue, proving that knowledge management is still a valid topic, and offering abundant research opportunities. I would also like to express my sincerest thanks to the anonymous reviewers who contributed highly to the selection of the best submissions for this issue and guided the authors to further improvements in their works. Finally, I would like to pay special thanks to Dr Anna Ujwary-Gil, Editor-in-Chief of JEMI, for her kind invitation to prepare this special issue and her continual support at each stage of its preparation.

I do hope that the readers of JEMI find the selected papers valuable and that they enrich their knowledge on KM issues. Additionally, I do believe that the collected works will be inspiring and offer some future directions for the examination of the knowledge management field.

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The KM Times They Are A-Changin'

Meliha Handzic[1]

Abstract

This paper traces the changes in the development of the field of knowledge management (KM) over time, through a review of the representative literature and the author's own research. The paper starts by going back to the origins of KM and reflects on three significant evolutionary stages termed fragmentation, integration and fusion. Following these reflections on the KM past, the paper speculates on the possible KM future. It identifies three emerging trends named extension, specialization and reconceptualization that point to several possible KM futures. The first two involve decentralisation and regeneration of prior KM interpretations, while the third trend signals a revolutionary next KM generation. Irrespective of the direction it may take, the evidence presented in this paper suggests that KM has a future, although it may not be without challenges.

Keywords: *knowledge management (KM); KM development; KM past; KM future.*

INTRODUCTION

Knowledge management (KM) is a young discipline, only thirty or so years in the making. It is therefore not surprising that there is a lack of clarity and agreement on what KM means, what its objectives are and what value to individuals and collectives their accomplishments can bring.

On the bright side, it appears that there is a healthy research community interest in KM aimed at providing answers to the above questions. This is reflected in a substantial number of recent articles devoted to the analysis of the field using scientometric methods (Serenko & Dumay, 2015a; 2015b), as well as more traditional (Handzic 2015; 2016) or structured (Massaro et al., 2015; 2016a) literature reviews.

Such findings contradict some recent reports of the pessimistic views of KM as the management fad facing inevitable decline (Garlatti & Massaro, 2015). Furthermore, they reinforce other evidence of the ongoing interest in

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NOTE: The article's title is inspired by Bob Dylan's 1964 song: The Times They Are A-Changin'

the field, shown by numerous existing associations, conferences, publishing outlets and academic programs. Indeed, Serrat (2017) asked, "If knowledge is the strategic resource of the 21st century, how can its management be thought redundant?"

The good news is that some significant advances have been made over the past decades of KM history. These advances have been well documented in the recent literature (Bolisani & Handzic, 2015). However, despite the many advances made, it seems that people are still struggling with the great variety and vagueness of different views on what KM is and where it will go. According to Spender (2015), KM is not yet a coherent academic field with an established body of ideas, methods, and target phenomena. Therefore, those who wish to map the field of KM are faced with considerable challenges.

Predicting the future can be a particularly risky business as testified by many famous historic blunders (McQuary & Hester, 2011). Yet, to continue the KM journey, it is important to know "which way we ought to go from here" if we want to get to the full recognition of KM as a discipline and ensure its survival and advancement (Hasan & Handzic, 2003).

Recognising the need to link up-to-date KM research with future challenges, the main purpose of this paper is to trace the development of KM over time through a review of the representative literature and the author's own research. It is hoped that such a brief will help provide some answers to the lingering questions of KM meaning and value, as well as offering a peek into its future. The section on the KM past builds on the author's earlier work (Handzic, 2016), while the section on KM future speculates on KM in the future despite risking to be wrong.

METHODOLOGICAL CONSIDERATIONS

A traditional literature review was adopted as a research methodology for this study, as its goal was to provide an overview of the research findings on the topic of KM development over time. Conducting a literature review is considered particularly important when a field of inquiry (in this case KM) changes. Generally, the method involves authors reading relevant studies and organizing emerging themes in order to develop a comprehensive understanding of the main findings. In this way a valid synthesis of the research literature can be developed and additional interesting insights can be generated. A critical summary of the literature reviewed for this study is organized into two main sections around KM trends identified in its past and predicted for its future.

LITERATURE BACKGROUND AND CONCEPTS

KM past and origins of KM

For understanding the historical development of the field of KM, it is necessary to start with the modern organizational theories, especially RBV (the resource-based view of the firm) and KBV (the knowledge-based view of the firm). The major contribution of RBV is that it refocused strategic thinking about the firm from external competitive forces to internal organizational resources as its key success factors. The special contribution of KBV is in recognising knowledge as the most important strategic resource of a firm. This recognition led to another major concern over how to deal with the required new and available existing knowledge to ensure successful performance and achieve competitive advantage. The initial response was offered by the concept of a learning organization. The argument put forward was that each firm had to learn and transform constantly in order to remain competitive in its business environment. Building on this initial idea, knowledge management (KM) appeared as the latest response of management science and practice to the recognised need for development and utilization of knowledge assets for organizational survival or advancement in the 21st century. In order to better understand what KM is, the following sections chronicle the evolutionary development of the field since its inception.

It is hard to pin-point an exact date when the term knowledge management (KM) entered the lexicon. Usually, the coining of the term and its first use is attributed to Karl Wiig, who introduced the concept at an ILO conference in Zurich in 1986 (Lelic, 2002). Karl-Erik Sveiby also used the term in his 1986 book "Knowledge Companies" published in Sweden (Schlussel, 2009). Sometimes, the KM beginning is linked to the publication of another book by Sveiby entitled "Managing Knowhow" back in 1987 (Favero, 2016).

While Wiig and Sveiby are often described as the founding fathers of KM, Spender (2015) warns that knowledge management is not a new concept, as people were always keeping records and watching costs. However, its rapid development over the past 30 years may be attributed to three megatrends: globalization, ubiquitous technological development and knowledge-centric economy.

A number of management theorists have contributed to the evolution of knowledge management. Among notable KM pioneers are: Peter Drucker and Thomas A. Stewart who stressed the importance of knowledge as a source of competitive advantage; Peter Senge and Chris Argiyris who introduced the concept of a learning organization; as well as Robert M. Grant and John C. Spender for their work on the knowledge-based theory of the firm.

However, it was in 1995 that KM truly captured management attention with the publication of the widely read work "The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation" by Ikujiro Nonaka and Hirotaka Takeuchi. This book is considered as one of the most important contributions to the burgeoning field of knowledge management in the 1990s. Another important book that established the enduring vocabulary and concepts in KM appeared soon after in 1998. It was co-authored by Thomas H. Davenport and Laurence Prusak under the title "*Working Knowledge: How organizations manage what they know*". The co-authors of these two books were voted the most influential persons in KM (Edwards et al., 2003).

Since 2000, the term knowledge management has been in widespread use, as attested to in the titles of many new books, as well as in numerous articles in business publications. Research from other disciplines (e.g. library, computer, cognitive and organizational sciences) has also embraced the field as a means of solving the problems of today's economy and society. Still, this "science" appears to be struggling with constructing its road of validation, still looking for its true destination. Therefore, the following sections will try to identify where it stands at the moment, and where it can go from here.

Three stages of KM development

There have been a number of significant periods in the evolutionary development of KM. One of the most popular accounts of change in KM over time identifies three KM generations (Snowden, 2002). The focus of the first generation was on explicit knowledge and technology. In the second generation, the emphasis was on human and cultural factors, while contextual contingencies took a central place in the third generation. Another historical account distinguishes among three KM eras that involve: leveraging explicit knowledge, leveraging experiential knowledge and leveraging collective knowledge. This account views changes over the three eras in terms of expanding understanding and the creation of new sets of KM practices (Dixon, 2010). The third account is more detailed and traces KM evolution by using the seven ages of human analogy: information management-IM (infancy), KM emergence (childhood), bandwagon (adolescence), consolidation (adulthood), re-evaluation (middle-age), social KM (old age), analytics (very-old age). This model assumes that growing and maturity brings a greater understanding of KM and its value to organizations (Skyrme, 2013). There are also some mentions in the literature of the fourth and fifth KM generations (Cummings et al., 2013).

A different way of analysing KM change was offered by Handzic (2016). It identified two significant moments as a basis for the analysis. First, it is a widespread recognition that KM is not solely about technology, or solely about people, but has five interlocking aspects, covering content, process, people, strategy, and technology. Second, it is a growing belief that blending KM with other disciplines can significantly boost productivity and effectiveness outcomes. The following sections briefly present descriptions of each of the three historical KM stages termed fragmentation, integration and fusion. These stages are depicted graphically in Figure 1. The figure shows three fragmented KM schools (technocratic, behavioral, and economic), integrated KM components (context, driver, enabler, process, stock, and outcome) and examples of KM fused into other disciplines (e.g. e-learning, CRM, health informatics, and digital humanities).

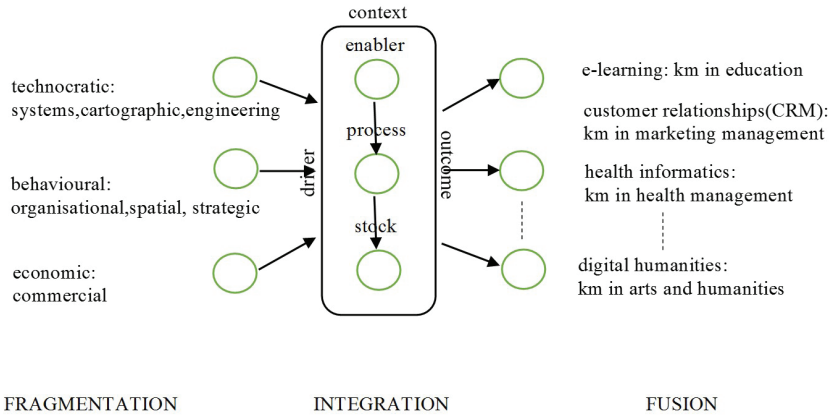

Figure 1. Three stages of KM development

Fragmentation

Earl's (2001) taxonomy of major KM schools of thoughts is used here as a frame for discussing the fragmented nature of the field in the 1990s. The schools are divided into three general categories: technocratic, economic and behavioral.

The technocratic school of KM consists of the systems, cartographic and engineering schools. Similar to the first generation KM, it views knowledge as an object and places emphasis on the role of information and communication technologies in KM. The systems school focuses on formalised knowledge bases that make explicit knowledge of human experts available for use by

non-experts. The cartographic school focuses on knowledge directories or yellow pages that allow others to locate experts' tacit knowledge that they need. The engineering school focuses on processes and knowledge flows. From the engineering school perspective, KM systems are used to document knowledge processes and store best practices in shared databases, warehouses and document management systems. Hahn and Subramani (2000) identified a number of issues and challenges related to the utilization of information and communication technologies for KM. These include the need to balance knowledge exploitation and exploration, overload and useful content, additional workload and accurate content. There is also a need for flexibility, evolutionary development and user acceptance of knowledge systems.

The behavioral school of KM is similar to the second generation KM. It consists of the organizational, spatial and strategic schools. The focus of the organizational school is on the sharing and pooling of knowledge by networked employees. The spatial school focuses on creating physical spaces for greater facilitation of knowledge exchange. Nonaka and Konno's (1998) concept of "ba" extends the notion of place to four types: originating, interacting, cyber and exercising. They promote four knowledge processes: socialisation, externalization, combination and internalization which enable knowledge creation. The strategic school emphasises the importance of KM as a firm's strategy. In general, the behavioral group of models addresses issues of complexity, organizational culture and learning, change and risk management, and the support of communities of practice.

The economic school of thought of KM focuses on the idea of knowledge as a competitive resource. Sveiby's (1997) model of Intellectual Capital (IC) is one of the first and best known representatives in this category. This model incorporates human, structural and relational capital as the key knowledge assets from which organizations extract value. From the IC perspective, KM aims to create value from knowledge assets by maximising the interrelationship between different types of organizations' intellectual capital. In contrast, Earl's (2001) commercial category is more concerned with protecting and exploiting a firm's knowledge or intellectual assets to produce revenue. It emphasises the importance of patents and copyrights as means to protect these assets.

Integration

The variation between different schools of thought on knowledge management is an indication of the many problems the concept poses. This led to a number of projects worldwide that worked on integrated models of

KM during the 2000s. The aim was to provide KM researchers with a holistic view, common ground and consistent terminology, and units of analysis across a variety of settings. There was also a need to develop frameworks that could help practitioners to understand the sorts of KM initiatives or investments that are possible and to identify those that make sense in their context.

According to Hasan and Handzic (2003), all integrated frameworks consider KM as a complex and multidimensional concept; synthesise the object and human perspectives of knowledge; view KM as both a social and technological concept; and recognise the evolutionary and contextual nature of KM. In this paper, I use the knowledge *context-driver-enabler-process-stock-outcome* model adapted from Handzic et al. (2008) as a basis for discussing the fundamental concepts of KM in a holistic manner. The integrated KM model essentially provides a link between different fragmented KM approaches and generations. The main contribution of the model is that it helps organise various factors in a more meaningful way. While the model was conceived with a view of organizations, it may be applicable to different individual and collective levels.

The model core views KM as configurations of an organization's socio-technical knowledge enablers, knowledge processes and knowledge stocks. Supported by Nonaka and Konno's (1998) concept of ba, the model brings together the technology, maps, spatial and networks categories of Earl's (2001) technocratic and behavioral schools of KM. It emphasises the importance of both social and technical factors in enabling and facilitating knowledge processes. Organizational environment with proactive leadership and open culture is assumed to help create a knowledge-conducive climate and technological infrastructure to facilitate knowledge processes.

The knowledge process component of the model covers various processes through which knowledge is moved (e.g. transfer person-to-person, person-to-document) and modified (e.g. creative idea generation, mining of hidden patterns in captured data). The underlying assumption is that the better the processes of knowledge generation, sharing, capture and discovery, the greater the likelihood that the knowledge needed will be available leading to more effective and innovative organizational performance. The knowledge stock component draws from Earl's (2001) economic, and Sveiby's (1997) intellectual capital perspectives, where knowledge is seen as a valuable organizational asset. More importantly, it brings together different perspectives of knowledge (human and object, explicit and tacit, know-what and know-how) by proposing a multidimensional view.

Furthermore, the integrated model takes a contingent theoretical approach to KM which argues that no one solution is best under all circumstances. It gives contextual contingencies (e.g. task-, environment-

and person-related) an important place in selecting the right KM choice that best fits a particular set of circumstances. A number of researchers provide considerable theoretical and empirical support for the view (e.g., Hansen et al., 1999; Becerra-Fernandez & Sabherwal, 2001; Snowden, 2002; Becerra-Fernandez et al., 2004).

The model also recognises explicitly that KM is driven by forces from its surrounding external environment. Australian KM standard (AS5037, 2003) describes KM drivers as strategic levers through which an organization delivers its desired outcomes. It identifies operational excellence, stakeholder intimacy, service delivery, growth, sustainable profitability and risk mitigation among core strategic drivers found across for- and non-profit sectors. Earl's (2001) strategic category provides further reinforcement of the view of knowledge as a competitive weapon and points to the importance of KM consciousness in a firm's business strategy.

Finally, the integrated model includes a KM outcome component that allows assessing of the impacts of KM on organizational performance. Australian KM standard (AS5037, 2003) identifies two principal benefits of undertaking KM: improving productivity and organizational efficiency, and promoting innovation. Earl's (2001) economic school of KM suggests that when aligned with business strategy, KM may generate revenue and profit through the use of knowledge to create innovative and improved products and services. It may also generate a sustainable competitive advantage by effective use of its accumulated intangible assets to develop and exploit other tangible resources better than the competitors.

While it may be hard to identify all the immediate benefits from a KM initiative, organizations need to get some feedback on the degree to which KM fulfils their articulated drivers. Both knowledge and outcome measurements are needed in continuous knowledge audits and for eventual adjustment of KM strategies over time.

Fusion

Most recently, scholars have started to call for convergence between KM and other disciplines in order to broaden research interests and opportunities in academia and enhance their value to practice. Some notable attempts include conceptual models connecting KM and BPM (business process management), KM and communication management; KM and IC (intellectual capital); and KM and PM (project management).

The combined KM and BPM solution is based on the connection between process model and corporate knowledge base (Ternai et al., 2014). In particular, the process structure is used for building up the knowledge

structure (ontology) of a certain domain. By using the ontology and combining it with the process model, knowledge management and business process management are connected in a dynamic, systematic and controlled manner. In another research with the intersection and complementation of different disciplines, the cooperation model of an organization's dynamic communication is built for a research organization based on the definitions and characteristics of knowledge management and communication management (Wu et al., 2007). Among those arguing the connections between KM as a dynamic and IC as a static perspective on knowledge, Kianto et al. (2014) proposed several alternative models on how these knowledge-based issues affect organizational performance. In some proposed options, KM practices moderate or mediate the effect of IC assets on performance. In other options, IC assets moderate or mediate the effect of KM practices on performance.

Advocates of KM's integration with PM claim that it is necessary to enable the people involved in the project to take individual contributions to the project's objectives and align them with the organization's strategic objectives (Levin, 2010). So far, several attempts have been made to combine aspects of KM and PM in order to improve project success (Cope et al., 2006; Lierni & Ribiere, 2008; Owen, 2008; Ismail et al., 2009; Gudi & Becerra-Fernandez, 2006; Yeong & Lim, 2010). Most recently, Handzic and Durmic (2015) proposed a new conceptual model which combines factors from three fields in a way that can increase the rate of project success in organizations. This model includes a set of interrelated components derived from KM, IC and PM frameworks. From KM, the proposed model adopted contextual contingencies and drivers of KM, as well as KM practices comprising socio-technical knowledge enablers and processes. From PM, the model adopted people (project team and customer) and process (project planning, execution, verification) elements as critical IC dimensions, and project success as PM, as well as KM as an outcome component. With respect to relationships, the proposed model recognises that various motivational forces and contextual contingencies drive and influence the choice and application of KM practices in PM and thus indirectly impact project success.

While all of these merger models point to the importance of KM consciousness, Cervone (2016) warns that in some cultures, KM has diffused to the point where it is no longer considered a separate thing, but a natural part of how people organise work. Consequently, it becomes invisible not only in the process, but also in the name. There are many examples of this trend. Thus, e-learning represents a clear case of KM fusion in education. Customer relationship management (CRM) is a specific application of KM in marketing. Health informatics and biomedical informatics are the products of the merger of knowledge and health management. Furthermore, digital disciplines such

as digital arts and humanities sit at the crossroads of traditional, digital and knowledge sciences. For example, at Stanford (http://shc.stanford.edu/digital-humanities), digital humanities projects focus on the preservation of archival material for posterity through digitization and mapping the exchange and transmission of ideas in history. They have implemented sophisticated KM tools such as 3-D mapping, algorithmic literary analysis and advanced visualisation techniques. This enables researchers to experiment with source materials, as well as share knowledge and build a community.

While the fusion stage may lead to the complete disappearance of KM as a distinct field, this would indicate the true success of KM according to some scholars (Kay, 2003) However, here lays the danger that organizations may forget what they knew about KM and fail to manage their knowledge for the benefit of their business. So, the position advocated by this paper is that the possible "next KM generation" should make sure that KM remains relevant and rigorous to guarantee the field to proceed.

KM future

The above historical chronicle of the field shows that KM has made some significant advances since its inception. However, after three decades of high visibility, the field has recently come under critical scrutiny questioning its future. A recent controversial remark by Davenport (2015) that KM is "gasping for breath" has caused concern in some parts of the KM community. Reacting to this statement, O'Leary (2016) reviewed several emerging KM concepts; investigated empirical evidence of KM trends using Google Scholar and Google Trends; traced Gartner's history of KM from a hype cycle perspective; reviewed arguments behind "KM is dead" proclamations; analysed the concern about KM value; and finally concluded that "it does not appear to be dead or dying", but "it does appear that knowledge management is continuing to evolve". Therefore, the time seems right to take a closer look at what the future might hold.

Moving KM forward

The future of knowledge management has been recognised as an area of interest to both academics and practitioners since its inception (Girard & Ribiere, 2016). However, the majority of scholarly articles that looked to the future of KM were published back in the 1990s, when KM gained momentum. These pioneering works charted the KM course for many researchers over the past three decades. Unfortunately, only a few scholars addressed the issue in recent years in order to help chart the KM course in the next decade and beyond.

These proponents of the "next generation" pointed to the "blue ocean" of opportunities for KM regeneration or revolution. Thus, Bedford and Lewis (2015) suggested the following possible ways ahead: chances for testing new ideas and practices presented by the emerging trans-disciplinary and/or inter-disciplinary fields of study; organizations incentivised by the growing knowledge economy and society to learn and experiment with KM ideas; changing historical nature of disciplines evolution through common practices rather than around core theories. Also adopting the next KM generation concept, Schmitt (2015) proposed advancing KM towards individualization and innovationalization. He also outlined his own personal KM system in the making.

From an explorative study of KM experts' views Heisig (2015) recommended: revisiting some fundamentals such as the concepts of knowledge and KM process; exploration of ecological and biological models of the KM environment; examination of the KM relationships with other disciplines such as organizational studies, innovation and human resources management; looking beyond KM technology to human and social factors and the related root disciplines of psychology and sociology; and consideration of the macro-economic and societal outcomes of KM. Based on yet another recent study of KM experts' views Girard and Ribiere (2016) mapped KM's future using Earl's (2001) taxonomy. The aim was to discover areas that offer interesting KM research opportunities for the future. The engineering, cartographic and systems schools emerged as the top three schools. Thus, this study predicted technocratic approaches as the most likely areas of KM research and practice in the near future.

However, argued Handzic (2016), in the long term, the challenge is to develop novel models that will incorporate enough of the contextual complexities to be effective, while remaining simple enough that people who are not KM experts can use them. A way ahead may be what Skyrme (2013) calls reincarnation, with KM taking on a new lease of life and being reinvigorated.

Three emerging KM trends

In order to make sense of various views and predictions for the KM future found in the recent literature, the author categorised them into three emerging trends termed extension, specialization and reconceptualization. They differ in the nature and extent of change they bring to the field through the ongoing broadening, deepening, adapting, repurposing or innovating activities of the KM concept. Thus, the first two represent evolutionary developments within the existing theoretical frameworks, while the third one points to the shifting paradigm of knowledge and science that brings radical

change. The following sections take a closer look at each of the three emerging trends shown in Figure 2. The figure shows three major KM specializations (big data, social KM, innovation management), examples of extended range of KM components (wider enablers and processes, deeper stocks) and three novel conceptual developments (data science, connectivism/collectivism, human/nature-based KM).

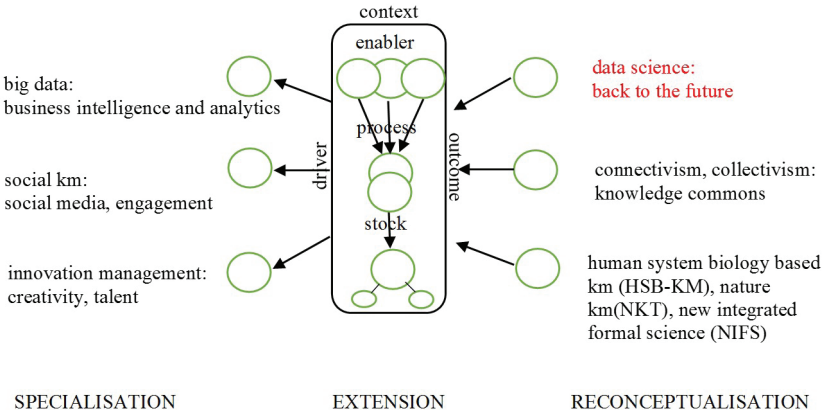

Figure 2. Three emerging KM trends

Extension

The extension trend can be best described in terms of a widening and deepening of the existing integrated model of KM. This widening is especially visible in the technology arena with new technologies emerging daily. The Cloud, open linked data, AI applications, and the Internet of Things are only some of the latest developments to better enable and facilitate knowledge processes. These sophisticated KM tools promise to deliver knowledge that will improve its application and impact; connect people in the best way to transfer knowledge; connect knowledge and the power of knowledge discovery; and accelerate the expertise development that is crucial as the baby boomers retire (McQuary & Hester, 2011).

The widening tendencies are not confined to the technology sphere alone. The ever-growing volumes of explicit knowledge deposited in linked repositories provide opportunities that affect the logistics of knowledge seekers and suppliers (Schmitt, 2015). The curation of the world's intelligence is one important newly introduced KM activity that ensures its reliability and retrievability for future research and reuse purposes.

With respect to KM applications, they are spreading from primary to tertiary sectors, from commercial to government to non-profit contexts, from personal to global levels. The variety of applied KM practices is well documented by Ark Group, a leading provider of business information in Australia (http://www.arkgroupaustralia.com.au/). It is interesting to note that the supporting voices urging for more personal KM applications that give power and autonomy to individuals and self-organised groups are growing in number (Schmitt, 2015). There are also other voices that promote KM as a means for the predominantly social change (Tuomi, 2002).

The deepening of KM is clearly manifested in the deconstruction of the concept of intellectual capital (IC). The original Sveiby (1997) model of IC incorporates human, relational and structural capital as the key knowledge assets from which organizations extract value. More recently, these three concepts themselves have been recognised as being complex and multi-dimensional. Specifically, Molodchik et al. (2014) decomposed human capital (HC) into the abilities of management and human resource capabilities; structural capital (SC) into innovation and internal process capabilities; and finally, relational capital (RC) into networking capabilities and customer loyalty.

In summary, the extension trend retains the holistic approach to KM while harnessing the power of new technologies and deeper insights gained into the field for the benefit of all segments of the knowledge society and economy.

Specialization

The specialization trend may be viewed in terms of the adaptation and repurposing of KM. In the first instance, specialization may resemble fragmentation, as its focus is often on a part of KM rather than on the whole. However, the difference between the two stages is in the present awareness of the whole-part relationship compared to the earlier partial views of the "proverbial KM elephant". Some scholars also argue that KM requires the development of specialized studies that consider the specificities of the research context (Massaro et al. 2015, 2016a). For example, the public sector cannot simply translate models developed for the private sector. Similarly, SMEs cannot simply translate the models used in large companies.

Furthermore, specialization is considered a normative decision response to high complexity, uncertainty and the accelerated pace of change in today's world. These characteristics are brought about by mega trends of globalization, virtualization and knowledge centricity. By focusing on specific aspects of a problem rather than all of it at once, individuals and collectives may better deal with the challenges they face. The same principle applied to KM resulted in several emerging specializations. The most popular ones

are: big data and its related concepts of business intelligence and business analytics, social knowledge and innovation management.

Big data, business intelligence and business analytics (BI/BA) can be viewed as an adaptation of the codification KM strategy aimed at knowledge preservation and discovery. Capturing explicit knowledge is essential for the purpose of minimising the risk of knowledge loss (Von Krogh et al., 2000), while discovering and making visible novel patterns hidden in knowledge stores is important for better knowledge access, discussion and value (Eppler & Burkhard, 2007). The roots of the big data and business intelligence approaches can be found in structured database and data warehousing systems, as well as in unstructured web-based and mobile content. These vast digital collections offer plenty of opportunities for analytical activities to drive decisions and actions. Typically, analytical techniques are classified according to their purpose into: descriptive (aimed at revealing patterns), predictive (used in forecasting future) and prescriptive (for recommending an optimum course of action) (Edwards & Taborda, 2016).

Another emerging KM specialization is labelled social knowledge management and is placed as part of social business, an umbrella term for the use of social tools within an organization (Gurteen, 2012). This powerful approach clearly puts responsibility for knowledge sharing, and making it productive, in the hands of people. In the world of social KM, a powerful combination of soft (e.g. knowledge café) and technological social tools (e.g. blog) facilitates knowledge sharing, collaboration, connectedness and relationships that are leveraged towards business objectives. The term social KM, may also be understood as the management of social knowledge that addresses developmental objectives of regions or the entire global community, beyond one organization's competitive advantage.

Some authors claim that innovation is the most important driver of KM, as innovation ensures advancement rather than just survival in the knowledge economy (Von Krogh et al., 2000). It is therefore not surprising that innovation management emerged as an important trend in business research and practice. For innovation to happen, visionary ideas and creative leaps need to be turned into disruptive realities. The story of the people who created the digital revolution is a useful account of how inventors' minds worked and what made them so inventive. It is also a narrative of how their collaboration and teamwork made them even more creative (Isaacson, 2014). For an era that seeks to foster creativity and innovation, this KM specialization may perhaps be the right way forward.

Overall, with specialization, different notions of KM have come along and are gaining popularity. Davenport (2015) urges the KM community not to shun, but instead embrace these other related notions and thus allow the idea of KM to thrive.

Reconceptualization

One of the strangest "back to the future" kinds of theoretical developments mentioned in the recent literature is the re-emergence of the concept of data science. According to Hayashi (1998), data science is a concept that unifies statistics, data analysis and their related methods in order to understand and analyse actual phenomena with data. It employs processes and systems from the areas of mathematics, statistics and computer science to extract insights from data. Based on this definition, it is not possible to see any distinction between data science and the KM concept of knowledge discovery as described by Fayyad et al. (1996). Some critics consider data science as a buzzword that simply replaced business analytics, which replaced data mining as the term of choice for describing the analysis of data (Press, 2013). Therefore, the rise of data science may signal the beginning of the decline of the business analytics.

A very different theoretical lens on KM is provided by connectivism (Siemens, 2005). It is inspired by the era of networks and collaboration, and addresses the gap between the existing KM theories and emerging knowledge initiatives such as Web 2.0. Connectivism contrasts traditional behavioral and cognitive approaches to learning by acknowledging the role of social and cultural context of learning. It is often promoted as a learning theory for the digital age. Siemens also opened a discussion on the notion of collectivism versus connectivism. He argued in favour of connective intelligence as it permits retaining own ideas in collaboration with others, and against collective intelligence which overwrites individual identity.

Among the recommendations for KM's future, experts from Heisig's (2015) study mentioned: revisiting some fundamentals such as the concepts of knowledge and the KM process; and exploration of ecological and biological models of the KM environment. The search for the evidence of such explorations led to the concept of nature knowledge (NK), nature knowledge theory (NKT) and its derivative human system biology-based knowledge management (HSBKM) model (Santo, 2015). NKT has been developed based on the postulate that nature knowledge is the source and centre of consciousness and that human knowledge is essentially part of a nature knowledge continuum. Generated from NKT, the HSBKM model defines KM as the act of managing either personal or organizational consciousness as the attribute of knowledge. Such redefining of knowledge and KM, in the upstream science way, gives it an incredibly broad cosmic meaning.

In the end, one can be certain that whatever path KM may take in the future, it will live as long as there are people interested.

CONCLUSION

This paper portrays KM as a dynamic and constantly changing field. With respect to the KM past, the paper reveals that the infancy of the field was plagued by fragmentation. This was followed by a more mature stage characterised by a comprehensive integration of separate approaches into proactive practices. Beyond this, there was a notable tendency discovered towards the fusion of KM with other disciplines, with less emphasis on doing KM and more on exploiting KM for various business reasons.

However, exactly where the field will be moving from here is open for debate. While it is clear that KM is neither dead nor short of breath (based on the amount and diversity of research in the field being undertaken), it may be wise to be cautious about making concrete predictions as to what direction it will take in the future. This paper attempted to shed some light on the possible directions of the field by identifying extension, specialization and reconceptualization as three visible emerging trends. It is also possible that something else is going on, but remains undetected to date.

These findings have important implications for KM research and practice. For research, they show that the landscape of KM is quite varied and suggest that those who believe in KM should embrace these different notions under the "KM Conceptual Umbrella". The umbrella metaphor assumes that within its boundaries many themes, ideas, approaches and tools concerning knowledge can be addressed. Thus, KM may be in the vanguard of development at personal to global levels. These findings also warn KM practice of the danger that the field may completely disappear and organizations may forget what they knew about KM and fail to manage their knowledge for the benefit of their business. Contrary to some opinions that KM's disappearance would indicate its true success this paper recommends that the next KM generation should make sure that KM remains relevant.

Irrespective of whether KM regeneration or revolution will be the more likely scenario, it seems that interesting times lie ahead. However, such conclusions need to be interpreted with caution due to the current methodological limitations. The traditional literature review applied in this study has been criticized in recent literature because of a lack of rigour (Massaro et al. 2016b). Therefore, using a more rigorous structured literature review (SLR) is recommended as a way of potentially developing more robust and defensible future research agendas and questions.

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Abstract (in Polish)

W niniejszym artykule prześledzono zmiany w dziedzinie zarządzania wiedzą (ZW) na przestrzeni lat w oparciu o przegląd literatury i własne badania autorki. Artykuł zaczyna się od powrotu do początków ZW i odzwierciedla trzy istotne etapy ewolucyjne, nazywane fragmentacją, integracją i fuzją. Po tych refleksjach nad przeszłością ZW, artykuł spekuluje o możliwych ścieżkach przyszłości ZW. Określa on trzy pojawiające się tendencje zwane rozszerzeniem, specjalizacją i rekonstrukcją, które wskazują na kilka możliwych przyszłych scenariuszy rozwoju ZW. Pierwsze dwa dotyczą decentralizacji i regeneracji wcześniejszych interpretacji ZW, a trzecia tendencja wskazuje na następną rewolucyjną fazę ZW. Niezależnie od kierunku, jakim może podążyć ZW, dowody przedstawione w niniejszym artykule sugerują, że ZW ma przyszłość, chociaż nie jest ona pozbawiona wyzwań.

Słowa kluczowe*: zarządzanie wiedzą; ZW; Rozwój ZW; ZW w przeszłości; ZW w przyszłości.*

Biographical note

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A Knowledge Concept Map: Structured Concept Analysis from Systematic Literature Review

Philip Sisson[1] and Julie J.C.H. Ryan[2]

Abstract

The purpose of this article is to present a mental model of knowledge as a concept map as an input to knowledge management (KM) investigations. This article's extended knowledge concept map can serve as a resource where the investigation, development, or application of knowledge would be served with a broad mental model of knowledge. Previously unrelated concepts are related; knowledge concepts can sometimes be expressed as a range, i.e., certainty related states: view, opinion, sentiment, persuasion, belief, and conviction. Extrathesis is identified as a potential skill level higher than synthesis, and associated with the concepts: discovery, institution, insight (the event), revelation, or illumination that precedes innovation. Qualitative methods were used to gather and document concepts. System engineering and object analysis methods were applied to define and relate concepts. However, the theoretical sampling and theoretical saturation methods applied do not guarantee all appropriate concepts have been identified. Given the breadth, depth, and dimensionality of concepts of knowledge, later researchers may add additional concepts. This article provides evidence of additional things people know, an alternative to psychology's acquaintanceship, understanding and placement of newer categorizations of knowledge in relation to older ones, and suggests that ranges for knowledge terms exist. This article extends the 2015 paper on this topic by: 1) taking a deeper look into epistemological terms and relationships, 2) providing contextual definitions, 3) suggesting extrathesis as an idea beyond synthesis, 4) updating the concept map; and 5) providing new insight on the overloaded knows including adding an eleventh know. It provides a much more solid basis for KM investigations than typical presentations, providing a broad understanding of knowledge that is beneficial.

Keywords: *knowledge; concept map; knowledge concept map.*

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INTRODUCTION

Recurring themes that resonate in business, the media, and academia, affirm that we are in the "Age of Knowledge," that knowledge management (KM) is important, and that both individuals as well as organizations need to continually learn to improve their knowledge base to remain relevant. What tends to be glossed over in these discussions is the question of what knowledge is, and furthermore how to acquire it.

There are whole discourses in philosophy on what is knowledge which tend toward arcane arguments about justified true beliefs and how such beliefs might be formed. Operationalizing these philosophical concepts prove to be difficult, primarily because the philosophical debates are less about utility and more about theory. Thus, an increasing chasm between traditional philosophy and practitioners has developed.

Partitions of knowledge trace back to Aristotle's five virtues (techne, episteme, phronesis, sophia, and nous) (Parry, 2008). How-we-know breakdowns were explored in the 20th century (Stroll, 2013), although they trace back to 1 BC (Leff, 1983). Nichols (2000) summarized a KM perspective ("explicit, implicit, [and] tacit" and "declarative and procedural knowledge") (pp. 3-4). Holsapple and Joshi (2004) present a web of numerous knowledge attributes. The authors' developed knowledge concept map is important because it unloads overloaded terms about what we know, and relates the old and new "knows" to each other, as well as a wide list of previous unrelated, or poorly related, concepts, in a single visual.

As Stroll (2013) suggests, the article first "'[studies] uses of "knowledge" in everyday language;'" (the nature of knowledge, para. 3) - "by example, 'who, what, when, where, why, and how' (Pompper, 2005, p. 816)" (Sisson & Ryan, 2015, p. 1028). This article then looks at the antecedents of these forensic knows (Wilson & Ibrahim, 2011, p. 132) and moves on to the epistemological basis of some of them, identifying know-valid and know-basis in the process. Other concepts are developed by discussing epistemological beginnings, psychology's contributions, a deeper look into the "knows" of, and knowledge management (KM) contributions to knowledge categorization. "The presented concept map relates diverse concepts such as mental processes, reasoning, justification, Gardner's multiple intelligences, Bloom's Taxonomies, scales and measures of proficiency, and certainty, as well as other topics" (Sisson & Ryan, 2015, p. 1027). Putting management concepts in perspective to each other allows people to often see separately addressed subjects (such as validity and propositional states, Bloom's taxonomy, and competency terms like journeyman) in relation to each other, perhaps opening new ideas on how to use them.

Eleven "types of knowns ... plus subcategories for some of them are named" (Sisson & Ryan, 2015, p. 1028) permitting their use without term-concept overloading. Know-why now has the new tool Option Outlines™ available to document (Lewis, 2015b). Extrathesis is suggested as an idea beyond synthesis. As postulated, extrathesis could have profound implications in understanding knowledge creation (intuition), upon which significant innovation and subsequent entrepreneurship depends.

This article expands upon "What do we know – building a knowledge concept map" (Sisson & Ryan, 2015) verbatim, in much of the presented material with specific material quoted and cited, in block quotes, and, in some cases, new ideas are integrated with verbatim extracts. In the last case, the new material will be set off with brackets or italics. Minor changes in punctuation and grammar are not noted. Also, the choice of paragraph style is sometimes based on reducing the complexity of citation to improve readability.

METHODOLOGY

To address existing and new ideas about what we know, multiple methods were used following qualitative research, concept analysis (systems architecting), and systems thinking (Senge, Kleiner, Roberts, Ross & Smith, 1994) approaches. Qualitative approaches to explicating and categorizing the components of knowledge were iteratively applied in identifying and examining different knowledge concepts. The goal of the investigation is to create a mental model of knowledge that incorporates more knowledge related concepts in a single visual. Knowledge analyzed as an object (object analysis) (rather than as "a state of mind," an access condition, capability (Alavi & Leidner, 2001, p. 109), social action (Crane, 2013), or KM view of knowledge as a process (Serenko & Dumay, 2015, p. 410)) was selected as the dominant presentation method, although enabling action is shown.

The initial words selected "represent knowledge [terms, their] attributes, and related terms that were drawn from a list of over a thousand candidate KM [domain] terms" (Sisson & Ryan, 2015, p. 1028). They were the basis for further theoretical sampling. Identified concepts were informally coded, relationships were established, and then the concepts were distributed in the evolving concept map. Five basic attributes for knowledge were identified and subsequently extended to accommodate information technology oriented attributes, such as those identified in Holsapple and Joshi's (2004) web of knowledge attributes. New concepts such as influencers, and where knowledge is located (embodied, embrained, etc.), were positioned in the

map because the authors think ideas like these are important and needed to be addressed.

Knowledge valuation, knowledge as assets, and intellectual capital topics, are not specifically included. Redefinition and extension of the location terms by personal KM (PKM) researcher Schmitt (2015) were only noted, similarly with Lewis's (2015c) Symbiotic Table of Knowledge™. Both ideas merit mentioning but further consideration is not critical to this overall visualization.

The theoretical sampling and theoretical saturation methods applied do not guarantee all appropriate concepts have been identified. Given the breadth, depth, and dimensionality of concepts of knowledge, later researchers may add additional concepts.

LITERATURE REVIEW

The old knows and epistemological beginnings

> Knowledge [, understanding,] ... enables capability for action (Peter F. Drucker in The New Realities, cited by Stankosky, 2003). Enabling action traces back to Aristotle's téchné leading to poiesis and phrónésis leading to praxis – action [(Marquardt, 2002; Schwartz, 2011)]. ... It is represented in "facts (including generalizations) and concepts" (Gregory, 2004, knowledge) and in people is "the psychological result of perception and learning and remembering" (Thinkmap, 2012-2017, knowledge) (Sisson & Ryan, 2015, p. 1028).

Knowledge as representations of the knows resides in many artifacts. It is fairly easy to see hunters shooting deer with arrows in the Lascaux Cave Hunting Painting – know-how. Observers can see a picture of Capistrano with the swallows arriving, and as a result know that birds return annually, but; we do not know what birds visualize (if it is visual) (know-where). The picture could also represent know-when to people. Perhaps the Ankh is an unremembered map to the Garden of Eden (Sisson, personal communication, 2014); see Figure 1. Whether the Lascaux Cave painting is meant to represent know-what or know-how, if the picture of swallows generates a recognition of know-where, or if the Ankh was first a map to the garden of Eden—not a "sacred emblem symbolizing life" (Darvill, 2008, ankh; Merriam-Webster, 2013-2017, ankh), fertility (Ankh, 2016), or a key to "the gates of death onto immortality" (Magalis, 2005, p. 5116)— is in the mind of the observer.

(Ankh, 2016)

Photograph of a TV screen during a PBS program on ancient rivers, circa 2012 (L. H. Sisson, personal communication, 2014).

The left graphic is one of many images of an Ankh. On the right, the photograph of a TV screen shows a hypothesized location of Eden and the location of rivers at that time. Notice that the shape of the rivers is similar to the shape represented in the Ankh on the left (L. H. Sisson, personal communication, 2014).

Note: sources as indicated.

Figure 1. The Ankh as a potential map to the Garden of Eden

The earliest writings of humankind also reveal an interest in understanding how we know. One of the first documented knowledge managers was Imhotep, a famous intellectual and architect of Egypt, living in the 27th century BCE. He was known for his organization and harnessing of knowledge in areas as diverse as medicine, architecture, and agriculture (*Encyclopaedia Britannica academic*, 2012-2016, Imhotep). One of the most famous early philosophers, Sun Tzu, who lived in the 5th (Li, 2012, p. 437) or 4th century BCE, applied the lessons of knowledge management to warfare (Bellamy, 2001, Sun-Tzu) and is widely quoted to this day (The Sonshi Group, 2015). The Greeks developed the concept of the Academy (Kidd, 2006, p. 171) to explore knowledge, in the fourth century BCE, producing scholars such as Plato. It is from the latter that we get many of the concepts upon which the current philosophy of knowledge discourse is founded.

> Aristotle presented "five virtues of thought" (Téchné, Phrónésis, Noûs, Epistémé, and Sophía) which can be mapped to know-how, experience, intuition, truth (know-that) (Schwartz, 2011, pp. 40, 42-45) and basic truths (theoretical wisdom) (Feldman & Ferrari, 2005, p. 485). Accepting Plato's definition of knowledge as a "justified true belief," (Blackburn, 2008 (2016), p. 270, Gettier examples; Conee & Feldman, 2006) reveals a need for validity (know-valid as something one knows) and raises the idea of how one knows it is justified (know-basis).
>
> Over the millennium other philosophers have investigated knowledge resulting in suggestions of what [it] is and claims by

> others [of what] it is not. "Much of epistemology has arisen either in defense of, or in opposition to, various forms of skepticism" (Klein, 2014, Skepticism; Sisson & Ryan, 2015, pp. 1028-1029).

Table 1 summarizes the authors' perception of general relationships between some of these epistemological viewpoints, followed by Table 2 with stipulated definitions (as explanations).

Know-that, who, when, where, why, and how "have been explored in detail, especially since the beginning of the 20th century" (Stroll, 2013, epistemology). Most of these terms match Hermagoras of Temnos's (1 BC) list of "a constellation of circumstances" … "often expressed in the form of … questions" (Leff, 1983, pp. 28-29). The terms are common to news writing (forensic or straight news) (Pompper, 2005, p. 816)) and in criminal investigations as "situational based explanations" (Wilson & Ibrahim, 2011, pp. 130-132; Sisson & Ryan, 2015, p. 1028).

Thus, in modern terms, we find ourselves discussing the same issues plaguing the ancients. Today, however, we are in the context of a technological underpinning that has revolutionized the development, communication, and archiving of that which feeds knowledge: information.

Psychology contributions

Histories of psychology and philosophy began to diverge in the mid-nineteenth century, when "psychologists came to regard themselves as engaged in a fully fledged science" (Heil, 2005, epistemology and psychology). "Psychology acknowledges three categories of knowledge: declarative knowledge, procedural knowledge, and acquaintanceship knowledge. Declarative and procedural knowledge relate respectively to know-that and know-how (Colman, 2009-2016, declarative knowledge and procedural knowledge)" (Sisson & Ryan, 2015, p. 1029).

Acquaintanceship knowledge is knowledge of "people, places, and things." and "This class of knowledge was discussed by the Welsh philosopher Bertrand (Arthur William) Russell (1872–1970) in *The Problems of Philosophy* (1912) and is poorly understood in psychology" (Colman, 2009-2016, acquaintanceship knowledge). However, Thomas Nagel's example of "a bat's knowing what it was like to experience its echo-locatory senses as an example of consciousness" (Van Gulick, 2011, concepts of consciousness, section 2, para. 5) suggests another term: know-like. Dancers also know-like in how they move (Sisson & Ryan, 2015, p. 1028). Those examples fit in with Russell's "knowledge by acquaintance is 'what we derive from sense'" (Russell per Gregory, 2004, knowledge by acquaintance, and knowledge by description) and may be a missed opportunity to understand acquaintanceship better in terms of know-like (Sisson & Ryan, 2015, p. 1032).

Table 1. Summary of relationships in selected epistemological viewpoints

Mental (Sensory Induced)				Non-Mental (Observed in Actions)	
Occurrent (Aware of)				Dispositional (Shown in Behavior)	
Basis					
Perceived, Sense Experience				Innate [A]	Hypothesized
Empiricism				Rationalism	
A posteriori; Observation (including introspection, feelings [B]), experiments [C], or experience [D]. Acquired through sense-data [E].				a priori [F] (incl./ intuition [G])	Reasoning [H] (Thinking, reflection, etc.)
Creation					
Sources			Inference		
Revela-tion	Intuition	Gener-ate [J]	Induction		Deduction
Devine disclosure	Rational insight [K]		Cause to effect	Effect to cause	
			From premises	From observations (facts)	
			"particular to general" [L]	"particularizing from the general" [M]	
Justification					
Evidence			(logical propositions)		Reliabilism
Certainty / Certitude					
Skepticism					
Adapted based on the Indiana Philosophy Ontology Project (InPhOrmers, 2014)					

[A] (Brown, 2005, innate ideas). [B] (Pike, 2005, p. 2778). [C] (Colman, 2009-2016, empirical). [D] (Colman, 2009-2016, a posteriori; Heery & Noon, 2008, empiricism). [E] (Lacey, 2005a, empiricism). [F] (Brown, 2005, innate ideas). [G] (Lacey, 2005b, rationalism). [H] Lewis (2013) assets there are only 8 Degrees of Reason™ (p. 143). [J] Including mash-ups, artificial smartness (Foxwell, 2013; Kelly, 2014a, 3. Better Algorithms, para. 10; 2014b, When and Where ... , para. 7). [K] (Markie, 2013 1.1 Rationalism, para. 2). [L] (Cohen, 2005, induction). "Another name for this is 'generalization from the particular'" (Last, 2007, induction; J. Tiles, 2004). [M] (Last, 2007, deductive reasoning).

Psychologist's broader interests include "behaviour and mental experience" (Colman, 2009-2016, psychology). The elements of mental and cognitive processes under review in the literature sometimes list different elements. For this article, mental processes mean cognition (thinking) processes, "affect (emotion)" states, "conation or volition (striving)" factors (Scott & Marshall, 2009-2015, cognition (cognitive)), and sensing processes - "whether conscious or unconscious" (Chandler & Munday, 2011, cognition (cognitive processes)). Figure 2 shows these as inputs to understanding/ knowledge. They are positioned in the upper left corner of the knowledge concept map. Volition factors and affective states influence knowledge "creation" as an entity's knowledge influences an individual's perception

and mental processes (Bennet, Bennet & Avedisian, 2015, p. 1; Schwandt & Marquardt, 2000, p. 734). Schwandt's Organizational Learning Systems Model contains similar ideas (Schwandt & Marquardt, 2000); see upper right, left of legend.

Table 2. Explanation of epistemologically related terms

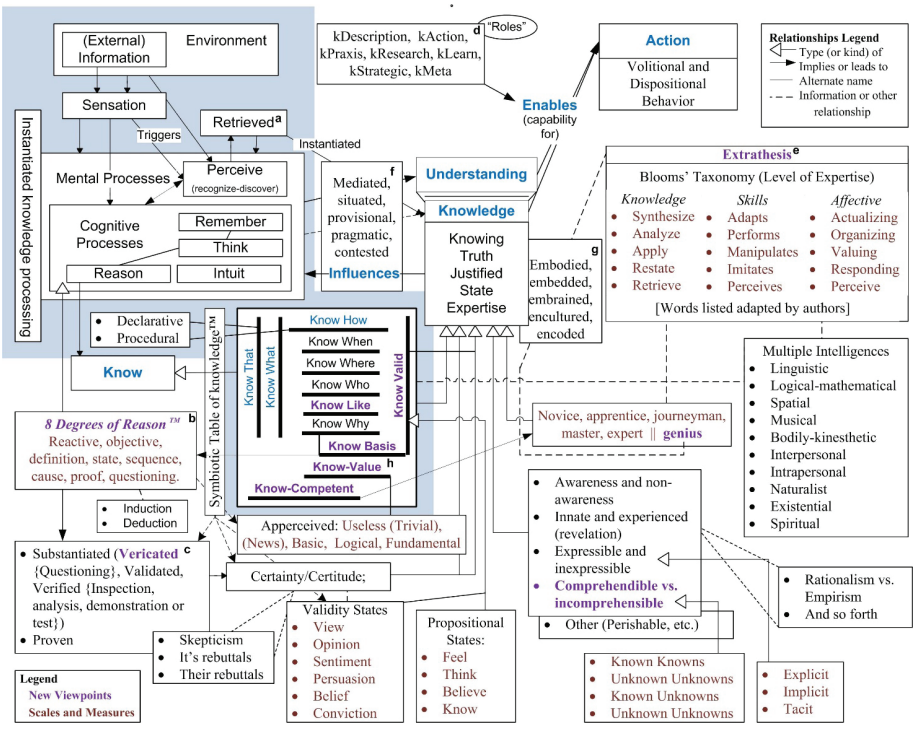
Term	Definition, Example, Perspective or Historical Source		
Acquired	"All human knowledge is derived from experience" (Quinton, Quinton, & Fumerton, 2013).	Experience	John Locke (1632-1704); B.F. Skinner (1904–90)
A Priori [A]	"Independent of experience;" [B] reasoned from axioms (Oxford English Dictionary, 2011-2017, a posteriori).	Innate; [C] Intuited; Logical	Albert Of Saxony (1316-1390); Immanuel Kant (1724–1804); …
A Posteriori	Reasoned "from effects to causes, from experience and not from axioms" (Oxford English Dictionary, 2011-2017, a posteriori).	Observation; Experiential (phrónésis)	
Behavior	"Behavior refers ... to easily observable activities" (Doorey, 2004, p. 3275). According to Collins (1993), "behavior-specific action is decontextualizable. It is the only form of action which is not essentially situated" (p. 108).		
Certainty	Indubitability (Reed, 2011, 2. Conceptions of certainty, para. 2) "Knowledge is radically different from certitude and neither concept entails the other" (Referencing Wittgenstein, Stroll, 2013, Knowledge and Certainty, para. 4).	Certitude	Ludwig Wittgenstein (1889-1951)
Certainty / Certitude	Certainty/certitude "imply the absence of doubt about the truth of something" - certainty with evidence; certitude, conviction, perhaps purely on belief (Allen, 2008, certainty, certitude).		
Constructionism	Knowledge (meaning) is constructed (Bodner, 1986; Lowenthal & Muth, 2008).		
Declarative Knowledge	"Awareness and understanding of factual information about the world—*knowing that* in contrast to *knowing how*" (Colman, 2009-2016, declarative knowledge).		
Description	"What kinds of mental content, if any, ought to count as knowledge" (Husserl per Stroll, 2013, Description and Justification, para. 2). "Descriptions focus on 'a single thing' (What is it?)" (Whetten & Rodgers, 2013, p. 850)		1858-1989
Dispositional	"Dispositional knowledge, as the term suggests, is a disposition, or a propensity, to behave in certain ways in certain conditions" (Stroll, 2013, Occasional ...).		Behavior

Term	Definition, Example, Perspective or Historical Source		
Empiricism (knowledge sources)	"All knowledge is based on experience derived from the senses" (Stevenson, 2010-2017, empiricism).	Sensed; Perceptions	Hume, Locke, Mill (Buchanan, 2010-2016, empiricism) (1632-1873)
[A] "In strict philosophical usage, an a priori truth must be knowable independently of all experience" (J. E. Tiles, 2004). [B] Kant according to Casullo (2006). [C] "By some metaphysicians used for: Prior to experience; innate in the mind" (Oxford English Dictionary, 2011-2017, a priori, 3.).			
Empiricism	In philosophy, "[empiricism is] the theory that all knowledge is based on experience derived from the senses" (Stevenson, 2010-2017, empiricism); "direct observation, experiments, or experience" (Heery & Noon, 2008, empiricism). "Knowledge, or the materials from which it is constructed, [is based] on experience through the traditional five senses" (Lacey, 2005a, empiricism); through "experience, which involves two logical levels, sensation and reflection" (Darity, 2008, p. 578).		
Evidence	In this article, evidence is "something that furnishes or tends to furnish proof;" "an outward sign: indication, token" (Merriam-Webster, 2013-2017, evidence, 1b & 1a).		
Experience	In this article, experience is "the sum total of the conscious events that make up an individual life" (Merriam-Webster, 2013-2017, experience, 5. a) and "the events that make up the conscious past of a community or nation or humankind generally" (Merriam-Webster, 2012-2016, experience, 3. b.).		
Inference	Inference can be seen as the process, "premises and conclusion that represent a process of inferring or that form the determinants of a belief" (Merriam-Webster, 2013-2017, inference, 3).		
Innate	"Present in the mind, in some sense, from birth" (Stroll, 2013, innate and acquired knowledge).	Plato (428/427-348/347 BCE); Descartes (1596-1650); Noam Chomsky (1928-)	
	Innate knowledge is "an idea that is inborn, rather than being learned through experience" (Colman, 2009-2016, innate idea) (Blackburn, 2008 (2016), innate ideas); "ideas that exist in the mind without having been derived from previous experience" (Brown, 2005).		
Intuition	"In philosophy, [intuition is] the power of obtaining knowledge that cannot be acquired either by inference or observation, by reason or experience" (Encyclopaedia Britannica Academic, 2012-2016, Intuition).		
Justify	In this article, to justify is to "show to be reasonable or provide adequate ground for;" "show to be right by providing justification or proof" (Thinkmap, 2012-2017, justify).		
Justification	"What kinds of belief (if any) can be rationally justified" ... "what one ought ideally to believe" (Stroll, 2013. description and justification, para. 3).		
Knowledge	"Justified true belief" (Blackburn, 2008 (2016), Gettier examples); "(1) if A knows that p, then p is true, and (2) if A knows that p, then A cannot be mistaken; ..." (Stroll, 2013skepticism, para. 3).		

Term	Definition, Example, Perspective or Historical Source
Mental State and Knowing	"Knowledge is a state of mind" (awareness). "Knowing is a mental state akin to, but different from, believing" (Stroll, 2013, Mental and Non-mental ... , para. 1). Awareness Plato (c. 427-c. 347 BC)
Perceived	In psychology, perception is "the process or product of organizing and interpreting sensations (sensory data from external objects or events) into meaningful patterns" (Chandler & Munday, 2011, perception (perceiving)). "Perception depends upon the sense organs possessed by the animal, and the interpretation that is placed upon incoming sensations by the brain" (McFarland, 2006, perception).
Procedural Knowledge	"Information about how to carry out sequences of operations—*knowing how* in contrast to *knowing that"* (Colman, 2009-2016, procedural knowledge).
Mental Processes	For this article, mental processes are cognition (thinking) processes, volition factors, and affective states (Scott & Marshall, 2009-2015, cognition (cognitive)), and sensing processes.
Nonmental conditions	"Knowing is tied to the capacity to behave in certain way" (Stroll, 2013, Mental and Nonmental, para. 3). As observed in actions (behavior) Wittgenstein (1889–1951)
Occurrent	"Knowledge of which one is currently aware" (Stroll, 2013, Occasional ...). Awareness
Rationalism	"The ultimate source of human knowledge is the faculty of reason" (Stroll, 2013, Rationalism and Empiricism). Reason (Thinking) Descartes, Spinoza, Von Leibniz (1596-1716)
	In philosophy, rationalism is "the doctrine or theory that emphasizes the role of reason in knowledge, or claims that reason rather than sense experience is the foundation of certainty in knowledge" (Oxford English Dictionary, 2011-2017, rationalism, 2. a.).
Reliabilism	Reliabilism is, "in traditional epistemology, what makes a belief justified, being a matter of the believer's rationality and responsibility, must lie within his 'cognitive grasp'. That is, for a belief to be justified the believer must be aware of what makes it justified" (Bach, 2005).
Revelation	Revelation is "the divine or supernatural disclosure to humans of something relating to human existence" (Stevenson, 2010-2017, revelation, 2.).
Skepticism	"Skepticism in philosophy refers to the principle that all knowledge, whether sensory or conceptual, is subject to the limitations of the human mind and, thus, unreliable" (Reines, 2007, p. 657). "Scepticism is now the denial that knowledge or even rational belief is possible" (Blackburn, 2008 (2016), scepticism).
Volitional (Conation)	Conation and volition represent "intentional mental occurrence[s]" (Ginet, 2006, p. 704) leading to a "conscious adoption by an individual of a line of action." (Kent, 2007-2016, volition) Shown in Behavior

Historical annotations based on Encyclopedia Britannica Academic epistemology articles, primarily (Stroll, 2013).

These ideas lead "to concepts of sensation [(know-like)], perception, remember/retrieve/recognition/recall (Marzano & Kendall, 2007, kindle 828-839, Level 1: Retrieval), think, intuit, reason and know. Know-like is revealed in terms of experiential consciousness (like a bat's echo-locatory senses) (Van Gulick, 2011 2.1)" (Sisson & Ryan, 2015, p. 1029). The concept map differentiates know-that (description) from know-what (an understanding) and displays nine knows (plus know-why (basis)) showing when, where, why, who, like, and why can be clarifiers of how. In the knowledge concept map, the knows are positioned left and below the knowledge box shown in Figure 2.



Notes: a) (Marzano & Kendall, 2007). b) Adapted from (Lewis, 2013). c) (Bennet & Porter, 2003, p. 477). d) (Bennet & Bennet, 2008, pp. 410-412). e) (Ryan, Dirienzo, Noteboom & Sisson, 2015). f) (Blackler, 1995, pp. 1040-1042). g) (Omotayo, 2015, p. 5). h) (Anonymous, 2017).

Figure 2. Location of mental processes and the eleven knows in the concept map highlighted

Source: updated graphic from Sisson & Ryan (2015, p. 1030).

Epistemological expertise is know-how – "knowledge of how to do some particular thing; skill, expertise, esp. in regard to a practical or technical matter" (Oxford English Dictionary, 2011-2017, know-how). "More recently, Bloom's Taxonomy (Atherton, 2013; Krathwohl, 2002; [Krathwohl, Bloom & Masia, 1964]) was developed to help with setting educational objectives that show [an individual's] acquisition of knowledge and skills. The levels in Bloom's three taxonomies can also be viewed as proficiency in cognitive, kinesthetic, and affective capabilities;" perhaps in another respect, kinds of human knowledge that are respectively often named (cognitive), partly named (or macro specified: throw a ball - psychomotor), or gross categorizations (feelings - affective). "Marzano and Kendall (2007) and Fink (2013) address adaptions and extensions of Bloom with an educating, rather than educational, objectives focus." (Sisson & Ryan, 2015, pp. 1030-1031).

"The medieval guild terms apprentice, journeyman and master speak to levels of competence (Dreyfus & Dreyfus, 2005)." Ubiquity staff (2005) states, "we do think of expertise as following along a continuum from novice through apprentice, and then journeyman and master." (Sisson & Ryan, 2015, p. 1030) Dreyfus and Dreyfus (2005), however, list five stages: novice, advanced beginner, competence, proficiency, expertise (expert) (pp. 782-788). Wiig's KM "model-degrees of internalization" (novice, beginner, competent, expert, master) (Dalkir, 2011, kindle location 0933), reverses the order of Dreyfus' labels of expert and master.

The Ryan Research Group suggests that there might be a competence beyond master or expert and a competency level greater than Bloom's synthesis addressing going beyond, extrapolating outside the expert's traditional domain (J. Ryan, J.C.H., Thomas Dirienzo, Anna Noteboom, and Philip Sisson. Ryan Research Group - discussion, spring semester, 2015). Extrathesis is postulated. It results in enlightenment, which in this context is "a state of greater knowledge, understanding, or insight" (Oxford English Dictionary, 2011-2017, enlightenment, 1. a.), not wisdom. Extrathesis has aspects of deep smarts (Brockmöller, 2008; Leonard & Swap, 2004, p. 55; Ubiquity staff, 2005) (knowledge), deep rationality (Ryan, 2014, section 5), and extraordinary consciousness (Bennet & Bennet, 2011; Bennet, Bennet & Avedisian, 2015) to see "the overarching pattern" (Bennet & Bennet, 2011, p. 12). However, these terms, collectively, are probably more loosely related than truly descriptive of extrathesis. Additionally, the referenced articles attribute them to the domain of the expert and extrathesis, as envisioned, is not limited by the need for high level expertise. The second component ("analytical, creativity, and practical") of "Sternberg's Successful Intelligence Theory", creativity, needs to be looked at with respect to extrathesis as well (Ruban & Cantu, 2005, pp. 866-867). Gardner's ideas of a "broadly scanning

mental searchlight" (Waterhouse, 2013, p. 542) is also interesting. Genius (extraordinary, manifested creative or original activity (Merriam-Webster, 2013-2017, genius, 4b)) is a strawman word to express an individual's competency associated with this concept. In the concept map, genius is shown with, but not as an extension of, the master, expert sequence. (Figure 3 shows where expertise levels, Bloom's Taxonomy, and Gardner's multiple intelligences are positioned in the knowledge concept map.)

Gardner's postulated multiple intelligences ("linguistic, musical, logical-mathematical, spatial, bodily-kinesthetic, interpersonal, and intrapersonal," naturalist, and existential intelligence (Nuzzi, 2010, p. 583) and spiritual intelligence – the last rejected by Gardner (Gardner, 2000)). Spiritual intelligence is "able … to make sense out of the 'ultimate' concerns of human beings, such as the meaning of life and death, or the puzzle of the existence of single individuals in a vast and empty universe" (Plucker & Esping, 2014, p. 557). "Spiritual intelligence calls for multiple ways of knowing, and for the integration of the inner life of mind and spirit with the outer life of work in the world" (Vaughan, 2002, summary).

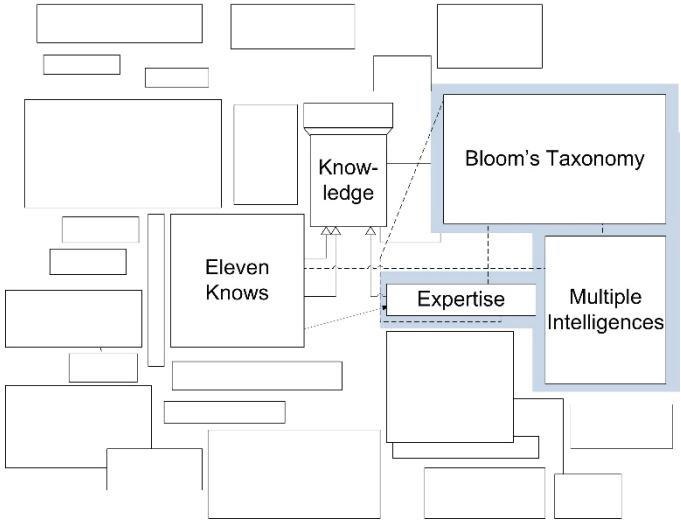


Figure 3. Location of expertise levels, Bloom's Taxonomy of Educational objectives, and Gardner's multiple intelligences in concept map

Source: updated extract (Sisson & Ryan, 2015, p. 1030).

However, "somewhat to [Gardner's] surprise, 'existential intelligence' qualifies well as an intelligence in light of the eight criteria that [he has] set forth in [his] writings (Gardner, 1993, chap. 4)" (Gardner, 2000, p. 29). For Gardner, "intelligence permits an individual to solve problems and create

products that are of value within a cultural context" (Ruban & Cantu, 2005, p. 866). "Neuroscience research has not validated [the idea of] multiple intelligences. ... researchers ... have noted that no neuroscience research had tested the theory of multiple intelligences and that neuroscience research had disconfirmed the existence of the putative separate content processing modules in the brain" (Waterhouse, 2013, p. 543). Regardless, Gardner's ideas are still useful in thinking about knowledge. Österberg (2004) separates Gardner's intelligences as "abilities that explain" "'knowing that' or 'knowing how'" (p. 147); notwithstanding, the authors believe that the general relationships shown in Figure 3 are better from a knowledge mental model perspective. In the concept map, "multiple intelligences are shown as related to the [eleven] knows in terms of what each of the intelligences can know and to Bloom's taxonomy as indicators of proficiency in the intelligences" (Sisson & Ryan, 2015, p. 1031).

DISCUSSION AND FINDINGS

The Knows

"Know-that and know-how trace back to Epistémé and Téchné" (Sisson & Ryan, 2015, p. 1029). Epistémé is know-that (Fantl, 2012), truth/reality. In this context, truth is "the Greek notion of truth as 'correspondence with reality'" (Schwarzschild, 2007, p. 162). Sophía is basic truths/theoretical wisdom. Both come from "Theoria - the production of truth" (Calhoun, 2002, praxis). For this article, they are viewed as know-that in terms of the knows. Ein-Dor (2011), in his "*Taxonomies of Knowledge,*" discusses know-about ("what drug is appropriate for an illness") as an example of declarative knowledge, but the term is not added as a separate row category in table 3, since it is a statement of fact, know-that. He places "tacit-explicit, individual-social, procedural-declarative, commonsense-expert, and task-contextual" as opposing dimensions (see his figure 1, p. 1497). In the discussion, he also lists categories: "Procedural: Know-how," "Causal: Know-why," "Conditional: Know-when," and "Relational: Know-with." Ein-Dor excludes three "the categories recognized in (Alavi & Leidner, 2001, p. 113) ... conditional, relational, and pragmatic" as "not generally recognized as basic dimensions of knowledge." (Ein-Dor, 2011, pp. 1491-1499).

Blackler (1995), however, in categorizing knowledge ties know-that from Ryles (1949) and know-about from James (1950) together, but in terms of "conceptual skills and cognitive abilities." Similarly, Blackler ascribes embodied, action oriented, partly explicit knowledge to Ryles (know-how) and James (knowledge of acquaintance) (pp. 1035, 1023-1024). In looking at

knowing as an activity state, Blackler (1995) brings out knowing as mediated [constantly changing], situated [interpreted within contexts], provisional [and developing], pragmatic [driven by conceptions], and contested (pp. 1040-1042). This group of terms in the knowledge concept map resides in the area from mental processes, leading to understanding, and supports the idea that knowledge is constructed each time it is used (Bodner, 1986; Lowenthal & Muth, 2008).

Conditional is shown as a subcategory of know-when in this article's model because of its time implication. Relational is included in this article's model as connectivity ("cause-and-effect" – know-why (Fink & Disterer, 2011, p. 651). Pragmatic knowledge, mentioned as "useful knowledge for an organization," (Alavi & Leidner, 2001, p. 113; Ein-Dor, 2011, table, p. 1492) is relevance in Table 3. Know-with may be a category of know-how. It also has connotations of connectivity already included in know-why (Ein-Dor, 2011, pp. 1492, 1496-1497). "Holsapple and Joshi (2004, pp. 597-598) use many of the same words as Ein-Dor." Their "web of knowledge attributes" are mode: tact, explicit; type: reasoning, procedural, descriptive; perishability: none, rapid; accessibility: public, private; applicability: local, global; immediacy: actionable, latent; orientation: domain, relational, self (p. 598, figure 596). "Their perspective seems more knowledge as represented in information systems oriented and revealed no new knows;" although, the web of knowledge and knowledge dimensions are alluded to in the knowledge concept map as "other" differentiators of knowledge's state attribute. (Sisson & Ryan, 2015, p. 1029).

Like know-how, "know-what partly comes from Hermagoras ('what resources? (quibus adminculis)') (Leff, 1983, pp. 28-29); on the other hand, know-what is sometimes used to mean 'clear recognition of the objective of a selected course of action' (Merriam-Webster, 2013-2017, know-what) or 'knowing which information is needed' (Marquardt, 2002, pp. 141-142)" (Sisson & Ryan, 2015, p. 1029). From an organizational learning perspective, Marquardt (2002) also stipulates for organizational learning: 1) "'Know how:' Knowing how information must be processed." 2) "'Know why:' Knowing why certain information is needed." 3) "'Know where:' Knowing where to find certain specific information." 4) "'Know when:' Knowing when certain information is needed" (pp. 141-142). "This [paper pictures] know-what as being able to have a mental image of a situation – an understanding" (Sisson & Ryan, 2015, p. 1029).

Table 3. What we know – the knows

Type of knowing	Sources	Definition, example, or source
Know-that	Epistémé Psychology	"Seems to denote the possession of specific pieces of information, and the person who has knowledge of this sort generally can convey it to others" (Martinich & Stroll, 2013. The nature of knowledge, para. 3); declarative knowledge (Colman, 2009-2016, knowledge).
Know-what	Greeks	Know-what is "structural knowledge, patterns" (Charles Savage per Green, 2005, slide 16); "something imagined or pictured in the mind" (Merriam-Webster, 2011-2016, concept, 2.).
Recitability of facts	Straight News	Capability to mentally identify supposed facts - "five W's and H (who, what, when, where, why, and how)" (Pompper, 2005, p. 816).
	Hermagoras	"With what resources?" (Leff, 1983, pp. 28-29).
Resources Objective	Dictionary	"Of a selected course of action" (Merriam-Webster, 2013-2017, know-what); "knowing which information is needed" (Marquardt, 2002, pp. 141-142).
Know-who	Greeks	Know-who is knowledge about "a person, indefinitely or abstractly; a 'some one'" (Oxford English Dictionary, 2011-2017, who, III. 14. b.).
Know-where	Greeks	Know-where is "a sense of place;" do/did something (Charles Savage per Green, 2005, slide 16); "where to find" (Kazmer, 2002, p. 426; Marquardt, 2002, pp. 141-142); "at this time; now" (Thinkmap, 2012-2017, where, adverbs) (present) extrapolated to include past and future.
Know-when	Greeks	Know-when is time, "a sense of timing" (Altheide & Snow, 1979, p. 35; Charles Savage per Green, 2005, slide 16) "the time in which something is done or comes about" (Merriam-Webster, 2012-2016, when, Main Entry: when, 1616); is needed (Marquardt, 2002, pp. 141-142); occurs or occurred.
Conditional	Research	"When to prescribe the drug" (Alavi & Leidner, 2001, p. 113; Ein-Dor, 2011, p. 1492).
Know-why	Greeks	Know-why provides rationale (D. Fink & Disterer, 2011, p. 651); "for what reason" (Merriam-Webster, 2013-2017, wherefore) (Lewis, 2015c); wider context (Charles Savage per Green, 2005, slide 16).
Motivation	Volition / Connation	Know-why (motivation) is what triggered the action or inaction.
Relevance	Leadership / KM /	Know—why (relevance) is external; pragmatic (Ein-Dor, 2011, p. 1492).
Connectivity	Research	Know—why (connectivity): "cause-and-effect relationships" (Fink & Disterer, 2011, p. 651); "relational: know-with" (Ein-Dor, 2011, p. 1492).
Basis	Justification (Aristotle)	Know-why (basis) is the rationale used for justification; "within [one's] 'cognitive grasp'" (Blackburn, 2008 (2016), scepticism) by accepting authority or using another one of Lewis's 8 Degrees of Reason™ (Lewis, 2015a).
Know-how	Téchné	Know-how is "knowledge of how to do some particular thing; skill, expertise" (Oxford English Dictionary, 2011-2017, know-how).
Know-competent	Medieval Guilds	Knowledge of personal and others (general) level of expertise.

Type of knowing	Sources	Definition, example, or source
Know-like	Sensation (Nagel)	Know-like is experiential awareness (acquaintanceship knowledge); familiarity.
Familiarity	Acquaintanceship	"The state of being well known: the familiarity of the scene" (Australian Oxford Dictionary, 2004, familiarity).
Sensation	Consciousness	From the senses.
Feelings	Affective Domain	"A feeling can be almost any subjective reaction or state" (Waite, Lindberg & Zimmer, 2008. emotion)
Categorization	Gardner	Naturalist Intelligence: discriminating and classifying (Colman, 2009-2016, multiple intelligences; Nuzzi, 2010, p. 585); (not just "found in nature" per (Nuzzi, 2010).
Perception (potential)	Gardner, Primal	From Gardner's spiritual intelligence classification (Colman, 2009-2016, multiple intelligences), chakra (Maxwell, 2009), and paranormal (Gustavsson, 2014, 7. Other Philosophical Work, para 4) feeling.
Know-valid	Aristotle	Know-valid is knowing that is "something that is true" (enough/verisimilitude versus verity (Merriam-Webster, 2013-2017. veracity, truth)); the veracity (Bennet & Porter, 2003, p. 477) (or level of veracity).
Know-value	Economic Knowledge	Know-value is being able to assess at least a relative value of the knowledge. Derived from the idea of economic knowledge (Anonymous Reviewer, 2017)

> Know-who, know-where and know-when also come from Hermagoras. ... Know-where is more than just a sense of place, it can be a sense of when something was done (the past) or might need to be done (the future). Know-when is obviously time, "a sense of timing" (Altheide & Snow, 1979, p. 35; Charles Savage per Green, 2005, slide 16) or with regards to a conditional (Alavi & Leidner, 2001, p. 113; Ein-Dor, 2011, p. 1492).
>
> Know-why, the last of the 5Ws in news reporting, overall addresses rational. From [a] professional knowledge [perspective,] it is "cause-and-effect relationships" (Fink & Disterer, 2011, p. 651) or relational (Ein-Dor, 2011, p. 1492) (also connectivity). *Citing Quinn, Anderson, and Finkelstein (1996), D. Fink and Disterer (2011) mention care-why (in terms of creativity) which includes "will, motivation, and adaptability for success" (p. 651 & 652). Dalkir (2011) lists care-why along with "expertise, know-how, [and] know-why" in the third category of tacit properties (, kindle, location 234). L. D. Fink (2013, pp. 3, 5, and 6) has caring as one of her six categories for significant learning. For this article's authors, care-why is more volitional or attitudinal than a type of knowing. The authors view* motivational rationale ... as entity specific with relevance more often institutional. *Adaptability is something exhibited, not something known. Knowing why-valid* [and] *know-basis,* leads to [Lewis's asserted, only] 8 Degrees of Reason™. (Lewis, 2012, pp. 113-174; Sisson & Ryan, 2015, p. 1029).

Lewis defines "learning as 'the gaining of knowing, satisfied with some degree of reason.'" For Lewis, reasoning is a conglomeration of categories, such as how or why it is done, i.e. "what is automatic," "what should be done," or "what one thinks from." (Lewis, 2015a) For this article's knowledge concept map, reason is why. These are several kinds of why – motivation, relevance, connectivity, and basis (see Table 3). Some of these map directly to Lewis, others do not. "Lewis dives deep into why with a more exhaustive viewpoint" (Sisson & Ryan, 2015, p. 1029) (Lewis, 2013, pp. 143-208; 2015a; 2015b; 2015c)

"When talking about know-why it would be good to qualify it [unless the usage is clear as] know-why (basis), know-why (motivation), know-why (relevance) or know-why (connectivity)" (Sisson & Ryan, 2015, p. 1029).

> Know-like was recognized as a category related to [psychology's] acquaintanceship knowledge – "knowledge of people, places, and things, *and although [acquaintanceship knowledge] may include declarative knowledge it need not necessarily do so, as when one knows a colour, or a smell, or a face, but cannot state any facts about it"* (Colman, 2009-2016, acquaintanceship knowledge). (Sisson & Ryan, 2015, p. 1029).

> *The acquaintanceship* distinction was made by Bertrand Russell. ... Knowledge by acquaintance is "what we derive from sense", which does not imply "even the smallest 'knowledge about"', i.e. it does not imply knowledge of any proposition concerning the object with which we are acquainted. For Russell, knowledge is primarily - and all knowledge depends upon - the "knowledge by acquaintance of sensations." ... More recently, theories of perception have blurred Russell's distinction by suggesting that there is no *direct* knowledge by the senses, but that perceptions are essentially descriptions (though by brain states rather than language) of the object world. This follows from the view that perception is knowledge based and depends upon (unconscious) inference, as suggested in the 19th century by Hermann von Helmholtz and now very generally, if not quite always, accepted. (Per Russell, 1914, Gregory, 2004, knowledge by acquaintance, and knowledge by description)

"Familiarity, sensation, and feelings [ideas] resonate well with the concept of [know-like]" (Sisson & Ryan, 2015, p. 1029), but are fundamentally different. Thinking about Gardner's naturalist intelligence as an object related intelligence (Nuzzi, 2010, p. 584) brings out the idea of categorization as a category of know-like. Also listed as a potential know-like category,

is perception from Gardner's spiritual intelligence (Colman, 2009-2016, multiple intelligences).

"Know-valid addresses the [level] of internal certainty or certitude – view, opinion, sentiment, persuasion, belief, conviction (Merriam-Webster, 2013-2017, opinion, Synonym Discussion; Merriam-Webster, 2012-2016, opinion)"[3] (Sisson & Ryan, 2015, p. 1029). Stroll (2013) cites Plato in that "knowing is one member of a group of mental states that," according to current theory, "can be arranged in a series according to increasing certitude" (Mental and Nonmental, para. 1). The authors' preferences are reflected in the concept map by propositional states such as feel, think, believe, and know (Atkinson, 2015, para. 3). Perhaps religious scholars would reverse the order of believe and know.

"Know-competent comes from the Medieval Guilds and Bloom's Taxonomies – [the first] as indicators of competence and [the second educational objectives that can be interpreted] as levels of expertise" (Sisson & Ryan, 2015, p. 1030). In many cases, it is difficult as an individual to assess true competency, but everyone makes competency assessments and decisions regularly in daily life.

For the presented knowledge model, learning, per se, is not a part of knowledge, rather the environment, or preparing to learn, creates opportunities to trigger pattern recognition and start cognitive processes leading to retrieving (Marzano & Kendall, 2007, kindle 828-839), or creating knowledge. See Figure 4. From a KM systems model perspective, recognize (discover) was identified as a common concept to capture the ideas about an event that includes recognize, discover, find, intuit, illumination, epiphany, revelation, insight (the event), and learning - to a degree. The authors' interim restatement of the levels of Bloom's Taxonomy shows the 1st level of each to be either retrieve or perceive. In fact, considering other parts of the model, each should start with perception.

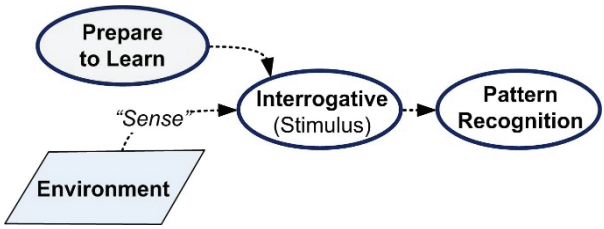


Figure 4. Preparing to learn

Source: modified Sisson & Ryan (2016a, p. 3, figure 1).

3 The order of these words differs depending which synonym source was consulted. (Merriam-Webster, 2013-2017 opinion. Synonym Discussion; Merriam-Webster, 2012-2016, opinion).

Organizational learning knowledge creation is similar. Sisson and Ryan's (2016c) poster shows three nominal learning models: for the individual (mental processes), artificial entities (artificial intelligence learning), and organizational learning as typified by Schwandt's Organizational Systems Learning Model (OLSM) (DR Schwandt & Gundlach, 1992; Schwandt, 1994; David Schwandt & Marquardt, 2000). The arrows in the poster pointing to all three suggest a common viewpoint may be possible. Or, Schwandt's OLSM may be a general case entity learning model, where the stimulus occurs in the interface, and sense making is analogous to pattern recognition.

Other knowledge management perspectives

> *The first KM perspective*, Nichols (2000) identifies "explicit, implicit,[4] [and] tacit" and "declarative and procedural knowledge" (pp. 3-4) - "dimensions of knowledge" (Nonaka, 1994, p. 16). "Explicit knowledge is that which can be codified or encoded and is represented in certain artifacts" (Bennet & Tomblin, 2006, p. 293). Implicit "can be articulated but [has not]" (Nichols, 2000, p. 3). "'Tacit' knowledge has a personal quality, which makes it hard to formalize and communicate" (Nonaka, 1994, p. 16); "thoughts that cannot be pulled up from memory and put into words" *(Bennet & Bennet, 2011, slide 33). "Choo (2002), on the other hand, categorise[s] organisational knowledge into tacit, explicit and cultural" (Omotayo, 2015, p. 7). Explicit, implicit, and tacit have aspects of a range (Chaharbaghi et al., 2005, p. 109)[, continuum (Blackler 2002, per Geisler & Wickramasinghe, 2015, p. 44)]. Cultural is in a different dimension and to these authors fits more with Holsapple and Joshi's "web of knowledge attributes" (2004, p. 598). Collectively,* these viewpoints lead to the idea of knowledge being expressible or inexpressible. *These concepts are in the center left and lower right corner in figure 5.* (Sisson & Ryan, 2015, p. 1031).

Omotayo (2015) extends Blackler (1995) and others to identify the dimensions of knowledge in terms of where it occurs versus knowledge attributes. Omotayo begins with Blackler who "defines knowledge as taking

4 Omotayo (2015) picks Koenig to address the differences, "Koenig (2012), however, describes this characterization of knowledge into explicit and tacit as rather too simple. He suggests that knowledge is better described as explicit, implicit, and tacit. Explicit means information or knowledge that is set out in tangible form. Implicit is information or knowledge that is not set out in tangible form but could be made explicit, while tacit is information or knowledge that one would have extreme difficulty operationally setting out in tangible form" (p. 7).

five distinct forms: embodied, embedded, embrained, encultured, and encoded."[5,6,7]

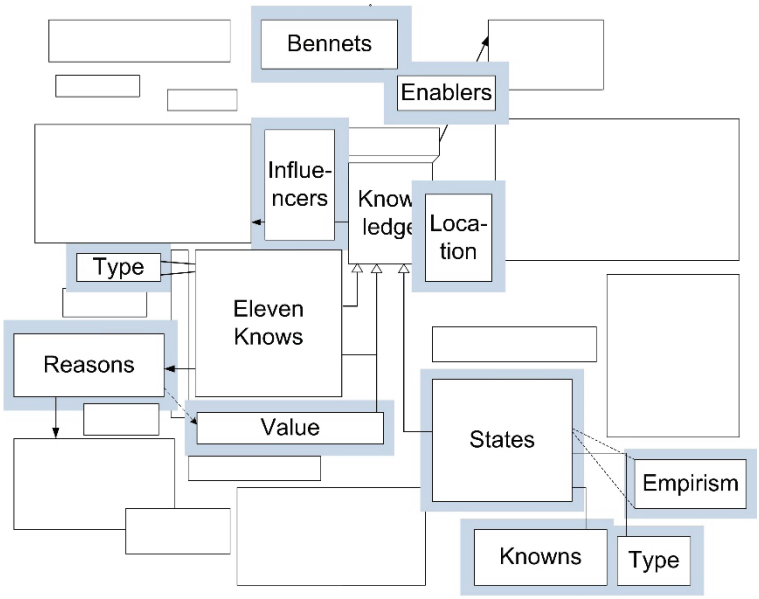


Figure 5. Fanning out from the central concepts to other perspectives

Source: updated extract (Sisson & Ryan, 2015, p. 1030).

Per Omotayo, embodied is gained through bodily training (Bloom's Psychomotor Domain). Embedded is in "routines and systems," (organizational memory in organizations). Embrained is tacit or implicit; encultured is shared knowledge; and encoded is explicit. "It can be said that organisational knowledge is embodied and embrained in the staff, embedded in routines/ common tasks, encultured among the staff, and encoded in manuals, guidelines and procedures" (p. 5). Hislop, Strati, Yakhef, Davenport and Pusak, Badaracco, Nonaka, Takeuchi, Baloh, et al., Duffy, Polanyi, Koenig, Hibbard, and Martensson are used in his amplification of these ideas (pp. 5-7). Omotayo's where-is-knowledge dimensions are incorporated into the knowledge concept map, but not as knowledge attributes. Blackler's

5 From Collins (1993), Blackler (1995) gets embodied, embrained, encultured (p. 99), the word embedded (p. 98), and encoded, implied by "symbol-type knowledge- that is, knowledge that can be transferred without loss on floppy disks and so forth" (p. 99).

6 Omitting embodied and adding encapsulated, Schmitt (2015, p. 2) mentions these in five, growing to six, pairs associated with "constraints overcome by five co-evolution" sequences: "embodied and embrained (1), encapsulated and encultured (2), encoded and organizational (3), digitized and networked (4), and enclouded and value-chained (5) knowledge with PKM and the World Heritage of Memes Repository (WHOMER) - argued to become the sixth one (p. 2).

7 Green and Ryan's (2005) categories: customer, competitor, employee, information, partner, process, product/service, and technology (p. 47), are all included in Blackler's five.

other categorizations ("mediated, situated, provisional, pragmatic," and contested (pp. 1040-1042)) are shown as descriptors influencing knowledge construction (Bodner, 1986; Lowenthal & Muth, 2008). These concepts are to the right and slightly behind the knowledge attributes in the center of the concept map.

> *Next, the subject of* validity is a dominant theme in epistemology. [Verification and validation][8] are used in system engineering to check requirements have been met [(verification – "proof of compliance" (NASA SEH, 2007))] and that a system is suitable for its intended purpose (validation[9]) (Armstrong, 2011; Krueger, Walden, & Hamelin, 2011, p. 363). Bennet and Porter (2003, p. 477) offered up another term (vericate) that fits with justification and knowing valid. Vericate means "grounding ... through implicit data and information" (Bennet & Porter, 2003, p. 477); "to determine the reasonableness or soundness;" (as opposed to verify ("grounded by the explicit)" (Bennet & Bennet, 2011, slide 4) – partly like validate per systems engineering above. It is accepting a source with "reason to know." *That can be "information that requires only an ordinary level of intelligence to infer from it that a certain fact exists, or that there are reasonable and sufficient grounds for its existence. Reason to know implies that a reasonable person may accordingly proceed, relying on the fact's likely existence" (BusinessDirectory.com, 2012-2016, reason to know). Vericate is more known acquaintance - implying checking with someone else (A. Bennet, Bennet, & Lewis, 2015).* Vericate [is somewhat] like Lewis' 8th degree of reasoning – *questioning in "ask, and expect an answer"* (Lewis, 2015a); *however, a hypothetical range of vericate, validate, and verify puts vericate at the beginning. These concepts are shown near the lower left above one legend of the concept map.* (Sisson & Ryan, 2015, p. 1031)

Lewis's (2015c) Symbiotic Table of Knowledge™ poses two questions… that expand into three question operations, six question types, and twenty base questions about knowledge with descriptive and prescriptive variations. It then categorizes the questions in terms of concise, contextual, consequential, and conceptual answer/knowledge. The concept is placed on the knowledge concept map, positioned between the 8 Degrees of Reason™

8 After review, the order of these two words is reversed from the order used in (Sisson & Ryan, 2015).

9 "The Validation Process answers the question of 'Is it the right solution to the problem?'" (Defense Acquisition Guidebook, 2013, section 4.3.16). In a semantic view of theories, "good models of the phenomena" (Gimbel, 2011l. 3370) are accurate and representative. Denzin and Lincoln (2011), in their Handbook of Qualitative Research, explore many context specific validation (methods) without defining the term generically; however, validity is about correspondence with reality.

and the eleven knows, with links to justification, certainty, and validity states. Justification in relation to reasoning, KM, and the scientific method is an area for further investigation (Sisson & Mazzuchi, 2017).

> From their work with the US Navy, the Bennets also developed "a knowledge taxonomy for grouping types of knowledge from the viewpoint of what knowledge is needed to do a particular type of work or take a particular action" (Bennet & Bennet, 2011, slide 22; Bennet, Bennet & Avedisian, 2015) – "categories of knowledge". The Bennets' categories do not map cleanly to the [eleven] knows. By example, kDescription, descriptive information (know-that), maps to "what, when, where and who" (Bennet & Bennet, 2011, slide 22; Bennet & Bennet, 2008, pp. 408, 410). In the concept map, Bennets' categories are shown related to action as enablers. *See, Bennet and Bennet (2008, pp. 409-411) for a discussion of their terms. In terms of the knows, kPraxis and kResearch also point to knowing conditions or causation – know-when (conditional) and know-why (connectivity) but are not shown as explicitly connected in the concept map. These concepts are at the top center.*
>
> Rumsfeld is widely credited with the term unknown unknowns [(Ayto & Crofton, 2011, Unknown unknowns)]. Know-knowns to unknown-unknowns are used in NASA for risk management and project management. The Johari window (1955) (Chandler & Munday, 2011, Johari window (JW method)) uses similar labels with regards to people. T*he principle author remembers the terms from, he thinks, a 1967 NASA Summer institute at the University of Southern California concerning project management and development. Two other parties report recalling the terms earlier than Rumsfeld: 1) The Jet Propulsion Lab CKO. 2) A NASA consultant mentioned a Lockheed Martin paper that he is unable to resurrect.* Regardless, the terms can be viewed as measures of [comprehensibility] and raise the idea of incomprehensibility as an opposite. *These concepts are at near the bottom-right* (Sisson & Ryan, 2015, p. 1031).

Table 4 defines concepts selected from these sources that have been included in this article's model of knowledge.

Table 4. Additional terms

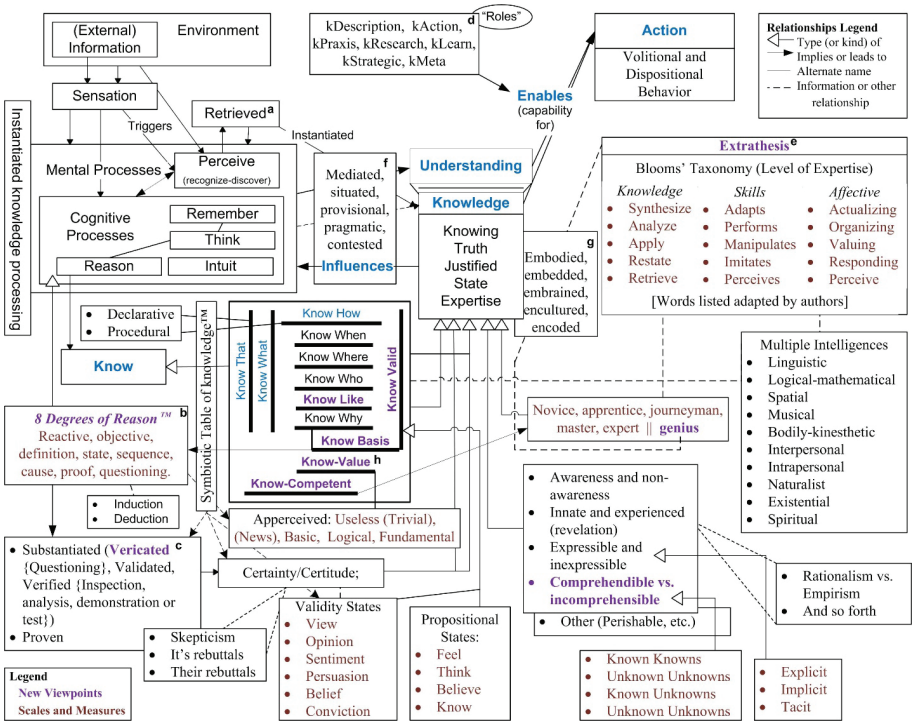
Aspect	Source	Definition or Example		
Expressible / Inexpressible	Psychology	Declarative or explicit knowledge (words, etc. and sharable) versus tacit knowledge ("unable to express" (Bennet & Bennet, 2011, slide 33; Matthews, 2007-2014, tacit knowledge))		
Comprehendible [10] versus Incomprehensible	Psychology	"An ability to understand the meaning or importance of something (or the knowledge acquired as a result)" (Thinkmap, 2012-2017, comprehension) - know-what (Lewis, 2012, p. 10) versus cannot figure out		
	Deduced	Incomprehensible is something "that cannot be understood" (Australian Oxford Dictionary, 2004, incomprehensible)		
Vericate	Bennets	Vericate is "to determine the reasonableness or soundness" (Bennet & Bennet, 2011, slide 4); "reason to know" (BusinessDirectory.com, 2012-2016, reason to know) – can be determined by consultation; (Bennet & Porter, 2003, p. 477)		
Verify	System Engineering	Verify is "to ascertain or test the accuracy or correctness of (something), esp. by examination or by comparison with known data, an original, or some standard; to check or correct in this way" (Oxford English Dictionary, 2011-2017, verify, para, 4a)		
Validate		Validate is to "provide objective evidence that the [solution meets] its intended use" (Krueger et al., 2011, p. 133); show correspondence with reality (Gimbel, 2011 l. 3370)		
• Known -Known • Known-Unknown • Unknown-Unknown	Johari Window (1955) (Chandler & Munday, 2011, Johari window (JW method))	"Things we know that we know."		(Rumsfeld, 2002) per (O'Connor, 2003, slide 2)
		"Events that are likely to occur based on historical data" (Bilbro, 2012, p. 2)	"Something that you know you don't know" (2105. known unknown)	
		"Events that cannot be predicted" (Bilbro, 2012, p. 2)	"Things we don't know we don't know."	
• Unknown-Known	NASA Knowns	"That which is hidden and known to me alone." (Johari Window) (Chandler & Munday, 2011, Johari window. (JW method))		"Things we don't know we know" (O'Connor, 2003, slide 2)

Mental model of knowledge – a concept map

Figure 6 presents a picture of how the authors see relationships between these different viewpoints.

10 In the meanings in which they overlap, [the words apprehend and comprehend] denote slightly different aspects of understanding. Apprehend means to grasp or perceive a general idea or concept, whereas comprehend means to understand an argument or statement" (Allen, 2008, apprehend, comprehend).

The environment produces triggers that kick off mental processes that recall, remember, or discover new knowledge – recognizing a pattern that results in some level of understanding (knowledge). Mental, (and cognitive) and sensing processes, and volition factors and affective states are influenced by and influence previously constructed knowledge. Knowledge attributes can be expressed in many dimensions, sometimes as a range within a category. [By example,] opinions and beliefs in the certainty/certitude area could be on a scale from "I feel, I think, I believe to I know" (Atkinson, 2015, para. 3). Certainty with regards to the states can vary from view, opinion, sentiment, persuasion, and belief to conviction (Sisson & Ryan, 2015, p. 1031).



Notes: a) (Marzano & Kendall, 2007). b) Adapted from (Lewis, 2013). c) (Bennet & Porter, 2003, p. 477). d) (Bennet & Bennet, 2008, pp. 410-412). e) (Ryan, Dirienzo, Noteboom & Sisson, Ryan Research Group, personal communication, spring semester, 2015). f) (Blackler, 1995, pp. 1040-1042). g) (Omotayo, 2015, p. 5). h) (Anonymous, 2017).

Figure 6. Knowledge concept map

Source: updated graphic from Sisson & Ryan (2015, p. 1030).

Initially, the authors viewed understanding and knowledge as nearly equivalent. This point of view evolved from definitions of the two, particularly as synonyms. More recently, understanding and knowledge are considered from another viewpoint, as two faces of the same thing (perhaps a yin and yang relationship). At this point, knowledge is beginning to be viewed from the more abstract Epistémé and Sophia perspective, while understanding is being viewed from an outcome of learning perspective.

Thoughts about justified, true beliefs (two attributes in Figure 7), for most people, are not regular, formal occurrences in daily life; yet, people act on knowledge based on internal, often unconscious, assessments (propositional states) of its apperceived value (know-value (Anonymous, 2017)), such as useless (trivial), only news, basic, logical, or fundamental. Perhaps saying "'useless' knowledge [is] such as which is the third, or the thirteenth, longest river in the world," (Gregory, 2004, knowledge) is a bit harsh, and trivial is a better categorization. News contains knowledge and is better on a scale of actionable value than trivial facts. Logical and fundamental are two measures tracing back to Aristotle's Epistémé and Sophía.

While originally the levels of Bloom's Taxonomy were considered progressions that need to take place in learning, later articles (possibly partly in response to Marzano and Kendall's (2007) and Fink's (2013)) implications) state the opposite (Krathwohl, 2002, p. 218; Seaman, 2011, p. 37). While extrathesis is placed in the knowledge concept map above all three parts of the taxonomy, it may not be really different from synthesis as in some perspectives, as in this article where the authors suggest wisdom is not different from knowledge – it is merely insightful knowledge.

Discussions about the KM data, information, knowledge, and wisdom (DIKW) hierarchy appropriateness continue.[11] Wisdom as insightful knowledge may be a good model for extrathesis as a special kind of synthesis. In that case, would synthesis need to be in each of the taxonomies? Or, does adapting for the Psychomotor Domain and actualizing for the Affective Domain, capture the synthezising idea?

> The knowledge concept map shows ... new ideas [developed in this article] such as comprehensible/ incomprehensible, know-like and know-valid, and vericate. [Figure 6 (the concept map)] presents a picture of how the authors see relationships between

11 "Wisdom is the combination of knowledge and experience, but it is more than just the sum of these parts" (Bennet & Bennet, 2014, p. 27). In the same book, Williams (2014) provides a graphic that shows wisdom is at the top-right of Devon, Horme, and Cronenweth's (1988) knowledge spectrum (event -> ... wisdom); however, he continues, "there are more critics of the DIKW hierarchy than there are exponents of it" (p. 83 & 85) (as part of an introduction to other alternatives and his "better" suggestion). Lewis, (2013) eschewing wisdom, takes the position that information is a signal that contain both data and knowledge and that data plus knowledge is needed for decision-making.

[these different viewpoints]. By example, it provides visibility to the 8 Degrees of Reason™ (Lewis, 2015a) and places the Bennets' knowledge categories in relation to other concepts. (Sisson & Ryan, 2015, p. 1031).

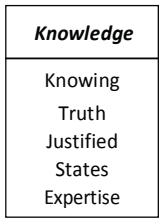


Figure 7. Principal knowledge attributes

Source: extract from Sisson & Ryan (2015, p. 1030).

CONCLUSION

The knowledge concept map confirms "knowledge is a multifaceted concept with multilayered meanings" (Nonaka, 1994, p. 15) with many knowledge concepts using the eleven knows and knowledge principal attributes (Figure 7) as focusing points. It substantiates that from epistemology, broadly, knowledge exists in the minds of people, may exist internally from birth, can be displayed in behavior, derives from experience perceived from the senses, is created by reasoning, may be a logically true proposition, may represent truth/reality, and "justified" knowledge can have degrees of certainty. It clarifies that "knowledge in people has been [shown] (Bloom) to be related to thoughts, as well as the kinetic nature of physical skills or feelings." The map shows that "philosophical opposing views about whether knowledge is innate or experiential" (Sisson & Ryan, 2015, p. 1031) is a knowledge sub state (innate and experienced). Truth (certain or with certitude) is discussed (both validity and propositional states).

The paper brings forth and extends the idea that knowledge attributes can be expressed in many dimensions, sometimes as a range within a category. By example, opinions and beliefs in the certainty/certitude area could be on a scale from "'I' feel; 'I' think; 'I' believe; [to] 'I' know" (Atkinson, 2015, para. 3) (hopefully indicating that the transition from belief to knowing is based on some assessment of truth). The knowledge concept map shows ideas developed in this article: comprehensible / incomprehensible, know-like, know-valid, know-competent, know-value, and vericate have a place in a general understanding about knowledge. It integrates the 8 Degrees of Reason™ (Lewis, 2015a) and places the Bennets' knowledge categories

in relation to other relevant concepts. It implies (Figure 7) that while many knowledge attribute suggestions can be found (Alavi & Leidner, 2001; Holsapple & Joshi, 2004), the principal knowledge attributes are knowing, truth, justified, states, and expertise.

The theoretical sampling and theoretical saturation methods applied do not guarantee all appropriate concepts have been identified. Given the breadth, depth, and dimensionality of concepts of knowledge, later researchers may add additional concepts.

One area for additional investigation could be revelation in regards to recognition-discovery. "All knowledge comes from God" (Butts, 1958, p. 117; Heck, 2013, p. 301). Or as, another Islamic thinker, "Syed Muhammad Naquib AI-Attas" "asserts that as far as the sources and methods of knowledge are concerned, all knowledge comes from God and is acquired through the channels of the sounds senses, true reports based on authority, sound reason and intuition" (Yousif, 2001, p. 87). So, does knowledge from God through revelation mean that while revelation fits within as a perception concept, the recognition-discovery common concept needs to be unbundled (recognition and discover versus recognition-discover) – recognition (remember, recall, etc.) and discovery (find, intuit, illumination, epiphany, revelation, insight (the event)?

"Other areas to consider include know-like. Does thinking of know-like as familiarity help with psychology's difficulty explaining acquaintanceship? Would changing the acquaintanceship to know-like or familiarity help?" (Sisson & Ryan, 2015, p. 1032). Do Gardner's existential and spiritual intelligence ideas indicate knowing other than like or being distributed across the other knows? Is know-like (perception) a way to address Gardner's (rejected) spiritual intelligence? Are know-who and know-where as generic as displayed in Table 3?

If one postulates a propositional awareness sequence of feel, think, believe, know; how does the idea of faith[12] affect the sequence? Does the order of religious propositional states differ – perhaps, feel, think, know, and believe? Do two such propositional statement sequences indicate a fundamental difference between mundane and religious validity (the order of believe and know)?

Expanding the list of knowledge locations (such as enclouded, etc.) (Schmitt, 2015) brought up in the methodology section, Lewis's (2015c) Symbiotic Table of Knowledge™, organizational knowledge specific attributes, and how knowledge is created, are also ideas for potential further investigations to see if they offer new insights that merit integration into the

12 "Faith almost always implies certitude even where there is no evidence or proof" (Merriam-Webster, 2012-2016, belief).

concept map as a general mental model of knowledge. Option Outlines™ to document decisions (Lewis, 2015b) merits further investigation as a separate topic. Extrathesis's implications in understanding knowledge creation (intuition) also merit further investigation. In addition, Sisson and Mazzuchi (2017) suggest that justification, in addition to "validation, verication, and verification" could include "methodification (qualitative research approaches validation), or provisionalization (statistics)" (p. 4.), which would be another, minor addition to the concept map.

For investigators into KM, or knowledge in management, innovation, or entrepreneurship, the knowledge concept map reveals the broad scope of knowledge that needs addressing, a truly common description of KM, and facets that can be important in other venues.

> Seeing relationships of these concepts (Figure 6) helps relate many viewpoints on and about knowledge as an explicit, shareable image. The concept map provides a starting point for other investigators to use [and] explore different relationships or add other concepts (Sisson & Ryan, 2015, p. 1032).

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Abstract (in Polish)

Celem tego artykułu jest przedstawienie mentalnego modelu wiedzy jako mapy koncepcyjnej i wkładu w badania nad zarządzaniem wiedzą (KM). Ta koncepcja mapy rozszerzonej wiedzy może służyć jako zasób, w którym badanie, opracowywanie lub stosowanie wiedzy byłoby dostarczane z szerokim, mentalnym modelem wiedzy. Wcześniej niepowiązane pojęcia są łączone; pojęcia wiedzy można czasami wyrazić w pewnym zakresie, tj. w pewnych stanach, jak: pogląd, opinia, sentyment, perswazja, wiara i przekonanie. Extrathesis jest określany jako potencjalny poziom umiejętności wyższy niż synteza i związany z pojęciami: odkrycie, instytucja, wgląd (zdarzenie), objawienie lub oświecenie poprzedzające innowacje. Do zebrania i dokumentowania koncepcji wykorzystano metody jakościowe. W celu zdefiniowania i powiązania pojęć zastosowano inżynierię systemów i metody analizy obiektów. Jednak teoretyczne metody pobierania próbek i teoretycznego nasycenia nie gwarantują, że wszystkie odpowiednie pojęcia zostały zidentyfikowane. Biorąc pod uwagę szerokość, głębokość i wymiarowość pojęć wiedzy, badacze mogą dodać dodatkowe pojęcia. Artykuł dostarcza dowodów na dodatkowe rzeczy, o których wiedzą ludzie, alternatywę dla znajomości psychologii, zrozumienia i umieszczania nowszych kategoryzacji wiedzy w stosunku do starszych i sugeruje, że istnieją zakresy wiedzy. Artykuł stanowi

rozwinięcie artykułu z roku 2015 na ten temat: 1) pogłębiając spojrzenie na epistemologiczne pojęcia i relacje, 2) dostarczając kontekstowe definicje, 3) sugerując, że ekstrakcja jest pomysłem poza syntezą, 4) aktualizując mapy koncepcyjne; i 5) dostarczając nowego wglądu w „wiedzieć". Artykuł zapewnia solidne podstawy do badań nad KM, zapewniając szerokie zrozumienie wiedzy.
***Słowa kluczowe**: wiedza; mapa koncepcyjna; mapa koncepcji wiedzy.*

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Money Talks: Communication Patterns as Knowledge Monetization

Karl Joachim Breunig[1] and Hanno Roberts[2]

Abstract

In this conceptual paper, we suggest that knowledge flows constitute the antecedences of value creation by means of its communication component. Knowledge is increasingly being accepted as a source of value creation and a differentiator between firms. However, to a large extent, current approaches to management and governance of knowledge resources prescribe measurements of the stock of knowledge. Therefore, we suggest a bridge that connects current knowledge sharing understanding with properties from communication theory, to explicate knowledge in use through a communication patterns perspective. Building on the perspective of knowledge as a flow, and postulating that value is based on knowledge use, rather than knowledge possession, this paper addresses the research question: How can we express knowledge in such a way that it can be monetized and made accessible to specific managerial interventions? We explain how communication is instrumental in capturing knowledge value and allows for a connection with monetary value. Extant literature on organizational communication roles emphasizes the role of boundary-spanners in the search for and combination of experience and tacit knowledge. Individual nodes in organizational networks can possess knowledge. However, to be valuable, the knowledge resources need to be deployed and utilized. The use of knowledge will involve the communication of this knowledge through ties to other nodes. The paper proposes that boundary-spanning roles provide a focal point for such monetization efforts. The contribution of this paper is six propositions for future research on how management accounting and control systems can be brought to bear in their governable and calculable aspects if communication functions are given more attention.

Keywords: *boundary spanners; monetization; communication; knowledge flows; knowledge sharing.*

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INTRODUCTION

This conceptual paper combines and links insights from several different disciplines, including communication theory, strategy theory, and management accounting theory, to provide a framework for the monetization of knowledge resources. We suggest that knowledge flows constitute antecedents of knowledge-based value creation and, subsequently, formulate six propositions to expound monetizing of knowledge resources.

Over the past decade, several efforts have been made to account for knowledge as a resource. Many of these attempts have emphasized the ownership of the knowledge resource and, consequently, its valuation and reporting, rather than the dynamic processes involved in the use of knowledge (Breunig & Roberts, 2013). Meanwhile, managerial accounting endeavors to account for knowledge as a resource tend to be limited to adopting a management control perspective, matching specific aspects of knowledge resource management against existing management control concepts of, for example, uncertainty and one's decision-making tool set (Ditillo, 2004; 2012).

In contrast, our approach is based on a relational premise and we argue that because communication is the carrier of knowledge flows, it constitutes the starting point in developing an approach towards knowledge-based value creation and, ultimately, towards monetizing the knowledge resource. We claim that the relational deployment of knowledge matters more than how much knowledge one has 'on inventory'. Such knowledge deployment is grounded in communication patterns around a problem-solving effort, possibly supported or triggered by an organizational artefact such as an information item (e.g., a report, a customer query, or a design blue-print). In this paper, the organization is viewed as a networked pattern of knowledge flows with communication acting in a platform role. This perspective allows for the identification of value creation patterns which, in turn, allows for monetizing knowledge by looking at the structural make-up of these patterns. Building on a dynamic pattern of knowledge flows and acknowledging that value creation is based on knowledge-in-use, this paper addresses the research question: *How can we express knowledge in such a way that it can be monetized and made accessible to specific managerial interventions?*

The paper's core proposition is that the communication patterns inherent in social networks of knowledge sharing carry the rudimentary bases for monetizing knowledge-value creation. The latter concept here adopts the postulate that the role of management accounting and control systems is a functional technology for constructing a governable reality (Miller & O'Leary, 1987) given its instrumental capabilities towards monetization. The paper contributes an extension of existing theory on intellectual

capital and knowledge management by bridging it with social network and communication theory. Indeed, this ambition relates directly to unresolved issues, and recent calls for research, in the knowledge management field (Cuozzo, Dumay, Palmaccio & Lombardi, 2017; Dwivedi, Venkitachalam, Sharif, Al-Karaghouli & Weerakkody, 2011).

Knowledge management research encompasses diverse topics. A recent review article aimed at identifying current themes and future trends could neither conclude that the field was fragmenting nor that a future dominant theme was emerging (Lee & Chen, 2012). However, it remains to be resolved how knowledge management, and indeed knowledge application, is related to value-in-use. Recently, the relevance of resolving this issue has been emphasized by the digitalization trend threatening to disrupt the way knowledge workers make their living (Christensen, Wang & van Bever, 2013). Indeed, a recent review article identifying four potential future directions for knowledge management research point towards specifying the knowledge process as a particularly promising future direction (Mariano & Awazu, 2016) that relates to the complex combination of three distinct phenomena: social capital, networks, and knowledge transfer (Inkpen, 1996; Inkpen & Tsang, 2005; 2016).

This paper relates directly to this discourse in that it aims to explain how specific communication roles are instrumental in capturing knowledge value creation and its subsequent monetization. The implication of this extension is particularly relevant for management control systems, based as it is on a decomposition logic of breaking down strategies into objectives, targets, and performance metrics. Applied within the context of knowledge-based firms, this decomposition logic reduces knowledge management to a strategy implementation problem, involving selection of appropriate responsibilities, budget allocations and performance measurement models. The latter (performance measurement modeling) has been a key tenant of intellectual capital approaches in which it is treated similarly to the financial resource in terms of how it can be exploited or governed through a regime of transactionable property rights and accompanying measurements and reporting systems. Rather, we approach the issue differently by taking a close look at 'knowledge-in-use', focusing on the knowledge sharing phenomenon, identifying its relational, networked, and communication aspects, and then attempting to work towards monetization opportunities.

The paper is built up as follows. First, we address different ontologies when addressing assets, and how these ontological differences affect the ability to surmise knowledge flows. Second, we address knowledge value creation as knowledge flows and integrate theory on communication networks into our line of argument, indicating how the concept of boundary spanners can offer

a suitable vantage point for managerial intervention. Third, the monetization opportunities related to the networked communication flows are discussed. We conclude by discussing both the theoretical and practical contributions of this paper, and the perspectives it develops for future research.

METHODOLOGICAL CONSIDERATIONS

The aim of this conceptual paper is to build mid-range theory by detailing a specific line of argument. Rather than singling out a narrowly aimed structured literature review to extract existing literature, our argument for knowledge flows, as the antecedence of value creation draw on a broad set of disciplines and literatures. Therefore, consistency considerations emphasize the sequence of laying out the line of argument, and underpinning it with reference to extant research. The essence of our approach is the credibility of argument in this inductive theory building ambition.

The line of argument, leading to six propositions, is presented in the following sequence. First, we address different ontologies when addressing assets, and how these ontological differences affect the ability to surmise knowledge flows. Second, we address knowledge value creation as knowledge flows and integrate theory on communication networks in our line of argument, indicating how the concept of boundary spanners can offer a suitable vantage point for managerial intervention. Third, the monetization opportunities related to the networked communication flows are discussed. We conclude by discussing both the theoretical and practical contributions of this paper, and the perspectives it develops for future research.

LITERATURE BACKGROUND AND CONCEPTS

Ontologies of "assets" affect the ability to address the flow of knowledge

Within the field of strategy, knowledge and competence form a strategic asset for firms, with the term asset being used in a pluralistic way to signify multiple processes and routines (Nelson & Winter, 1982). In particular, the knowledge-based theory of the firm considers the firm itself to be a repository (i.e., a big warehouse) for knowledge. That is, the firm functions as a container that bounds the various knowledge forms, types, and categories available for deployment (Grant, 1996; Spender, 1996) with the container itself being a fluid entity that adapts to the content whirling within it (Teece, 2004). Issues of asset ownership are considered of less importance than "*control or access to resources on a preferential basis*" (Helfat et al., 2007, p. 4)

Conversely, within accounting theory, the definition of an asset is more monistic, referring to a legal property right that can be exchanged via market transactions (Schuetze, 1993). Typically, the monist accounting perspective of what constitutes an asset allows for an epistemology of value creation in which assets are building blocks that can be reconfigured to optimize value creation. Meanwhile, it allows for an instrumentation of the reconfiguration process, by adding, merging, or transforming asset categories (Venkatraman and Henderson, 1998). As such, it has the benefit of being able to address instrumental questions on, for example, asset development, deployment, transformation, transaction and the like, thereby opening up the conceptual treatment of knowledge assets for operational and managerial use (Bollinger & Smith, 2001). Such use includes the articulation of knowledge assets into monetary terms in such a way that assets are transduced from the strategy ontology to a financial ontology as occurs in mergers & acquisitions and in joint ventures. This transduction will equip knowledge assets with an instrumentation that allows for monetization (e.g., goodwill or brand valuation) and, simultaneously, in the transduction process itself, flex the kind of multiple epistemological muscle that is called for in deepening the development of a knowledge-based theory of the firm (Spender, 1998).

One of the ontologies that monist accounting theory brings to bear on knowledge assets is that of financial categorization. It distinguishes assets into fixed and current asset categories, based on a (time of holding the) property right criterion. Other categorizations are equally possible, such as tangible versus intangible assets, or purchased versus self-generated assets with the problematization of categorization criteria (i.e., what and how to create relevant epistemological containers)—an important area for transduction heuristic creation (Grojer, 2001). The asset categorization used for this paper is one based on (asset) stocks and flows. However, rather than applying a dichotomy of (static) stocks and (dynamic) flows, we employ a continuum in which (asset) stocks liquefy into (expense) flows and vice versa. The classic example of this transformation is asset depreciation; over time, the asset stock decreases while the depreciation expense increases. Typically, the accounting heuristic is supported by a further categorization, that of capitalizing expenses (putting them on the balance sheet as a stock item) and expensing assets (putting them on the income statement as a flow item). Given that these accounting heuristics are motivated by arguments of risk and uncertainty for proper value estimation, the principle of conservatism is applied. That is, a decision heuristic is used in cases of high uncertainty to categorize transactional events as flows (expense the item) rather than as stocks (capitalize the item). It is important to note that ‘value’ in accounting theory is singularly perceived as monetary value based

on a market exchange transaction, while referring to principled arguments of 'objective' measurement.

Returning to 'knowledge assets', the above implies that categorizing knowledge as an asset would assume that it is of low risk and uncertainty—an assumption that is highly dubious given the dynamic nature and much debated phenomenological status of knowledge, both of which are illustrated in the many disparate efforts to measure it (von Krogh et al., 1998; Liebowitz & Suen, 2000; King & Zeithaml, 2003). As a result, and for the purpose of this paper, we emphasize knowledge as a flow between knowledge users rather than as replenishing or depleting a stock. Equally importantly, we emphasize the dynamic nature of knowledge; the knowledge itself is changed through its use each time it flows between users. This interpretation locates our understanding of knowledge flows within the literature on knowledge sharing, with each user having the potential to add to the organization's shared knowledge (Ipe, 2003; Cabrera & Cabrera, 2002; Riege, 2005). Stated differently, knowledge sharing harbors an appreciation rather than a depreciation mechanism with an ever-increasing value based on its use (Hansen, 2002). This view resonates strongly with a learning ontology; the more it is shared and used, the more we learn and the more its value is increased (Yang, 2007; Ardichvili, 2008).

As for the flow process itself, we adopt a network rather than a dyadic perspective on sharing. That is, there are multiple knowledge users who share knowledge with one another within bounded networks or clusters rather than one-on-one (Rowley, 1997; Cross et al., 2001). Users, thus, have sharing portfolios in which knowledge flows are routed among different users. Moreover, it implies that the level of analysis of our discussion is the network per sé, thus allowing for arguments and constituting features that pertain to networks as well as intra- and internetwork behaviors. There is an implicit assumption that knowledge-sharing networks create more knowledge value than the simple dyadic sharing between two users. This assumption resonates with the interpersonal network literature and the various social and behavioral assumptions that accompany it, including why such knowledge sharing networks are ultimately important (e.g., innovation, value creation) (Swan et al., 1999; Hildreth & Kimble, 2004). However, here, we do not distinguish between formal and informal flows (knowledge sharing) because we do not want to limit ourselves to the instrumentation options that are bundled with the formal versus informal knowledge sharing dichotomy.

We adopt three concepts in our line of argument, all centered on the core concept of social networks: (1) relations, (2) communications, and (3) sharing. Briefly, to create value out of knowledge, people need to relate to one

another to communicate and share knowledge. Relatedness ('connectivity') is therefore the basic premise upon which all other subsequent stages are built. Relational 'capital' and social networks thus provide the first step in building knowledge-based value creation. The actual communication patterns that are established within social networks then give rise to the sharing of knowledge (experience, insights, and tacit understanding). Hence, it is communication patterns that provide the second step. These patterns develop and evolve towards a 'meeting of minds' in tackling tacit, sticky, and hard to codify knowledge held by communication participants (Liyanage et al., 2009). These 'meetings of minds' take the shape of (re)combinations and (re)configurations of new and existing knowledge and interpretations in which participants arrive collectively at a new level of understanding, or a knowledge 'innovation'. This third step, thus, revolves around the combinations made within communication patterns, bringing desperate tacit and codified knowledge together. As such, the combinatory, sharing aspect of communication patterns is considered to be a 'personalized' approach to knowledge management (Hansen et al., 1999) that is highly reminiscent of situated cognition and learning (Brown & Duguid, 1991; Lave & Wenger, 1991). Therefore, the combinations of tacit knowledge are highly localized and contingent on context, but nevertheless are open to identification and intervention.

The three steps in our line of argument provide for an equal amount of analytical approaches. For example, step one focuses on the arena of knowledge-based value creation: the identification of the primary times and places when and where relatedness ('connectivity') occurs. Typically, these are meetings; including project meetings, debrief sessions, seminars, investment evaluations, milestone assessments, and problem-solving task forces, among others. Usually, these meetings tend to be dominated by a specific agenda (e.g., solving a problem, launching a product, a campaign kick-off) that mobilizes implicitly a wide range of formal and informal knowledge resources. From the new product development literature, we know that to be considered successful, such meetings need to comply with a series of minimal requirements related to input diversity, a semi-open agenda, and a participative and collaborative process (Houman & Balslev, 2009; Swink et al, 2006; Cooper et al., 2004). We postulate that these arenas are aligned with business activities and do not exist in a vacuum. That is, they are there to create value even if this value is not clearly and unequivocally considered or assessed upfront. Arenas as such are not 'investment objects' subject to return criteria but part of processes of value creation with these processes created and justified for the aim of value creation. That is, these meetings are not talk for talk's sake.

The communication patterns that constitute the next step in our line of argument are where the knowledge monetization possibility emerges. Interpreted as social network structures in which these patterns are nested or accommodated, the constituting nodes and ties and the classification of each category in terms of their characteristics provide the building blocks for mapping out value creation flows. For example, different nodes occupy different positions within networks, each having a predominant association with a specific activity (Cross et al., 2001). A node can bind a network together owing to its centrality in the network, with communication flows going primarily through this central person or unit. Or a node can serve as an inter-network link, fulfilling a boundary-spanning role that allows for diversity of knowledge interaction and the emergence of novel insights and conclusions. Similarly, the ties between the nodes in a network signify how loose or tightly knit a network is. Strong ties indicate an intense and frequent communication pattern, whereas weak ties indicate an infrequent and random communication pattern. Networks as such can be typified according to a number of characteristics apart from the characteristics of their constituent parts. For example, the characteristics of centrality, density, and bridging address the distribution of nodes within networks while homophily, multiplexity, and reciprocity describe connections within networks. Hence, social network characteristics promulgate a series of drivers in communication patterns that can be used to diagnose the strength, cohesiveness, and focus of a knowledge value-creation effort.

Where earlier stages are articulated in terms of communication patterns (i.e., who talks to whom), the third stage expresses itself in terms of combinatory criteria and, as such, allows for specifying optimization of who talks best with whom; certain combinatory patterns are more likely to result in successful solutions, insights, or proposals than others. This third step resonates with research on optimal team composition vis-à-vis team performance; certain combinations outperform others owing to their members' configurational characteristics (Mathieu et al., 2014; Hollenbeck et al., 2004). In comparison with the focus on communication patterns in stage two, the combinatory focus provides an additional set of criteria that can act as drivers for knowledge-value creation, which can either predetermine or leverage communication pattern criteria and define their potential for use as a metric in monetizing knowledge. However, for the purpose of this paper, we limit ourselves to looking at steps one and two in developing knowledge-based value creation, selection of relational ('connectivity') arenas, and specifying appropriate communication patterns.

Knowledge value creation is relational

According to Bontis (1999), knowledge originates from human capital and is combined with other knowledge resources in relational capital, being harvested ultimately as organizational capital in the form of new sets of routines, procedures, and managerial processes. Breunig and Roberts (2013) surmise that knowledge value creation is located within relational capital, combining individual knowledge in a networked fashion and based on communication. Typically, efforts in managing relational capital involve establishing such communication networks, making them work, directing them, and maintaining them. Our main underlying proposition is that the social relations among (groups of) people constitute a firm's knowledge value creation process, while it is the communication within these people-to-people networks that provides the novel combination of hitherto separated knowledge of perspectives upon which new business ideas and innovative practices are based. In this context, we distinguish between concurrently existing "contactivity"[3] (between people) and "connectivity" (between communication systems).

Within the field of communications research, several of these processes have been specified and refined. For example, in the communication model developed by Tucker, Meyer, and Westerman (1996), strategic knowledge capabilities are developed as the result of interpersonal communication systems at an institutional level. Their model stresses the role of organizational routines and managerial direction, implicating the importance of management intervention in authorizing and establishing critical communication opportunities and channels. Once communication occurs, connectivity and contactivity are created, and subsequent stages of combining knowledge can be entered, including knowledge sharing, expertize leveraging, and collaboration (Cross & Prusak, 2002; Davenport & Prusak, 1998; Nahapiet & Ghoshal, 1998; Tucker et al., 1996). The communication perspective on knowledge value creation revolves around the design features, procedures, and routines that establish intra-network connections. Some of these facets are codified and embedded in information and communications technology systems. However, many relate to concepts and methods outside the domains of knowledge management, information and communications technology, and communication theory. Examples are incentive systems for knowledge sharing and work collaboration, a project staffing system that engenders contactivity between people with diverse sets of interpretations and action vocabularies, the meeting and debriefing methods used around reporting systems within management control, and an intervention style that

3 The term 'contactivity' was coined by Leif Edvinsson, a reputed author within the Intellectual Capital field.

is based on openness and involvement rather than entrenchment into job descriptions and other formally mandated responsibilities.

In summary, knowledge value creation through communication networks requires pulling from a broad set of distinct disciplinary areas. Criteria for soliciting conceptual and instrumental inputs revolve around system connectivity and interpersonal contactivity in a sequential, step-wise manner, initiating from awareness to development, often in practical efforts aimed at knowledge co-creation (Kazi et al., 2007). It is perhaps ironic that academic workshops tend to claim a similar knowledge co-creation focus (Hatcher et al., 2006).

Knowledge value creation is communication based

Communication as a personalized process refers to the interpersonal transfer of knowledge. From the perspective of the firm, however, such interpersonal exchange is understood as personal networking, with the firm's role in communication revolving around encouraging, allowing, bounding, and focusing the development of such personalized communication networks. Both codified and objectified knowledge as well as non-codified and subjective knowledge are communicated via such networks. Thus, interpersonal communication networks become the focus of a deliberate effort to manage knowledge by combining different perspectives. But the question remains of how can these processes be managed and followed up with management accounting and control systems.

Research has indicated that firm level networks tend to revolve around communities, including communities of practice, collaboration, interest, and innovation (Adler, Kwon & Heckscher, 2008; Ahuja, 2000; Inkpen, 1996; Wenger & Snyder, 2000). These communities are networks that are organized around several ground rules, one of which is that of purposeful information and experience sharing. Communities of practice can arise spontaneously but can also be encouraged to develop by management through deliberate design (Brown & Duguid, 2000). It is in the interest of management to develop communities that can be used as vehicles for more effective information and knowledge sharing, compared to the more hierarchical reporting flows of typical organizational responsibility structures (Stevenson, 1990). The emergence of the community concept and its apparent usefulness in information, experience, and knowledge sharing has triggered a large array of application areas, ranging from online communities to civic communities in urban renewal and politics (Putnam, 2000). The community of practice concept informs the present work in two ways: the community as a social network of communication; and the community as an organizing format for the structuring of communication flows.

The social aspect of these communities (i.e., the fact that communication is interpersonal and personalized) provides a possibility to map communication flow patterns. Using Social Network Analysis (SNA), these maps outline who communicates with whom, and with what frequency (Scott, 2000; Wasserman & Faust, 1994). Actors (communicators) within these "communicaties" that have high frequency counts can be classified according to the roles they fulfil. Hence, we conceive of communication networks as stable communities over time, and vice versa (i.e., communities as communication networks) (Brown, Broderick & Lee, 2007; Gillani, Yasseri, Eynon & Hjorth, 2014). For communication networks to classify as communities, network roles need to develop over time. Hence, the community becomes an organizing format to group and classify communication. Consequently, we suggest that:

Proposition 1: Knowledge value creation is communication network-based.

Knowledge value creation by means of communication roles

Communities conceived of as organizing formats for communication flows and patterns are demarcated by the various roles that people take up within these networks (Cross & Prusak, 2002). Each role is defined as creating a certain type of connectivity, with a distinct set of communication functions. Breunig and Roberts (2013) identify four roles (i.e., central connectors, boundary spanners, information brokers, peripheral specialists; Cross & Prusak, 2002) in social networks that allow for the appropriate management of each network. For example, the inclusion of the concept of boundary spanners can accelerate the implementation of a corporate-wide communication system with boundary spanning individuals acting as gatekeepers to other domains within the organization. Similarly, the information brokers within a selected number of social networks can be asked to chair formal meetings, thus propelling the distribution and accelerated dissemination of information across constituencies. As these examples elucidate, identifying the above roles within social networks is followed by a selection of which roles and which networks are important for knowledge-based value creation.

Although these roles are stated originally vis-à-vis people, they can also be elaborated towards roles for typical organizational formats. That is, an item on the organization chart or within work process flows where cross-functional coordination and exchanges occur. Such 'organizational arenas' can be relatively low key, such as, meetings that have been systematically structured into workflows and occur with periodic regularity. But in contrast to being based on an agenda defined by hierarchical reporting on formal responsibility areas, these 'arenas' are defined by activities and shaped by

a role towards (diversity of) interpretations and requisite actions precipitated by a dynamically changing context. For example, a customer order flow might be standardized as a formal activity protocol, but with each new customer requirement, variety and diversity are introduced, requiring a response in terms of requisite knowledge deployment, such as a response based on codified (design or installation blueprints) and/or tacit (prior personal experiences executing a similar job) information.

Moreover, a combination is equally possible. Personal roles may be harnessed or leveraged by the roles of the organizing arenas. That is, people can fulfil boundary spanner or connector roles within networks, but organizing arenas can take up these roles too. For example, a meeting sequence can have a connector role within dispersed functional knowledge areas or it can have a boundary-spanning role across knowledge domains. Jones (2007, chapter 4) holds that these 'integration mechanisms' are already known within the organization design discipline. However, they tend to be related to the allocation of tasks and responsibilities to counteract the silo-effect of functional specialization and, by purpose, are far less intended for the exchange and sharing of insights, tacit knowledge, and experience. Therefore, the organizing format of communities has a different agenda and a different purpose. This distinction is also revealed in how such organizational arenas are commonly identified, not on an organization chart, but in an activity/work flow process map. The boundaries that these roles (fulfilled by people and by organizational formats either separately or in combination) span determine the diversity and richness of the tacit and explicit knowledge inputs that are invoked in them. High diversity (of knowledge inputs) across all knowledge dimensions requires the involvement of boundary spanning roles, with high diversity increasing the potential for novel knowledge creation that, in turn, increases the potential for value creation.

Therefore, with the aim of connecting monetary value to a firm's knowledge resources, identifying a firm's boundary spanners provides a first step towards monetizing knowledge-value based on communication. Though all of the aforementioned roles are relevant for knowledge exchanges to occur, Breunig and Roberts (2013) suggest that the role of boundary spanner is particularly important. Boundary spanners bridge different knowledge communications in which knowledge is produced and maintained, including their related interpretative schemata. Tushman and Scanlon (1981) indicate that boundary spanners are individuals who maintain a high level of contact with both the external environment and the internal organization, enabling them to diffuse, filter, and translate information across domains. Specifically, the translation aspect is relevant as information is recast in terms that can be understood and used by others (Allen, Tushman & Lee,

1979). Translation of work requires a 'common syntax, code, or heuristic' (Zhao & Anand, 2013: 1517), such as a value creation conceptual toolbox and accompanying constructs of value and profit drivers. Bringing this diversity of knowledge, practice, and learning together via boundary spanners provides a high potential to create new knowledge. Once entities that will fulfil the boundary spanner roles within an organization have been identified, the ties that connect different communities and knowledge repositories can be identified and made available for managerial interventions (Obstfeld, 2005). That is, identifying and managing the boundary spanner roles fulfils the first value creation step originating from connectivity. This supposition implies that there will be a boundary role 'discovery' process mediated through, for example, network analysis or deliberate construction (e.g., via a purposeful organizational design intervention involving the establishment of 'arenas') that creates a similar opportunity for conversion of knowledge into monetary value. Similarly, the various ideas that are pulled together via boundary spanner roles (and combined into novel knowledge configurations on that specific boundary spanning location) allow opportunities for alternative ways of configuring the monetary value encapsulated in each knowledge input to be identified (e.g., in terms of business or pricing models). Consequently, we suggest that:

Proposition 2: Boundary spanner roles provide a vehicle for monetization.

Boundary spanner individuals

The concept of boundary spanners is interdisciplinary and not novel. For example, within the communications discipline, they are sometimes referred to as "communication stars" (Tushman & Scanlan, 1981). Such "stars" are able not only to connect, but also to translate information into a format that conforms to an organization's decision-making processes. Internal communication stars are seen by their co-workers as being technically competent and having work-related expertize. These stars communicate significantly more often than non-stars with other areas in their close work environment, in the organization as a whole, and with areas outside the organization.

Considering the ideas of boundary spanners and communication together, it can be said that boundary spanners act as bridges between networks, and do so both intra-organizationally and inter-organizationally. This bridging activity refers to accessing and applying local knowledge across domains of application, combining it into novel understanding and insights. Boundary spanning as an activity is not entirely removed from the formal organization design; people occupying a high hierarchical position tend to

have more opportunities for establishing internal and external organizational ties and, thus, are more likely to act as boundary spanners (Manev & Stevenson, 2001). In other words, the existing organizational hierarchy and its corresponding responsibility design can act as a proxy for the uncovering of boundary spanning roles rather than deploying a full-fledged social network analysis. As a result, the internal responsibility accounting structure and its accompanying reporting system continues to be relevant for identifying monetization opportunities (Gupta & Govindarajan, 1991). In particular, the communication and bridging activities of 'bosses' (management work), provide flow denominators for knowledge value creation. Consequently, we suggest that:

Proposition 3: Communication patterns at boundary spanning, hierarchical nodes in the organization structure, provide the first opportunity to initiate knowledge monetization.

Some qualifications of boundary spanners include technical skills, economic skills, legal skills, network knowledge about the partner, and experiential knowledge gained through past interactions. Boundary spanners conceived as persons rather than as organizational formats, contain social qualifications, such as being autonomous, being an extravert, and displaying ambiguity-tolerant behavior in social settings. Typical communication abilities include conflict management, empathy, emotional stability, self-reflection, and cooperativeness. This list of individual characteristics can be used to identify boundary spanners by means of questionnaires issued within organizations (Ritter, 1999). For example, the authors of this paper used such a questionnaire to screen for boundary spanners as part of a communications instrument developed for the International Association of Business Communicators (Roberts, Simic-Brønn & Breunig, 2003). Human resource departments may possess in their skill and social profile databases information that can be used as a first-stage filter to prescreen, identify, and target specific individuals with the skill set and social characteristics desirable for boundary spanners for a subsequent boundary-spanning survey questionnaire.

Boundary spanner arenas

Insomuch as boundary spanner roles at a personal, individual level refer to "contactivity" in social networks, organizational formats also can fulfil this role. Typically, this role encompasses deliberate information flow interventions concentrated at a specific 'stoppage point' within an activity sequence or protocol, such as a handover within a larger project that is accompanied

by a milestone assessment (meeting, reporting, measurement) or a 'stage gate' moment in a new product development process. This 'stoppage point' creates a natural organizational arena that aggregates, combines, and reconfigures diverse knowledge inputs, commonly for subsequent use in activities downstream of the 'stoppage point'.

Purposeful design and the regular occurrence of the boundary spanning arena with a declared agenda of knowledge sharing are key. Hence, it is not a one-off moment related to a single project or special circumstance (as in project management), but rather a regular and systemic feature of an activity stream across projects. Thus, boundary spanning arenas should be visible on activity flow charts and embedded in organizational routines of knowledge work in terms of systemic debriefing and 'what did we learn?' agenda points and performance measures (Gasson, 2005). Although boundary spanning arenas may not be represented on an organizational chart, they can involve specific tasks and responsibilities that are allocated to individuals or functional expertize areas. Their exclusion makes sense because the boundary-spanning role would break down if it were to be locked into a specific domain, liaison role, or task force responsibility that is bounded by an agenda of coordination and the numerous standard operating rules involving reporting, key performance indicators, and budget accountabilities. These arenas tend to be located outside of existing, formal responsibility domains and at the periphery of the organization's focal activities, an idea which resonates with existing perceptions of where organizational learning takes place (Lave & Wenger, 1991). Consequently, we suggest that:

Proposition 4: Identifying communication arenas acts as a proxy for boundary spanning, communication patterns for the purpose of knowledge-based value creation, and its subsequent knowledge monetization.

Knowledge monetization opportunities

The monetization of knowledge can be conceived of as a form of capital conversion as inspired by Bourdieu (2008). Its aim is to exemplify the reciprocal interdependence between knowledge and financial resources without getting stuck in a 'the chicken or the egg' primacy argument. Both knowledge and financials are interrelated, with one driving the other and vice versa; financial resources are needed to create originating stocks and receptor pools as well as to make sure that knowledge actually flows. Vice versa, knowledge actively stored and mobilized within networks and 'spun' by boundary spanners acts as both a cost and revenue driver for a firm's financial success. To paraphrase a tired management slogan, people might be the organization's most important resource, but one needs to be able

to afford to convert knowledge carried by people into knowledge made financially productive for the organization. Ultimately, the argument here is for the sustainability of a firm's competitiveness: the conversion of non-financial (knowledge) resources into financial resources and back again is essential for being able to compete over time (Allee, 2008). Thus, conversion requires addressing how one can be expressed in terms of the other, showing the interdependence of the two.

Knowledge networks and the role of the boundary spanner in creating reciprocal interdependencies necessitate a requisite conceptualization towards the financial domain in terms of networks and patterns. Typically, such conceptualization addresses the area of cost behavior in which total costs are categorized as the sum of fixed and variable costs, allowing for the computation of profit (costs < revenues) or determination of breakeven status (costs = revenues). The patterns identified are related to the axiomatic form of the two cost categories (including (dis)proportional, progressive, regressive, and (non)linear costs or mixes thereof) following the canons of underlying microeconomic cost functions. As a result, patterns of cost behavior are understood as independent variables in a cost function, but do not generate a pattern beyond the domain defined (bounded) by the variables. Networked cost functions or patterns that transcend the initial domain of definition (e.g., a production cost function, a logistics cost function, a sales cost function etc.) are unfamiliar territory (Boons et al., 1992). However, we argue that we can avoid this problem area by using an identified communication pattern as the template for a commensurate and requisite cost behavior pattern. That is, by layering two patterns, an underlying communication pattern and an overlaying cost pattern, we can attempt to monetize the knowledge that flows through the communication pattern. Stated differently, it is not so much the knowledge itself that gets 'costed' but rather the 'pipelines' (patterns) through which it flows. This form of structural (behavioral) equivalence implies that the characteristics of the communication patterns are reflected by corresponding characteristics in the structure of the cost patterns. Thus, the characteristics of networked patterns in communication, such as centrality, density, frequency, and bridging, ought to be reflected in cost behavior patterns.

At this point, an effort to establish 'pattern matching' between the communication domain and the financial domain would benefit from avoiding as yet too narrow definitions. Rather than talking about 'cost patterns', it would be beneficial to use a wider and more inclusive definition of 'spending patterns'. The difference is that spending simply means a financial outlay disregarding its origin as cash, a cost, or an expense. Consequently, we suggest that:

Proposition 5: Monetization rests on pattern matching and establishing definitional equivalence between characteristics of communication patterns within social networks and spending patterns.

Spending patterns

For the purposes of this paper, we conceive of the organization as a network of networks in which networked relational clusters that can connect to one another exist. We also conceive of networks as conduits for knowledge transfer, with such transfer being motivated by and aimed at value creation (i.e., their purpose is legitimized upfront in the creation of their ties) (Zhao & Anand, 2013, p. 1518). Similarly, the organization as a 'network of networks' can connect to its external environment, which also consists of network clusters. The boundary spanner role here is to develop connectivity between network clusters with the relative success of its connectivity expressed in terms of membership: a well-connected organization has many memberships across multiple constituencies and stakeholder groups (networks). The latter can be understood as a metric of the relative success of organizational-level knowledge sharing and its 'situated learning'. Conversely, an organization (network of networks) that is not well connected will have barriers to knowledge sharing and transfer due to its distance from relevant networks and an absence of interfaces (connections). Boundary spanners (individuals or arenas) can be deployed to overcome this relative isolation and bridge the distance. In social network theory, this issue is addressed in terms of 'structural holes': collaboration produced by the bridging of networks with distinct, non-overlapping knowledge repositories (Burt, 2002; Ahuja, 2000). 'Structural holes' are not necessarily desirable. An organization may choose to isolate themselves, wholly or in part, for strategic reasons, such as for protection of proprietary knowledge or unique competencies.

Spending patterns can take one of two orientations: inflows (revenues) or outflows (costs). Revenue patterns are commonly referred to as 'revenue streams' with the patterns of relatedness left to the identification of 'revenue drivers', which can be causally interdependent in their occurrence over time (e.g., Thrane, 2002; Douglas & Douglas, 2004). In this respect, much is made of the use of "big data" to reveal patterns among revenue drivers. Typically, the point of departure is (customer) buying behaviors available in customer relationship management systems. Similarly, typical accounting tools, such as 'customer profitability analysis' and 'customer lifetime value', are grounded in prior knowledge of these revenue patterns.

Cost behavior patterns and their identification and visualization have a long history given their background in microeconomics (Boons et al.,

1992). This history also constitutes a barrier for change due to entrenchment in conventional wisdom and canonical knowledge. Spending patterns are intuitively understood in terms of their textbook meaning. However, we suggest, specifically, that a recent development in the so-called 'driver hierarchies' is relevant. The term cost driver was coined as part of the activity-based costing approach to cost allocation, representing a link between operational domain activities and financial resource consumption in the monetary domain (Foster & Gupta, 1990; Cooper et al., 1992). Drivers are operational factors that cause financials. The issue then becomes identifying relevant cost drivers and assessing the causal relationship between activities performed and financial resources consumed, that is, what leads to what, and how far the causal chain of interdependence should be followed.

Within network research, the issue of costs is used primarily as a decision-making criterion for the effectiveness of connectivity, thus ignoring the idea of patterns (Zhao & Anand, 2013). For example, when assessing the effectiveness of knowledge transfer by boundary spanners, Zhao and Anand argue that a 'collective bridge' of boundary spanners is more effective than a single boundary spanner. Their criterion for effectiveness is the costs for development and maintenance of network ties (i.e., connectivity), which are considered to consist of training, travel, and IT support. Typically, these costs can be viewed as interrelated; communication requires knowing who to connect to (IT support), to meet physically or in virtual space (IT support, travel), and to establish a common base condition for understanding (training). Zhao and Anand's definition of knowledge complexity as 'the extent of interdependencies and interactions among different subareas of the totality of the knowledge' (based on Simonin, 1999) hints at a suggestion of cost patterns as much as costs as stand-alone categories. 'Collective knowledge', which combines individual knowledge on specific subject areas with the knowledge of how to coordinate, share, distribute, and interpret the subject area knowledge, provides yet a further basis for considering patterns rather than individual cost categories or cost as a mere decision-making criterion. As a result, a consequence of focusing on cost patterns is that it enables knowledge to be considered as complex (as defined by interdependencies among the encompassed knowledge areas), implying that knowledge value should be considered as a combinatorial pattern rather than a point-item object or outcome (Tasselli, 2015). In other words, communication is as multiplex as its network conduit, as is its substance of exchange and its representation as a pattern. This concept preempts the question of whether knowledge value creation can be circumstantial or randomly incidental; collective knowledge defined as interdependencies already includes an assumption of contextual value-in-use.

Monetization can be reduced into an effort to identify drivers within spending patterns, with the spending patterns in turn being driven by the characteristics of the communication networks in which they operate. For example, if the network is of high centrality (revolves around one or a few individuals or arenas), high density (all communicating participants are closely related in time and space), and high frequency (communication occurs often), then there are three spending drivers. Moreover, if the communication ties between the participants are strong, a fourth spending driver is identified. The spending pattern that is the result of these four drivers is a multiplicit bundle of four financial origins that make up the structure of the communication activity: the central actors that initiate, the participants that are structurally near, the communication that is frequent, and the historical tenure of the communication. Each communication driver has its own associated variable, committed, and infrastructural spending levels that combine into an overall spending pattern that is a corollary of existing network characteristics.

Furthermore, in terms of spending patterns, monetization would follow a network dynamic in that it has no hierarchy (top or bottom), but rather a center and a periphery. Dynamics are thus defined in terms of centrifugal or centripetal forces (outward or inward). Spending patterns have a corresponding dynamic in that the patterns multiply (grow) outward or contract (shrink) inwardly. Obviously, a longitudinal perspective is needed to observe this dynamic with the spending patterns signaling knowledge sharing and value creation activities' increasing or diminishing returns to scale. Consequently, we suggest the following:

Proposition 6: Spending patterns are proxies for knowledge sharing and knowledge-based value creation with communication network characteristics acting as drivers and providing its longitudinal dynamics.

CONCLUSION

In this conceptual paper, we have addressed the research question: "How can we express knowledge in such a way that it can be monetized and made accessible to specific managerial interventions?" and distilled six propositions for future research on how accounting can be brought to bear onto the governable and calculable aspects of knowledge management.

The contribution of this paper is its addressing knowledge value creation at the level of communication flows within social networks. Networks represent a meso-level between individual actors and the organization, where the identification, visualization, and management of knowledge value creation can be operationalized. Communication flows use the organizational

format of communities of practice, so-called "communicaties", emphasizing boundary spanners and other connectivity roles held within a communication network (Hildreth & Kimble, 2004). The monetization of knowledge value revolves around identifying communication roles, each of which acts as a point of origin of expense patterns that reflect the knowledge value-creation process. Boundary-spanner expenses are expressed in financial terms, with expenditure patterns acting as multipliers (not aggregations) driven by the communication patterns initiated by a boundary spanner (role) within the network. The fact that communication is a commonly existing function within organizations—supported by both technology and specific human expertize, each with an accompanying set of databases— makes it a useful starting point for operationalizing knowledge value creation.

In this paper, we propose that the boundary-spanning role brings together diverse knowledge and provides a focal point for monetization efforts. Extant literature on organizational communication emphasizes the boundary-spanner role in the search for and combination of tacit knowledge and user experience (Tushman & Scanlon, 1981; Cross & Cummings, 2004; Levian & Vaast, 2005). We address how the boundary-spanner role is fundamental for this combinatory effort to occur. In addition, we address how these combinatory efforts within boundary-spanning roles can be extended to communication-enhancing regimes at the organizational level. Moreover, we show how monetization itself reflects a networked characteristic as a combinatory perspective (rather than conventional point-item aggregation) of flows. Therefore, we suggest that the argument starts from the resource consumption perspective (i.e., costing) rather than from the commonly used valuation or pricing perspective. The visualization of knowledge communication activities is important because it shows how the knowledge resources of a firm actually flow. The monetization aspect here falls back on the identification of the various communication roles, among which the boundary spanner role acts as a focal point for monetization. Consequently, we do not claim to provide an instrumental algorithm that converts knowledge into money. Rather, we intend to direct attention toward *where* to focus the conversion effort (boundary spanners), and how to build an argument of primarily *what* to convert (communication) as well as indicating *which* form such a conversion might take (multiplying patterns). In doing so, this work aims to bring the research and practitioner communities within the knowledge management field closer together (Metaxiotis, Ergazakis & Psarras, 2005).

The practical benefits of visualizing knowledge value creation by means of communication networks are twofold. First, the insight gained can be used to improve accountability. Visualizing the exchange of knowledge

within communication networks shows what one actually does, not what one says they do or what instructions/contracts/task descriptions say one's role is nominally. This transparency allows for an immediate allocation of accountability with a subsequent 'reality capture' in terms of localized metrics and relevant costs. The practical benefit, thus, is not in suggesting that spending on communication networks is equivalent to the creation of value. Rather, that value originates from looking at communication network roles and spending patterns in relationship to each other, with the implication that close matches are preferable. This statement is open to empirical validation by future research. Second, communicating the knowledge flows within an organization to its external constituencies has an external and immediate usefulness. It is a form of "turning the firm inside out" towards, for example, customers and suppliers (notably in industrial and B2B markets), showing how expertize and knowledge resources are internally connected and made productive, including how management coordinates, enhances, and directs knowledge resource flows.

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Abstract (in Polish)

W niniejszym, koncepcyjnym, artykule sugerujemy, że przepływ wiedzy jest prekursorem tworzenia wartości poprzez swój komponent komunikacyjny. Wiedza staje się coraz bardziej akceptowana jako źródło tworzenia wartości i różnicowania między firmami. Jednak w znacznym stopniu obecne podejścia do zarządzania i zarządzania zasobami wiedzy wskazują na pomiary zasobów wiedzy. Dlatego postulujemy, że aby zrozumieć dzielenie się wiedzą, trzeba zaczerpnąć z teorii komunikacji w celu wypromowania słownictwa używanego we wzorcach komunikacji. Opierając się na wiedzy jako przepływie, a postulując że wartość opiera się na wykorzystaniu wiedzy, a nie na posiadaniu wiedzy, niniejszy artykuł opowiada na pytanie badawcze: „Jak możemy wyrazić wiedzę w taki sposób, aby mogła być zmonetyzowana i dostępna do konkretnych celów kierowniczych? Wyjaśniamy, w jaki sposób komunikacja ma zasadnicze znaczenie w zdobywaniu wiedzy i pozwala na połączenie z wartością pieniężną. Dalsza literatura na temat znaczenia komunikacji w organizacji podkreśla rolę, jaką odgrywają pracownicy przekraczający granice organizacji w poszukiwaniu i połączeniu doświadczeń z wiedzą milczącą. Poszczególne węzły w sieciach organizacyjnych mogą posiadać wiedzę. Jednakże, aby być cennym, zasoby wiedzy muszą być rozmieszczone i wykorzystane. Wykorzystanie wiedzy obejmie przekazanie tej wiedzy poprzez powiązania z innymi węzłami. W artykule proponuje się, aby role rozciągające granice stały się centralnym punktem dla takich działań w zakresie monetyzacji.
***Słowa kluczowe**: pracownicy przekraczający granice organizacji; monetyzacja; komunikacja; przepływ wiedzy; dzielenie się wiedzą.*

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Virtual Knowledge Sharing in Crowdsourcing: Measurement Dilemmas

***Regina Lenart-Gansiniec*[1]**

Abstract

One relatively new area of contemporary science research on management is crowdsourcing and virtual knowledge sharing occurring within it. It is defined as the dissemination of knowledge by a virtual community, informing others, making it public, expecting that others will comment on this knowledge, expand and complete it. Such a sharing of knowledge is particularly important for co-creating, participating, or acquiring innovative ideas by an organization. However, despite its positive impact on the organization, it has not been the subject of comprehensive research so far. This article presents the existing output in the scope of the ways of measuring community knowledge sharing within crowdsourcing. In this elaboration, explanations as to why it is worth studying virtual knowledge sharing may be found.

Keywords: *virtual knowledge sharing; virtual community; measurement.*

INTRODUCTION

In the literature on management it has been pointed out that knowledge is a resource, which may be the source of above average economic benefits, economic rent, and it also enables solutions to organizational problems (Bollinger & Smith, 2001, pp. 8-18; Krupski, Niemczyk & Stańczyk-Hugiet, 2009, p. 80). In order for organizations to tap into this potential, treating knowledge in an appropriate way and unconventional solutions are important (Kowalczyk & Nogalski, 2007, p. 33). Knowledge should be subject to constant identification, measurement, acquiring, development, use, and protection. It gains in strategic importance at the moment of its use (Yang, 2007) and transfer or exchange.

Knowledge sharing is considered a critical condition for every organization, a factor of creating new knowledge, creating innovations (Liao,

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2006), improving individual and organizational efficiency (Quigley, Tesluk, Locke & Bartol, 2007), making changes and adapting to the requirements of the environment (Sharratt & Usoro, 2003) as well as achieving a durable competitive advantage. The assumption underlying knowledge sharing is that an essential condition is diversification of the participants in the sharing process (Nonaka & Takeuchi, 1995; Wenger, 1998). From this perspective, crowdsourcing gains in importance, particularly taking into account its potential related to its ability to simultaneously acquire human knowledge from many sources, which are located outside the organization (Howe, 2008; Brabham, 2008; Lodge & Wegrich, 2014). The basis is the co-creation of knowledge according to the rules of voluntary collaboration of many Internet users (Chiu et al., 2006; Sloane, 2011).

An organization should above all reach for resources which are located beyond its borders. Knowledge may be acquired by collaboration with other entities, but also from communities of practitioners. Along with the growth of the importance of information and communication technologies, it has been pointed out more and more often that organizations may reach for information, which is found in virtual communities. They not only constitute the knowledge basis, but they also want to co-participate in organization creation. Knowledge sharing is for them a way of life (Din & Haron, 2012). This process is defined as the dissemination of knowledge by the virtual community, informing others, making it public, expecting that others will comment on this knowledge, expand and complete it. The basis is the co-creating of knowledge by means of voluntary collaboration of many Internet users (Sloane, 2011). In the literature, the importance of trust towards the organization and other members of the virtual community gathered around a crowdsourcing platform, the level and way of participation, the ability and will to share knowledge, a feeling of a virtual community, and congruence value, have all been emphasized.

Although, crowdsourcing is an idea based on the crowd's sharing of its knowledge, ideas, and projects and acquiring this knowledge by the organization – the existing elaborations, mainly theoretical, have focused above all on the crowd's motivation and the factors impacting virtual knowledge sharing. The issue of measuring virtual knowledge sharing in the context of crowdsourcing is, however, omitted (Kosonen et al., 2013). The goal of this article is to identify the ways or methods of measuring the community's knowledge sharing in crowdsourcing. Based on this, and taking into consideration the related scarcity, an original measuring method has been proposed. In the elaboration it is also possible to find explanations as to why it is worth studying virtual knowledge sharing. The article is based on the results of a review of Polish and foreign literature from the years 2006-2017.

The article is composed of three parts. The first part contains definitions of the virtual community, knowledge sharing, and virtual knowledge sharing. In the second part the notion and essence of crowdsourcing are included. The last and third part focuses on a review of the ways of measuring virtual knowledge sharing.

LITERATURE REVIEW

Virtual communities

Virtual communities are expressed as an aggregation of persons or business partners that collaborate with one another, which is based on common goals, interests, needs, or other activity. The basis is constituted by a will to be a part of a community. Other definitions express them as self-defining networks of interactive communication, organized around each interest or aims (Pańkowska, 2007). They communicate regularly with each other by means of electronic media and they have common interests (Romm, Pliskin & Clarke, 1997). These communities are characterized by the following conditions: repeated involvement, active participation, strong emotional bonds, and common actions, access to common resources and defining the rules of access to them, mutuality of information, support, common context of social convention, language, and protocol, a will to interact in order to satisfy one's needs, common interests, norms which guide the relationships, and computer systems which assure support and integrity among members.

In addition they are characterized by the fact that they are not geographically or territorially limited, communication between them does not have to take place in real time, nonverbal communication is replaced by the so-called emoticons, and interactions between the members are very often anonymous. Moreover, as Wadhwa & Kotha (1999) point out, virtual communities form around common needs, whereas the members are people who are usually in a better financial situation, better educated, and have constant access to the Internet. The fact of being a member is intended, purposeful, and rational and it enables the creation of social relations (Lu, Zhao & Wang, 2010), and intense and strong emotional bonds (Whittaker, Issacs & O'Day, 1997). Each virtual community has its own culture and expectations, norms, and values, conditions of access to resources, information, assistance, and services to its members. Their interactions are based on an ongoing, multilateral exchange, which takes place through online communication (Murphy, 1997).

Knowledge sharing

Knowledge sharing is one of the key elements of the whole process of knowledge management and a critical stage of acquiring knowledge. It is defined as a process of disseminating knowledge within a specific group of employees (Van den Hooff & De Ridder, 2004), focused on exploiting the existing knowledge and identifying the existing and accessible knowledge in order to pass (transfer) and use to achieve a better, faster, or cheaper execution of a given task than would happen without sharing knowledge. It is a diversified action, based on exchange relations, which contain expectations for obtaining financial and non-financial benefits in the future for people participating in this process (Reychav & Weisberg, 2009). It mainly consists of providing information connected with a task or know-how (Wang, Noe, 2010). Knowledge sharing includes the process of communication, in which two or more parties take part in providing and acquiring knowledge (Usoro, Sharratt, Tsui & Shekhara, 2007). It occurs when people mutually share overt or hidden knowledge in order to create new knowledge (Van den Hooff & de Leeuw van Weenen, 2004).

Knowledge sharing is considered a critical condition for every organization (Majchrzak & Malhotra, 2013), a factor of creating new knowledge, creating innovation (Liao, 2006), improving individual and organizational efficiency (Verburg & Andriessen, 2011), making changes and adapting to the requirements of the surroundings (Sharratt & Usoro, 2003) and obtaining a durable competitive advantage (Van den Hooff & De Ridder, 2004). In order to reach for these possibilities it is required that the members of an organization share their knowledge (Nissen, 2007). At the basis of knowledge sharing is a process, which preceded the creation of organizational knowledge, an assumption that the necessary condition is the diversity of the participants of this exchange process (Nonaka & Takeuchi, 1995; Wenger, 1998). In addition, a surplus and diversity of knowledge is the source of creating something new.

Virtual knowledge sharing

As has already been mentioned, knowledge sharing is defined in the literature as a process of disseminating knowledge within a specific group. However, beside this concept such concepts as "virtual knowledge sharing" and "community knowledge sharing" may be found. Importantly, it should be emphasized that these concepts are not identical. Virtual knowledge sharing is in short sharing knowledge about a given subject by virtual communities. However, a virtual community is defined herein as an aggregation of individuals or business partners who interact around a shared interest,

where the interaction is at least partially supported and/or mediated by technology and guided by some protocols or norms (Lee et al., 2003; Preece, 2000). In turn, community knowledge sharing is sharing knowledge within communities of practices to provide a platform for employees to share professional knowledge and gain knowledge for professional development. It is a group of people who share common interests, goals, or practices and share information and knowledge (Liu et al., 2011).

Virtual knowledge sharing refers to three aspects: (1) interactions between people in a knowledge network; (2) on-line environments; (3) knowledge sharing in an on-line process. It is defined as the dissemination of knowledge by the virtual community, informing others, making it public, expecting that others will comment on this knowledge, expand and complete it. It refers to knowledge sharing using IT technology (Li, Downey & Wentling, 2008). The basis is co-creating knowledge on the basis of collaboration of many Internet users (Sloane, 2011) and technologies, which enable delegating and reacting (Wasko & Faraj, 2005). In the literature, the importance of engaging in social interactions, building of public welfare (Wasko & Faraj, 2005), trust towards the organization and other members of the virtual community gathered around an Internet platform, the level and way of participating, an ability and willingness to share knowledge, a feeling of a virtual community, and congruence value, are all emphasized. Despite the fact that virtual knowledge sharing is a specific case of knowledge sharing those elements, which contribute to knowledge sharing becoming virtual knowledge sharing are worth pointing out (Table 1).

Table 1. Comparison of knowledge sharing and virtual knowledge sharing

Criterion	Knowledge sharing	Virtual knowledge sharing
Synonyms	Knowledge sharing	Online knowledge sharing, virtual knowledge sharing
Processes	Externalization (explaining, coding, transfer from hidden to overt knowledge), internalization (seeking a goal in knowledge acquiring, transfer from overt to hidden knowledge)	Externalization (explaining, coding, transfer from hidden to overt knowledge), internalization (seeking a goal in knowledge acquiring, transfer from overt to hidden knowledge)
Knowledge type	Overt and silent knowledge	Overt and silent knowledge
Way	Formal and informal communication methods	Social media, discussion forums, e-mails, blogs, electronic bulletins, crowdsourcing platforms
Stages	Transferring acquired, processed, and gathered knowledge to lower organization levels	Necessity of having Internet access, creating an account and logging onto a special platform, entries on a website, starting a discussion with other members of the virtual community, coordination

Criterion	Knowledge sharing	Virtual knowledge sharing
Goals	Gaining experience, joining in creating of new knowledge, improvement of organizational effectiveness	Strengthening of the professional reputation of the virtual community members, altruistic, conformist, receiving a financial award, gaining prestige, will to be seen by others, acquiring of new knowledge (organization)
Actions	Individuals adapt their beliefs, actions through more or less intensive interactions, members of the organization share ideas, suggestions, and expert knowledge among themselves	Appearance of a reply to an online request for assistance, problem solving
Relations	People-people relations, level of individual knowledge of the employees, who possess it, and the organization level	Relations with other members of the virtual community

It is pointed out in the literature that people in virtual communities do almost everything, which they do in real life, only that they leave their bodies outside reality (De Kerckhove, 2001). Nonetheless, some differences appear between knowledge sharing and virtual knowledge sharing, which were grouped according to: process course, benefits, technologies, and motivation.

Environment

In virtual knowledge sharing it is important to create an environment of sharing knowledge, coordination of virtual community's actions, gaining trust and satisfaction of virtual community members, which may next increase their efficiency. The Internet is of special importance. It supports knowledge sharing amongst the organization's members, and it contributes to disseminating and sharing information and knowledge (Van Doodewaard, 2006). It enables the levelling of barriers and particularly those connected with the distance between employees or teams and locating the possessors of knowledge and potential recipients. The latter entails, therefore, significant challenges, even those resulting from a lack of possibility to use nonverbal communication.

Benefits

Sharing knowledge is considered the key factor of a company's success (Davenport & Prusak, 1998). It may contribute to increasing the efficiency of a given group of employees, coordination of other processes in a given organization (Alavi & Leidner, 1999; Salisbury, 2003), competitive advantage, cost reduction, accelerating realization of new product development projects, innovative potential, sales and income growth from new products and

services (Arthur & Huntley, 2005; Collins & Smith, 2006; Cummings, 2004; Hansen, 2002; Lin, 2007; Mesmer-Magnus & DeChurch, 2009), changing and developing organizational competences, collaboration, which may give a basis for creating innovative solutions. It is imperative in transforming individual knowledge into organizational knowledge, as it also stimulates the creation of new ideas, and creates new products (Hong, Doll, Revilla & Nahm, 2011). Moreover, it constitutes an element of many management concepts, among others: team work management, knowledge management, comprehensive quality management, an organizational learning (Rudawska, 2013). Virtual knowledge sharing can increase the creativity and quality of communication (Charband & Navimipour, 2016), employee productivity and efficiency, creativity, quality of communication, increase the possibility of achieving success by the organization, and learning optimising.

Motivation

In knowledge sharing, motivation along with experience, education, and perspectives constitutes the "critical step" (Nonaka & Takeuchi, 2000). The will and willingness of people, who possess and develop their knowledge for knowledge sharing alone means that it is possible to increase the value of organizational knowledge (Ipe, 2003). In knowledge sharing, the motives may be as follows: integration of employees with the organization's goals, connecting the individual perspective with the organizational one, orientation towards the future, readiness to give up existing knowledge, experiences, and skills, lack of fear of novelty, willingness to search for new solutions, readiness to imitate the ideas of others, clear and transparent criteria of awarding, a feeling of participating in the organization's development (Kożuch & Lenart-Gansiniec, 2016). In virtual knowledge sharing a large significance of motivational factors is emphasized - it is indicated that people do not share knowledge only because they have access to the intranet. The most important ones include, among others: possibility of creating new products (Fuchs & Schreier, 2011), innovation (Füller & Matzler, 2007; Sawhney et al., 2005), interacting with other members of the virtual community (Faraj et al., 2011; Von Hippel et al., 2011; Sawhney et al., 2005), testing one's skills, facing a difficult task and a willingness to learn something new, developing knowledge (Sloane, 2011), which is important for the organization's growth (Nooteboom, 2000). Another reason is also knowledge sharing. Despite the fact that the last motive is indicated as important in crowdsourcing, it is omitted in the subject literature (Zheng et al., 2011).

Crowdsourcing

The notion of crowdsourcing appeared for the first time in the subject literature in 2006, and is attributed to Howe. He defined crowdsourcing as an "act of a company or institution taking a function once performed by employees and outsourcing it to an undefined (and generally large) network of people in the form of an open call. This can take the form of peer-production (when the job is performed collaboratively), but is also often undertaken by sole individuals" (Howe, 2006). With time, the author expanded this definition by using the rules of an open source, not only in the scope of programming, but also delegating tasks to the crowd, adapting the crowd's talent and knowledge to the organization's needs.

It should also be mentioned that crowdsourcing – taking into consideration its versatility – is used by researchers to explain various phenomena, including many perspectives (Table 2).

Table 2. Crowdsourcing research perspective

Author	Perspective	Problematic aspects discussed
Afuah & Tucci (2012); Pénin & Burger-Helmchen (2011)	Behavioral and evolutionary theories of the company:	Problem solving
Afuah & Tucci (2012)	Organizational ambidexterity	Problem solving
Horton & Chilton (2010); Schenk & Guittard (2011)	Agency theory	Problem solving
DiPalantino & Vojnovic (2009); Archak & Sundararajan (2009)	Auction theory	Problem solving
Jeppesen & Lakhani (2010) (2010); Pénin & Burger-Helmchen (2011)	Knowledge management	Generating ideas, creating innovations
Afuah & Tucci (2012); Pénin & Burger-Helmchen (2011)	Transaction cost theory	Generating ideas, creating innovations
Lane (2010)	Value chain	Generating ideas, creating innovations
Trompette (2008)	Innovation theory	Generating ideas, creating innovations
Bayus (2010)	Motivation support theory	Motivation in crowdsourcing
Bayus (2010)	Cognitive evaluation theory	Motivation in crowdsourcing
Leimeister et al. (2009)	MIAB Mode	Motivation in crowdsourcing
Bayus (2010); Schlagwein & Bjørn-Andersen (2014)	Organizational learning	Acquiring knowledge from the crowd
Mazzola & Distefano (2010)	Strategic management	Decision making

Source: authors' work based on Majchrzak & Malhotra (2013).

Crowdsourcing is deemed an expression of open innovations (Sloane, 2011). What links crowdsourcing and open innovations is reaching for knowledge, ideas, opinions of the virtual community (Pichlak, 2012).

Crowdsourcing also contributes to solving problems, creating innovations, optimising costs of the organization's activity, or it is formulated as a marketing and customer collaboration tool. Crowdsourcing may constitute a source of competitive advantage (Leimeister & Zogaj, 2013). The possibilities of making use of crowdsourcing to improve business processes have been emphasized (Brabham, 2008). Taking into consideration its potential, it enables access to the resources of knowledge and creativity, and it facilitates acquiring new contents and data (Kowalska, 2015). However, these problematic aspects have so far been identified only to a small extent.

Dimensions of crowdsourcing

Crowdsourcing is a multilevel term. Beside the level of the organization in the process the issue of the crowd appears. It is deemed in the literature as one of the *sine qua non* conditions of crowdsourcing (Surowiecki, 2004).

Most authors agree that the principal substance of crowdsourcing is the crowd's wisdom (Surowiecki, 2004). The crowd in crowdsourcing is not an unorganized, chaotic group, but it is rather a collectivity which expresses the will to react and be involved. It becomes a specific virtual community that is connected by interactions, relations, and common knowledge (Rheingold, 1993). It constitutes a confirmation that in crowdsourcing the group may achieve and work out more benefits than any expert. Its remit is performing tasks, solving problems, or taking on any type of activity (Basto, Flavin & Patino, 2010). By the same token, the organization's motivation to make use of the crowd's wisdom is important. Many authors emphasize the necessity of remuneration for the crowd for the tasks performed (Vukovic, Mariana & Laredo, 2009) and other motivators, e.g. social recognition, entertainment value, or money. Others point out that a task should be performed for free or for much less than the costs incurred by the firm (Kleeman, Voss & Rieder, 2008). Some authors suggest that the best situation is one in which the award is not important and the motivation would be passion or participation in amusement (Stewart, Huerta & Sader, 2009).

In the literature the initiator is called the "crowdsourcer", thus a person or an organization, which can mobilize a potentially useful crowd to take action (Franke et al., 2006). The initiator may be a private person, organization, institution, or local government unit. In most cases the initiators are commercial organizations. They can also be public organizations as well as private persons. This means that crowdsourcing is not only a business model for firms, but also a tool for solving problems for governmental or non-profit sectors (Brabham, 2008). In this connection, it may be ascertained that a crowdsourcer may be a given unit that possesses resources, an

appropriate supply base (access to a platform, project promotion, payment of remuneration) to carry out an initiative.

The Internet and open collaboration with the crowd/virtual community gain importance here. The process may be directed outside, and then the crowd is asked to solve a given problem. The issue of a production model or partner production also appears which is based on collaboration and sharing resources and production results within it. Few authors express crowdsourcing as a process of open innovations, work organization (Whitla, 2009), or customer integration (Kleeman, Voss & Rieder, 2008). In these approaches it is possible to see common points: online process, Internet, crowd participation, an open call. The last one may be directed at all interested parties, limited to a community, which possesses specializt knowledge or the call limited and controlled by the organization (Whitla, 2009).

RESEARCH METHODS

As previously mentioned, the primary aim of this article is to identify the ways or methods of measuring a community's knowledge sharing in crowdsourcing. Based on this, and taking into consideration the related scarcity, an original measuring method has been proposed. To this end, the methodology of a systematic literature review was applied. One of the main reasons for using this methodology is the need for a methodological regime, which is important if we are willing to fulfil the rule of continuity. As opposed to traditional literature reviews, a systematic literature review enables avoiding the dangers stemming out of subjectivism, a lack of a systematic approach, and prejudice. According to its methodology, the entire procedure includes three stages: (1) selecting databases and a collection of publications, (2) selection of the publications and development of a database, (3) bibliometric analysis, contents analysis, and verification of the usefulness of the obtained results for further research. The first stage constituted a choice of subject for research. This concerned specifying a collection of publications, which would be analysed. The basis at this point was selecting the databases. The analysis covered full text, large databases which include the majority of journals dealing with strategic management i.e. Ebsco, Elsevier/Springer, Emerald, Proquest, Scopus, and ISI Web of Science. In order to establish the state of knowledge and existing findings, a review of the Polish databases BazEkon, and CEON was also carried out. They were selected owing to their integrity and completeness. The reason for using several databases simultaneously is down to their diverse range and the gathered resources and sources. The principal issue in defining the collection of publications is the choice

of key words connected with the subject of research in order to identify potentially significant scientific articles from the point of view of the analysed problematic aspects. In each of the above-mentioned databases, key words were used which met the following criteria of inclusion: "*crowdsourcing"*, "*crowd sourcing*" in the abstract, title, and key words. The base of publications obtained in such a way was further analysed and selected in the next stages. As a result of searching through the chosen databases, over 46,000 publications were selected from English language bases and 388 were selected from Polish language bases.

The second stage is based on imposing limitations and database selection according to the "snowball" procedure. Therefore, the following limitations were imposed on the identified articles: full text, reviewed publications and the area of management sciences. Publications related to IT, social, technical, mathematical, medical sciences, and humanities were excluded from the collection. Duplicating publications, books, dissertations, and book chapters were eliminated. Articles in their full version, published in journals and the so-called *proceedings* were included.

The third stage is the basis for identifying the areas for further research exploration, valuable from a cognitive point of view and important for the development of the theory of management. At this stage, the usefulness of the obtained elaborations for the realization of the research aims was verified. Those publications, which did not strictly concern crowdsourcing, but rather treated it as a secondary subject, were discarded. Only those publications, whose leading object of analyses had the term *"crowdsourcing*" in the title and key words, were deemed important from a research point of view. As a result, a literature base was obtained in the form of 54 publications selected from English language bases and 41 publications selected from Polish language bases. In the next stages, a total of 95 publications were further analysed using bibliometric techniques, including the frequency, number of publications, and citations. At this stage an analysis of the contents was also carried out, which enabled determining the findings of other researchers and their evaluation, and also organising the research findings. The results of this systematic literature review have been presented in the second part of this article.

Measurement of virtual knowledge sharing in crowdsourcing

Measuring virtual knowledge sharing may turn out to be a difficult process, for instance taking into account the intangibility of knowledge and, what is more, measuring knowledge requires the usage of many disciplines, among others psychology, sociology, or sciences dealing with organizational

behaviors. Despite the fact that many researchers have made attempts to understand virtual knowledge sharing in the context of crowdsourcing some difficulties with direct measurement may be observed (Ko et al., 2005). The existing research may be brought down to two directions: (1) making use of psychological models of behavior, (2) models of knowledge sharing. In the case of models of behavior, the authors referred to the following theories (Table 3): Cognitive Evaluation Theory (Zhao & Zhu, 2014), Self-Determination Theory (Cupido & Ophoff, 2014), Theory of Reasoned Action (Fishbein & Ajzen, 1975), Theory of Planned Behavior (Ajzen, 1991), Social Exchange Theory, Social Comparison Theory. Few developed original models of knowledge sharing, for example Knowledge Sharing Model by Ma and Yuen (2011). Many authors build on the proposal of Wasko and Faraj (2005), which expresses the model of knowledge sharing – referring to the theory of capital and the social cognitive theory. The notion of social cognitive theory was introduced by Hsu, Ju, Yen and Chang (2007), whereas the theory of social and personal investments was proposed by Chang and Chuang (2011). A compilation of the ways to measure virtual knowledge sharing was presented in Table 3.

Table 3. Ways of measuring virtual knowledge sharing

Author(s)	Way of measuring	Measurement metrics
Chiu, Hsu & Wang (2006)	Cognitive evaluation theory	need for autonomy, competence and social relationship, social context of events (e.g. feedback, communication, awards), financial awards
Yoon & Rolland (2012)	Self determination theory	internal autonomous motivation, controlled, and external, giving of satisfaction and possibility of freedom of behavior. Knowledge sharing is motivation per se for virtual communities
Wiertz & deRuyter (2007); Nambisan & Baron (2007); Wasko & Faraj (2005)	Theory of reasoned action	expected return on knowledge sharing, absorptive ability and self-evaluation. People behave in a rational way and when they take up a given activity they consider the possible consequences of their action and the possessed knowledge about the consequences and the so-called subjective norms lie at the heart of the intention, which precedes a given behavior
Jeppesen & Frederiksen (2006); Roberts et al., (2006); Wasko & Faraj, (2000); Nambisan & Baron (2007, 2009); Hsu et al. (2007)	Theory of planned behavior	inclination to trust, benefits of learning, social benefits, contentment, appreciation by other members of the virtual community, appreciation by the organization
Pierro et al. (2008); Spindeldreher & Schlagwein (2016)	Inventory of work preference	external and internal motivation
Heo & Toomey (2015)	Social comparison theory	need for assessing one's own abilities, features in order to obtain an accurate vision of oneself

Author(s)	Way of measuring	Measurement metrics
Lai & Chen (2014)	Extrinsic motivation, intrinsic motivation, and intracommunity factors	harmony, reputation, mutuality, joy in helping others, knowing ones' efficiency
Cheung et al. (2013)	Social cognitive theory and expectation disconfirmation theory	knowing one's efficiency
Oh (2012)	Social exchange theory and weak tie theory	harmony, reputation, mutuality, joy in helping others, knowing ones' efficiency
Chang & Chuang (2011)	Social capital theory	harmony, reputation, mutuality, joy in helping others, trust
Ho et al. (2011)	Theory of planned behavior	reciprocity, enjoyment in helping others, peer influence, knowledge self-efficacy, resource availability.
Jeon, Kim, and Koh (2011)	Theory of planned behavior model, motivation theory	reputation, reciprocity, enjoyment in helping others, resource availability.
Cho et al. (2010)	Theory of planned behavior	reputation, reciprocity, enjoyment in helping other, knowledge self-efficacy
Chen & Hung (2010	Social exchange theory and social capital theory	perceived usefulness, compatibility, reciprocity, interpersonal trust, knowledge self-efficacy
Tseng & Kuo (2010)	Social cognitive theory and social capital theory	interpersonal trust, knowledge self-efficacy
Phang, Kankanhalli & Sabherwal (2009)	Social exchange theory	perceived ease of use
Marett & Joshi (2009)	Self-determination theory	reputation, reciprocity
Lin et al. (2009)	Social cognitive theory	perceived usefulness, compatibility; reciprocity; interpersonal trust, knowledge self-efficacy;
Hsu et al. (2007)	Social cognitive theory	trust, knowing one's own efficiency
Chiu et al. (2006)	Social cognitive theory and social capital theory	mutuality, trust
Wasko & Faraj (2005)	Social exchange theory and social capital theory	reputation, mutuality, joy in helping others

The psychological models assume that the behaviors of virtual communities depend on individual motivations (Wasko & Faraj, 2000), expected benefits, attitudes towards knowledge sharing and the readiness to trust other members of the virtual community. Therefore, it is a mixture of inclination to trust, motivation, and actual knowledge sharing.

The Cognitive Evaluation Theory assumes that in favourable conditions the internal motivation for action will develop. The social context of events is contributory, for example: feedback, communication, or awards. A feeling of competence will not cause an increase in motivation - however a feeling of internal autonomy may strengthen the chances for motivation to appear. The competences and autonomy play a critical role here. Few authors make use of this theory to analyse virtual knowledge sharing. Zhao and Zhu (2012) developed a conceptual model of using this theory to study the participation of the virtual community in crowdsourcing. In the authors' opinion, this theory enables the identification of a participant's motivation in sharing knowledge in crowdsourcing platforms. Crowdsourcing contributes to autonomy, development of competences, relationship and leadership of the virtual communities. It also enables: analysing, explaining, predicting, explaining and predicting, and design. However, this proposal has never been tested.

The essence of the Self-Determination Theory is the three psychological needs of the human being, which constitute the basis of motivation, i.e.: autonomy, competence, and relationship. The need for autonomy assumes a longing for experiencing a psychological freedom of behavior (Deci & Ryan, 2000). The need for competence includes a will to achieve or interact, without unwanted effects. The need for relationship refers to the will to establish cooperation with others who have similar interests. According to the Self-Determination Theory satisfying those needs has an influence which is motivating and encouraging for taking action. Research on virtual knowledge sharing in the context of this theory was conducted by Jacobs (2016). The research question was: to what extent does knowledge-sharing behavior within a Virtual Community of Practice relate to perceived autonomy, competence and relatedness at work, and the employees' level of commitment to the organization? The research covered 270 employees at Rabobank of Rijk van Nijmegen. The variable level of activity was measured using a scale developed by Lin, Hung and Chen (2009). The scale consisted of four items that took the form of statements which were anchored by a seven-point Likert scale. The author considers this theory is suitable for research on virtual knowledge sharing since it includes the issue of involvement in knowledge sharing, which is often omitted by other authors. Yoon and Rolland (2012) conducted research into the scope of behaviors related to knowledge sharing. The research model was tested with data from a cross-sectional survey of virtual community members collected from Korea. The questionnaire contained measurements for perceived autonomy, perceived competence, and perceived relatedness adapted from the Basic Need Satisfaction Scale developed by Deci and Ryan (2000). The measurements for familiarity construct were adapted from Gefen's study. The items for

perceived anonymity were adapted from Chua & Jiang's study, and the items for knowledge sharing behavior were adapted from Lin et al.'s study. The proposed questionnaire takes into account all issues connected with virtual knowledge sharing. Lai and Chen (2014) used the scale of reputation by Kankanhalli et al. (2005) to identify motivating factors, mutuality by Davenport and Prusak (1998), joy in helping others by Wasko and Faraj (2000), knowledge of own efficiency by Spreitzer (1996), enthusiasm by Koh and Kim (2003), online activity by Jang and Ko (2010), joy by Koh and Kim (2003), and intention of sharing knowledge by Ajzen (1991). The research covered 324 users of the Mobile01 platform. The authors also made reference to the theory of Deci and Ryan, 1980, according to which a person internally motivated more willingly engages in actions.

The theory of reasoned action and the theory of planned behavior (Ajzen, 1991) are used for understanding the behaviors of Internet store customers, but also for evaluating intentions in knowledge sharing. Within the theory of reasoned action people behave in a rational way and while taking up a given activity they consider the potential consequences of their action and the possessed knowledge about the consequences and the so-called subjective norms lie at the heart of the intention which precedes a given behavior. The theory of planned behavior (Ajzen, 1991) assumes that knowledge sharing may be measured using factors, which impact behavior, i.e.: 1) attitude toward the behavior, (2) social norms regarding the behavior, and (3) beliefs about one's control over the behavior. An attitude is considered to be the degree, which evaluates a behavior as positive or unfavourable. A subjective norm is the perceived social pressure, whereas control beliefs concern the possessed skills, resources, and possibilities of getting involved in a behavior. If the control beliefs reflect the actual influence of an individual on a situation, it may be treated as a direct predictor of the behavior. If, however, it does not reflect the actual control, it determines the behavior in an indirect way. Sciences have used this theory to analyse knowledge-sharing behavior (Bock, Zmud, Kim & Lee, 2005). For instance Martinez (2017) used this theory to study the motivation of virtual communities in the scope of creating in crowdsourcing, taking into account the indirect role of trust towards a platform. In the author's opinion it may decrease unsurety and favour knowledge sharing. The empirical setting of this paper is Kaggle (www.kaggle.com), the world's leading online platform for predictive modelling competitions. Participation intention refers to the solver's willingness to participate in prediction competitions.

According to the Theory of Planned Behavior (TPB) (Ajzen, 1991), the stronger the intention is the more likely it will be to participate. For the measurement the author created her own measurement tool composed

of the following elements: autonomy, variability of tasks, complexity of competition, solving of tasks, specialization (Morgeson & Humphrey, 2006), internal motivation, intention to act (Zeng et al., 2011), and trust. Although the tool includes virtual knowledge sharing, the questions focus more on the motivation of the virtual community to create innovative solutions. Bakici, Almirall and Wareham (2013) deemed that the theory of planned behavior will provide a very good foundation for us to investigate the motivations of participators to open innovation intermediaries. In their research, intention is referred to as an individual's willingness to participate in open innovation intermediaries. To test the Theory of Planned Behavior model in an open innovation intermediary context, they conducted a Web-based survey on the Atizo community. The measurement scale included the following components: Intrinsic Rewards, Extrinsic Rewards, Participation, Attitude, Perceived Behavioral Control, Subjective Norm, and Intention to Participate. The authors discovered that development, play, pleasure, membership in the community, and reputation – constitute the motivation to participate in virtual communities. The applied tool did not focus on virtual knowledge sharing. The scale takes into account the intention to share knowledge Marett & Joshi (2009) ("KSI1" If I had some knowledge about a topic, I would consider posting it on the online community website", "KSI2 If I had some knowledge regarding a question someone asked, I would share this knowledge with others") – which does not reflect the idea of virtual knowledge sharing. Kosonen et al. (2014), based on the above-mentioned theories, constructed their own research tool – a questionnaire posted on the Internet (Likert's 7-point scale). 283 Internet users participated in the research study (39 questionnaires were rejected; the return rate was 83.3%). The following measurements were included in the research study: an inclination to trust, benefits of learning, social benefits, contentment, appreciation on the part of the other members of the virtual community, and appreciation by the organization. The tool seems to be complete because it takes into account the ascertainment's of the predecessors.

The Work Preference Inventory (WPI) is a tool for measuring virtual knowledge sharing in crowdsourcing. It is intended for an individual assessment of the internal (self-determination, competences, involvement in tasks, curiosity, joy) and external (competing, evaluation, recognition, money or other material incentives) motivation factors. This tool enables self- assessment of the perception of these motivators. It is composed of seven elements referring to a feeling of pleasure, seven related to a feeling of challenge, five connected with a will to receive an award, and ten related to the longing for apprehension. In the questionnaire, Likert's 6-degree scale is usually used. In the Work Preference Inventory there are no questions related to virtual knowledge sharing. It is also difficult to perform the measurement

since its construction enables only a self-assessment of one's behavior by each member of the virtual community.

The social comparison theory indicates that people engage in actions, which enable them to get to know their own abilities and confronting them with others. It is then when self-evaluation (assessment of comparative personal standing), self-enhancement (self-esteem), and self-improvement (ability) are made. This contributes to increasing self-awareness and satisfies the longing for becoming similar to others. This is done in a situation when there is no objective standard according to which one may assess oneself and when there is no certainty about how we are in a given respect. Then comparison takes place with persons who place themselves higher in relation to a given skill or feature. According to this theory, a standard of perfection which the other person wants to pursue is specified. An assimilation of skills occurs. In virtual knowledge sharing members of virtual communities adapt their behavior according to the group's norm. This theory, as well as the Self-Determination Theory to study motivation in the scope of knowledge sharing in crowdsourcing, was used by Heo & Toomey (2015). It seems that an integration of these two theories may constitute a good solution in the context of studying virtual knowledge sharing in crowdsourcing.

In the Social Exchange Theory, human interactions are a process in which an exchange of valuable resources takes place. The idea of mutuality is important here. According to this point of view, even in seemingly completely altruistic, philanthropic, and selfless actions there is a hidden – not always realized – will to gain something in return: admiration, prestige, fame, or trust. What is important is the bilateral, mutually conditional, and satisfying exchange (Wasko & Faraj, 2005). In this perspective, sharing knowledge in virtual communities means personal behaviors and a type of exchange between members, which takes on the form of long-term relations. The knowledge resources for each member may lose their useful value, but become beneficial to other members. That is why people devote their time, so that others may enjoy these resources (Wasko & Faraj, 2005). This theory was used in research by Jinyang (2015). He surveyed 240 students, doctoral students, and scientific and didactic workers experienced in the scope of knowledge sharing in virtual communities. He used a questionnaire with Likert's 5-degree scale. Items on reciprocity are adapted from Wasko & Faraj (2005); Items on trust are gained from Chiu et al. (2006); Altruism ideas derive from Chang & Chuang (2011) and Kankanhalli, Tan & Wei (2005); Sharing willingness ideas are adapted from Davenport & Prusak (1998); Items on sharing behaviors are adapted from Hsua et al. (2007). The obtained results indicate that the most important factor of virtual knowledge sharing is willingness and readiness to share. Trust, mutuality, and altruism are less important. By the same token the theory of social comparisons cannot unambiguously explain

virtual knowledge sharing. The author points out that future research should include psychological and environmental variables. Only a few ascertain that social exchange is the most popular theory in explaining knowledge sharing behavior. The tool adopted by Jinyang (2015) takes into account readiness to share knowledge (attitude for sharing knowledge, expectation for sharing knowledge, mutuality, mutual motivation, awards), altruism (individual efficiency, sharing efficiency), trust (interactions, coordination), sharing behavior (individual norms, behavior intentions). It may constitute a good base for studying virtual knowledge sharing.

Few authors, based on the existing theories, developed their own measuring tools. For instance the model of online knowledge sharing by Ma & Yuen (2011) assumes measuring virtual knowledge sharing in the context of learning and assessment of application components. The authors take into consideration particularly the degree to which a given person thinks that she or he can improve the goods in a social dimension, interact, build a feeling of unity with other users – owing to which they will be more inclined to be involved in Internet learning (Perceived Online Attachment Motivation Sources). In this approach all members of the virtual community have a common goal, which is learning, knowledge sharing, and developing of relations. This is not limited to discussions and meetings, but also observations, imitations, and exercises thanks to using an online platform. In addition, what gains importance is involvement, which reflects an internal perception of another person (Perceived Online Relationship Commitment). This is connected with the degree to which an individual believes she or he may maintain contacts with other Internet users – by the same token the greater the need of an individual for building relations, the greater the involvement in online communities and devoted time is. Knowledge sharing in this model is a way to establish close relations and it may be perceived as some kind of social support and a form of prosocial behavior. Within the maintaining of good relations, each member of the virtual community becomes more inclined to share knowledge with the other members of the Internet community. Nonetheless, the authors point out to some limitations: the model was tested in an online learning environment in Hong Kong, it is limited only to three constructs, it does not take into account people's behavior in learning, and so future research should consider additional variables which influence the process of online knowledge sharing. The authors suggest making reference to the self-determination theory, which suggests taking into account the autonomy, competences, and relation – as the three basic needs and determinants of quality, good state of mind, and satisfaction (Patrick et al., 2007; Deci & Ryan, 2000).

DISCUSSION AND CONCLUSIONS

The aim of the article was to present the existing output connected with the ways of measuring virtual knowledge sharing within crowdsourcing. In addition, the importance of searching for an answer to the question - why it is worth studying community knowledge sharing - was indicated. Based upon the conducted analysis, a number of conclusions may be drawn:

1) In the literature, various ways of measuring are indicated, which focus on an analysis of behaviors of the virtual communities. However, they only partially focus on virtual knowledge sharing.

2) It is difficult to apply most of them to the measurement. Most of them are of a theoretical nature only and they have never been tested. An interesting solution from a scientific point of view may be the proposal of Jacobs (2016). Based on the Self-Determination Theory the author additionally took into account the issues of involvement in knowl edge sharing. Few ascertain that social exchange is the most popular theory in explaining knowledge sharing behavior. This may constitute a good basis for research on virtual knowledge sharing. Others suggest combining two theories: Social comparison theory and Self-Determination Theory. Few authors, based upon the existing theories, developed their own measuring tools – the model of online knowledge sharing by Ma & Yuen (2011), which however does not include people's behavior in learning. It seems that the most complete and useful is the tool developed by Kosonen et al. (2014) – since it takes into account the findings of the predecessors and the theory of reasoned action and the theory of planned behavior. In addition, it contains not only forming individual intentions to share knowledge, but also the actual knowledge-sharing behavior, in the light of current research.

3. The conducted review of tools enables one to ascertain that the studies on virtual knowledge sharing are more and more popular and that surely the next variants of measuring this construct will appear in the literature. The first dilemma appears against this background: not all tools are able to fully study the essence of this process. Whereas, the second dilemma concerns the cognitive limits of virtual knowledge sharing and losing important information as a result of too many measures of a multidimensional nature.

Future research

The results of the review of existing tools for measuring virtual knowledge sharing confirm that this measurement is complicated and difficult. Not all existing ways match with the specificity of virtual communities in crowdsourcing. The majority of the research studies focus on identifying

the factors, which encourage the sharing of knowledge, while the issue and specificity of crowdsourcing is omitted. As it has already been stated the crowd or virtual community is the necessary condition for crowdsourcing to occur. That is why it is important to specify the relations between this level and crowdsourcing, in particular in the scope of the course of virtual knowledge sharing. The conducted review should act as an introduction to carrying out furtherpilot research that would verify the usefulness of the indicated tool in the crowdsourcing platforms' environment. Generally speaking, future research should take into consideration the above-mentioned limitations. While indicating the future research areas related to virtual knowledge sharing it ought to be borne in mind that it should be analysed taking into account the specificity of crowdsourcing (Nooteboom, 2000).

Implications

The review of the literature and research results leads to a number of conclusions useful for managers and business practice. Firstly, managers must bear in mind the importance of crowdsourcing and virtual communities. Secondly, a constant measurement of virtual community behaviors, particularly in the context of knowledge sharing – enables diagnosing the correctness of tasks directed to the crowd, assessment of the crowdsourcing platform's efficiency, which is connected with optimising costs and maximising benefits. It should be emphasized that the role of the organization-initiator is directing to the crowd, through a crowdsourcing platform, an open call for collaboration and defining the tasks expected to be solved. It is important here that the initiator specifies the goal, scope, schedule, expectations, awards, or a group of recipients. The initiator should also, during the project's course, exercise control over its process, e.g. evaluate the incoming ideas/ solutions, answer the participants' questions. It is worth noting that from the initiator's point of view there are measurable benefits of crowdsourcing, among others: access to talents, external knowledge, valuable information, resources, skills and experience, mobilization, and competences. This may be used for organizational learning, openness of the organization to new external knowledge, creating open innovations, building competitive advantage, improving business processes, optimising the organization's activity costs, or business models. However, without measuring the behaviors of virtual communities, in particular in the scope of - these benefits are difficult to achieve.

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Abstract (in Polish)

Jednym z stosunkowo nowych obszarów badań współczesnej nauki o zarządzaniu jest crowdsourcing oraz zachodzące w nim wirtualnym dzieleniu się wiedzą. Jest ono definiowane jako rozpowszechnienie wiedzy przez społeczność wirtualną, informowanie innych, podawanie jej do wiadomości publicznej, oczekiwanie, że inni tę wiedzę skomentują, rozszerzą i uzupełnią. Takie dzielenie się wiedzą jest szczególnie istotne dla współtworzenia, partycypacji czy uzyskiwania innowacyjnych pomysłów przez organizację. Jednak, pomimo jego pozytywnego wpływu na organizację, dotychczas nie było ono przedmiotem kompleksowych badań. Artykuł przedstawia istniejący dorobek w zakresie sposobów pomiaru społecznościowego dzielenia się wiedzą w ramach crowdsourcingu. W opracowaniu można też znaleźć wyjaśnienia, dlaczego warto badać wirtualne dzielenie się wiedzą.

Słowa kluczowe: *wirtualne dzielenie się wiedzą; społeczność wirtualna; pomiar.*

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Creating Intangible Value through a Corporate Employee Portal

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Abstract

Organizations create competitive advantage by creating more economic value than their rivals. Increasing business competition and information technology development have both led to huge corporate organizational changes and have raised the importance of intangible assets along the value chain. Value creation and the success of organizations increasingly depends on the leverage of knowledge available internally, as nowadays it has become essential to understand employee portals' business value and to build adequate change management programmes. The Balanced Scorecard (BSC) and Strategy Map (SM) show an organization's objectives, how they are achieved, and the link between the goals of the various sub-units and how these act together to produce the overall results. BSC and SM clarify how intangible assets are aligned with strategy, to create value for the organization. However, the concerns related to change management seem not to have been properly addressed. To conveniently deal with these matters, the authors propose a framework to map the cause-effect relationships that generates business value, as well as provides top management and decision makers with the information needed for a suitable top-down commitment and sponsorship, which is essential to bring about the appropriate change management and benefits' realization. SM and Benefits Dependency Network (BDN) were combined, resulting in a suitable framework to help organizations enhance their knowledge, mitigating the risk of investment failure or misuse, and a timely contribution to capture more value from investments in intangible assets. The developed framework helps organizations address their concerns related to value creation and change management, and it has been applied to this Employee Portal case study. This case study allows us to conclude that, although the promotion of organizational culture and corporate alignment are not usually frequent goals of organizations, and do not motivate investments in the development of employee portals, they are generally recognised as being essential tools for decision-making and value creation.

Keywords: *intranet; employee portal; business value; knowledge management; strategy maps; benefits management; change management; corporate culture.*

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INTRODUCTION

Today's increasing business competition and information technology development has led to huge corporate organizational changes and has placed intangible assets higher up the value chain. Much of corporate growth and shareholder value relies on a skilled workforce, patents and know-how, systems and technology, and in a strong commitment to relationships with customers, brands, projects and unique organizational processes, among others. (Lev, 2004)

In fact, these intangible assets may be just as real as other assets in their ability to generate value (Brynjolfsson & Yang, 1997). There is no universally accepted definition of intangible assets. Kaplan and Norton (2000, p.93) refer that "the learning and growth strategy defines the intangible assets needed to enable organizational activities and for customer relationships to be performed at an ever-higher level of performance".

The importance of developing an adequate corporate culture to promote collaboration, knowledge sharing and innovation is consensual among academics and practitioners alike. Bharadwaj (2000) describes knowledge management as being a social process that requires tremendous organizational change and that the creation of a culture of knowledge management involves both technological and social aspects, such as changing the organization structure, as well as control and communication systems and reward structures. Nowadays, companies contribute with different resources and technological capabilities that improve and complement a firm's innovation capabilities (Becker & Dietz, 2004; Miotti & Sachwald, 2003).

Enterprise portals are Web browser interfaces into a single point which are used within organizations to promote the collection, sharing and dissemination of information throughout their organization (Detlor, 2000). Employee portals are relevant informational assets which perform an important role in an organization's strategy. However, justifying returns from investments in these solutions is not an easy task, as their implementation demands large changes in culture, behaviour and processes.

Pickett and Hamre (2002, p. 39) describe an intranet portal as being a dynamic and personalised '*gateway to network-accessible resources'* that belongs exclusively to an organization. Known as corporate portals, enterprise portals, or employee portals, these intranet portals have evolved from web search engines to customisable, synchronised and real-time repositories of organizations' intellectual capital (Benbya et al., 2004). These portals improve employees' productivity by improving corporate information access (Aneja et al., 2000).

Although Employee Portal benefits are widely studied (Benbya et al., 2004; Dias, 2001; Lai, 2001), it is common sense to conclude that it is difficult to identify the return on investment from Information and Communication Technology (ICT) projects, especially as most of their benefits are intangible. In ICT projects, elements such as networks, computers and software are all just a small part of the total implementation costs. In these projects, the delivery of major business benefits comes from complementary investments (Ward & Daniel, 2006).

Brynjolfsson, Hitt & Yang (2002) point out that successful projects required careful attention to management, employee training and changes in areas that are apparently non-related to the business. Therefore, it is essential to understand how employee portals add business value and then build adequate change management programmes.

To understand how a corporate employee portal contributes to the intangible assets value creation process, and how can we can predict, measure and evaluate the impacts generated by these assets, we show in this paper how a corporate employee portal contributes to the intangible assets value creation process, and explain the relevant innovation and support processes involved and the changes required to guarantee benefits realization. The results show that an employee portal improves strategy communication and corporate alignment in the organization.

RESEARCH APPROACH

This position paper extensively addresses the reported concerns of organizations regarding unsuccessful ICT project implementations and focusses on Employee Portals. The methodology used in the research consisted of a case study with triangulation of the literature review, an extensive study of corporate information (communication with shareholders, annual reports, investors' day presentations, internal news magazines, intranet news, internal presentations, and knowledge of the employee portal roadmap), as well as semi-structured interviews with managers and employee climate surveys carried out over time.

This approach allowed us to develop a theoretical framework and to test the consistency of the findings obtained, allowing a clear understanding of how an Employee Portal contributes to the intangible assets value creation process and consequently for validating the framework.

LITERATURE REVIEW

According to Marr and Adams (2004), one of the major issues concerning intangible assets is that each author has their own framework (e.g. Andriessen & Tiessen, 2000; Bontis, 2001; Brooking, 1996; Edvinsson, 1997; Lev, 2001; Marr et al., 2004; Roos & Roos, 1997; Roos et al, 1997; Stewart, 2001; Sullivan, 1998; Sveiby, 1997). This myriad of approaches confuses practitioners who wish to apply it to organizations. The concept is discussed from various perspectives and with emphasis on different subjects, namely: accounting, human resources, information systems, and knowledge management, among others (Marr et al., 2004; Marr & Adams, 2004). The significant growth of intangible assets became clear by the changes seen within the tangible and intangible asset structure in modern organizations. Hall (1989, 1992) introduces the concept to the strategic management field. Itami (1991) refers to intangible assets as *invisible assets,* which include technology, consumer confidence, brand, corporate culture and management skills.

Kaplan and Norton (2004) clarify the content of the BSC perspective of *learning and growth*, citing that intangible assets include:

- Human capital (employees', skills, talent, and knowledge);
- Information capital (databases, information systems, networks and technology infrastructure);
- Organization capital (culture, leadership, employee alignment, teamwork, and knowledge management).

According to Armitage et al (2006), three of the most important aspects of organizational capital are: leadership, teamwork and communication. Together, these are responsible for the main changes necessary for implementing an organizational strategy.

Marr et al. (2004), following other authors, highlight the relevance of corporate culture, and state that it influences employee skills, and vice versa, and reinforces the achievement of overall goals and also provides a common and distinctive method for transmitting and processing information. The importance of developing an adequate corporate culture for the promotion of collaboration, knowledge sharing and innovation, is consensual among academics and practitioners alike. The use of collaboration practices in companies is the starting point for creating innovative processes, products or services that differentiate a company from its competitors (Nieto & Santamaria, 2007). To make these changes possible, companies must:

- Implement a culture of collaboration, trust, knowledge sharing and skills (Lai, 2001);
- Implement tools for exploiting collective knowledge, experience and communities (Martensson, 2000);
- Create the routine to use these tools (Martini et al., 2009).

The development of such skills and abilities is the foundation for the success of intranet initiatives and these demand both time and investment in communication and education, to modify behaviour and overcome existing barriers to non-use (Martini et al., 2009).

Intangible assets have been asserting themselves as a major source of competitive advantage and yet no tools have been designed to identify and describe the value they create (Kaplan & Norton, 2000).

The concept of BSC was introduced in 1992 to capture this value creation through the measurement of an organization's performance in four perspectives. The SM provides a common framework and language that can be used to describe any strategy (Kaplan & Norton, 2000). Reading the SM from bottom to top, one understands how employees need certain knowledge, skills, and systems – the learning and growth perspective, to innovate and build the right strategic capabilities and efficiencies – and an internal process perspective, to deliver specific value to the market, based on a customer perspective, which then leads to greater shareholder value from a financial perspective (Kaplan & Norton, 2000).

Armitage and Scholey (2006) propose a completed generic SM, which shows all three types of capital working together to help the company execute the various elements of the internal business perspective. Aligned learning and growth and internal business processes, i.e., deciding how we plan to accomplish it, help facilitate the achievement of customer and financial strategies, i.e., what we want to accomplish.

Information technology, by itself, does not create any benefits. On the contrary, it is business and organizational changes that produce most of the benefits (Ward & Daniel, 2006). According to Kaplan & Norton (2004), for this to occur, these changes need to be adequately aligned with the organization's strategy, and integrated programmes need to be implemented to enhance all intangible assets in a coordinated way.

Hughes and Morton's (2006) research shows that productivity earnings and competitive advantage can be gained from IT, not because of technology per se, but in the way that certain assets can lead to new products and processes, creating further sources of sustainable competitive advantage, examples being: organizational processes, embedded know-how, people skills and new organizational structure innovations.

Peppard et al. (2007) claim the existence of five principles to accomplish benefits through IS/IT investments:

1) Just having technology does not bring any benefit, nor create value;
2) Benefits arise when IS/IT enables people to do things differently;
3) Benefits result from changes and innovations in ways of working, whilst only involving people who can make these changes;
4) All IS/IT projects have outcomes, but not all outcomes are benefits.

5) Benefits must be actively managed if they are to be obtained.

Intranet portals provide organizations and institutions with a single electronic access point to a large and diverse array of internal web-based information for authorised end-users (Schubert & Hausler, 2001). The implementation of intranet portals allows for shared information workspaces that extend and transmit organizational knowledge (Boersma & Kingma, 2006; Li & Wood, 2005). Intranets, central document repositories and knowledge databases are all important information capital assets, which perform an important role in a corporation's strategy when used effectively (Armitage & Scholey, 2006). These tools have evolved from a communication and information-sharing stage to a consolidated workplace, and they are essential for promoting communication, collaboration and the sharing of information within an organization (Urbach et al., 2009). Dias (2001), in an extensive review of the literature, identifies several positive characteristics of intranet portals, including:

- Enhanced information life cycle management;
- Greater pin-pointing of organization experts in particular fields;
- Ability to better meet individual users' information needs,
- Fostering of information exchange between employees, suppliers, resellers and customers.

A corporate portal enables organizations to provide users with a single gateway to the personalised information that they need to make informed business decisions (Shilakes & Tylman, 1998). Further along the evolution of these tools, according to some known maturity frameworks (Forrester Research, 2010; Hawking & Stein, 2003), intranets evolved to becoming portals, which are now much more complex solutions which provide other organizational objectives. A portal can be seen as being a way to access disclosed information within a company, which is stored in multiple and heterogeneous systems, using different formats. A portal is, therefore, a single point of access to internet resources and an integration platform that focusses on organizational business processes unification. Portals synchronise knowledge and applications, creating a unique vision for organizations which have evolved by integrating a variety of services (Benbya et al, 2004).

An Employee Portal provides employees with the in-time relevant information that they need to perform their tasks and to make efficient business decisions. Being one of the tools for communicating a new strategy, helping to get employees to use this common platform may lead companies to experience some of the following benefits, among others (Dias, 2001; Lai, 2001; Nieto & Santamaria, 2007):

- Improved corporate communication and greater opportunity for collaboration;

- Improved sharing of knowledge, which may be crucial for maintaining a competitive advantage over the competition, as technological collaboration and the sharing of information impacts positively on product innovation;
- Improved employee service/convenience in accessing information and services, with more autonomy for employees in managing human resources processes and information, which results in reduced costs, improved employee productivity, and an organization's competitiveness;
- Greater operational efficiency and improvement in decision quality. It is consensual amongst academics and practitioners that ICT investment should be carefully justified, measured and controlled (Milis et al., 2009), and yet a surprising percentage of enterprises fail to adopt fundamental best practices regarding portal sponsorship and governance.

The research strongly indicates that feasibility studies of capital investment in today's companies and organizations are mainly based on a financial cost-benefit analysis (Milis et al., 2009). This may occur because the responsibility for most ICT investment decisions still remains with finance managers, and also because capital investment-appraisal techniques are well known, understood and practiced (Milis et al., 2009). The benefits generated by the intranet not only serve the initial development, but also help ensure that the intranet becomes a tool that brings added value to the business (Cury & Stancich, 2000).

One of the most widely used and cited models outlining the scope and nature of Benefits Management (BM) is the Cranfield model. The BM approach was developed to enable organizations to improve the value realized from specific ICT investments, but it can also be used to formulate, manage and implement strategic change programmes, and also to help formulate and implement business strategies (Ward & Daniel, 2006). The purpose of the benefits management process is to improve the identification of achievable benefits, and to ensure that decisions and actions taken over the investment life-cycle lead to realizing all the expected benefits (Gomes & Romão, 2013; Ward & Daniel, 2006). The greatest value from IT comes from the business changes that it enables an organization to make. Investment is in *'IT-enabled change'*, not just technology, to achieve improvements in business and organizational performance through better processes, relationships and ways of working (Ward & Daniel, 2006). A benefits management governance framework is built on the existence of a business case for contrasting benefits behaviour with cost behaviour (Eckartz, 2012; Ward et al., 2008), which is usually the responsibility of the senior owner of this change. BM follows a process cycle of 5 steps (Ward & Daniel, 2006): (1) Identification

and structuring of benefits; (2) Benefits Realization Plan; (3) Benefits Plan Execution; (4) Benefits Review & Evaluation; (5) Potential for further Benefits.

BDN is a key output from the activity of determining both the changes required for the delivery of each benefit, and how ICT assets will enable these changes to come about (Peppard et al., 2007; Ward & Daniel, 2006; Ward & Elvin, 1999). The BDN provides a framework for explicitly linking both the overall investment objectives and the desirable benefits with the business changes that are necessary to deliver these benefits, as well as the essential IT functionality required to enable these changes to occur (Gomes & Romão, 2013; Peppard et al., 2007). There is a clear understanding that benefits only result from the active involvement of business managers in defining and owning these benefits, and in carrying out the changes that deliver them (Ward & Daniel, 2006).

OVERCOMING THE STRATEGY MAP LIMITATIONS

SMs are important tools for communicating strategy and for showing how intangible assets align with strategy to create value for an organization. However, this tool gives little evidence of the interrelationship between assets, the identification of support processes, the impact of internal processes on intangible assets, and the identification of strategic enabling changes (Mendes & Romão, 2013). Therefore, the model can be complemented and reinforced with these elements, which will in turn result in a stronger framework for helping organizations enhance their strategic knowledge, and reduce the risk of project failure, and also help capture real value from their investments. Therefore, some enhancements were made to the SM to overcome the identified limitations (Mendes & Romão, 2013).

The Strategy Map does not evidence an interrelation between assets

Many academics support the resource-based view of a firm, where different assets depend on each other to create value as they are interconnected (Marr et al., 2004). The contribution of a particular asset can rarely be expressed independently from other assets, namely: skills, expertise, or corporate culture (Marr et al., 2004). In SM, intangible assets are presented as separated categories, as they relate to value-creating processes independently, but are not related. Exploiting assets complementarily allows them to be used more efficiently to strengthen an organization's competitive advantage (Hughes & Morton, 2006). Marr et al. (2004) claimed that without understanding the interrelationships and interdependencies between assets, it is impossible to have efficient management of all organizational assets.

Kaplan and Norton (2004) argue that the value of intangible assets arises from their interrelationships, and cannot be measured independently. To

overcome this SM limitation, and based on the importance of identifying and communicating synergies amongst assets, the authors introduced the "*asset synergy*" concept in the proposed theoretical framework.

Lack of evidence of how internal processes positively impact assets

Ulrich et al. (2004) identify organizational capabilities (collective skills, abilities, and expertise) as relevant intangible assets to the value generation. These capabilities "are the outcome of investments in staffing, training, compensation, communication, and other human resources areas. They represent the ways that people and resources are brought together to accomplish work" (Ulrich, et al., 2004, p. 119). Casadeus-Masanell et al., (2007, p. 5) define a business model as "a set of choices and consequences", and identify intangible assets as consequences, rather than choices. They also describe virtuous cycles as feedback loops generated by a business model's dynamics that iterate and strengthen some components of the business model (Casadeus-Masanell, et al., 2007).

Another example of this kind of feedback regards the organizational change required to perform efficient knowledge management processes. It is known that SM does not show how internal processes impact assets. According to Norton and Kaplan (2000), value is created in organizations through the management of internal processes and the development of human, information and organizational capital. They group internal processes into four main clusters: *"operations management processes"; "customer management processes; "innovation processes,* and; *"regulatory and social processes"* (Norton & Kaplan, 2004).

Ulrich and Smallwood (2004) identify organizational capabilities as being relevant intangible assets for value generation. These capabilities are the outcome of investments in staffing, training, compensation, communication, and other human resources areas. They represent the ways that people and resources are brought together to accomplish work (Ulrich & Smallwood, 2004). However, creating a culture for knowledge management requires changes to intangible assets such as organization structure, information systems and reward structures (Bharadwaj, 2000). To overcome the described limitations in SM, the introduction of the *"virtuous process feedback"* concept is suggested in the proposed theoretical framework.

The BSC internal perspective does not consider support processes

In the BSC there is no focus on support processes. Examples of investments in human resources areas (Ulrich & Smallwood, 2004) include such organizational capabilities as: talent, speed, shared mind-set, coherent brand identity, accountability, collaboration, learning, leadership, customer connectivity, strategic unity, innovation and efficiency.

Social aspects related to organizational change need to be considered in the knowledge management processes (Bharadwaj, 2000) which are managed in organizations' support processes. Because they are not usually implemented, we have suggested the introduction of a *"support processes group"* in the internal perspective of the proposed theoretical framework.

A lack of detail on enabling changes

SM does not identify those enabling changes (e.g. training, new working practices, communication) required to foster benefits realization. These changes are prerequisites to achieve business changes, and they are essential for bringing the system into effective operation within an organization (Ward & Daniel, 2006).

Bharadwaj (2000) also highlights the difficulty for organizations to manage effectively both ICT and the social aspects of knowledge management. He states that this social process requires tremendous organizational change and identifies organization structure, control and communication systems and rewards structures as being the assets that are required to promote effective change (Bharadwaj, 2000). As seen before, the importance of adequate change management and sponsorship in guaranteeing the success of projects is a common theme among academics and practitioners, and SM does not appear to have an answer to this concern. To overcome this limitation, we have suggested the introduction of the "*enabling changes layer"* in the proposed theoretical framework.

Theoretical framework

The BDN from the BM approach maps the objectives, benefits and required changes, and shows the way to achieve those (Gomes et al., 2013). Although its main focus is to determine the changes required for the delivery of each benefit and how ICT assets enable these changes, BDN can be used as a complement to SM, helping to overcome some of the previously identified limitations. Ward and Daniel (2006) define *"investment objectives"* as being agreed organizational targets to be achieved from investments in relation to the drivers. These organizational targets can be related to either human or organizational capital.

Throughout the reviewed literature, examples of business benefits were found that consist of strengthening intangible assets. Value creation through fortifying such assets as knowledge, culture, loyalty, image, brand, collaboration and custom orientation is identified as being a benefit by Allee (2000) and Bharadwaj (2000). According to Ulrich and Smallwood (2004), organizational capabilities are the outcome of investments in staffing, training, compensation, communication and other human resources areas.

The "*enabling changes layer*" consists of the addition of a new layer in SM (Figure 2), which corresponds to the BDN-enabling changes layer (Mendes & Romão, 2013), shown in Figure 1.

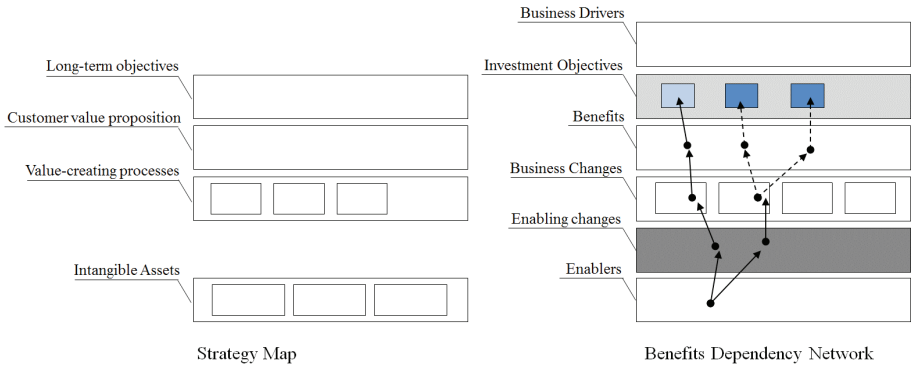

Figure 1. Enabling changes layer

Source: Mendes, Gomes & Romão (2016).

A *"virtuous process feedback"* should be addressed by the transposition of the BDN *"Investment objectives"* layer into the SM *"Intangible Assets"* and *"Long-term objectives"* layers (Mendes & Romão, 2013). *"Support processes group"* consists of the addition of this process group and the usage of BDN to identify all relationships.

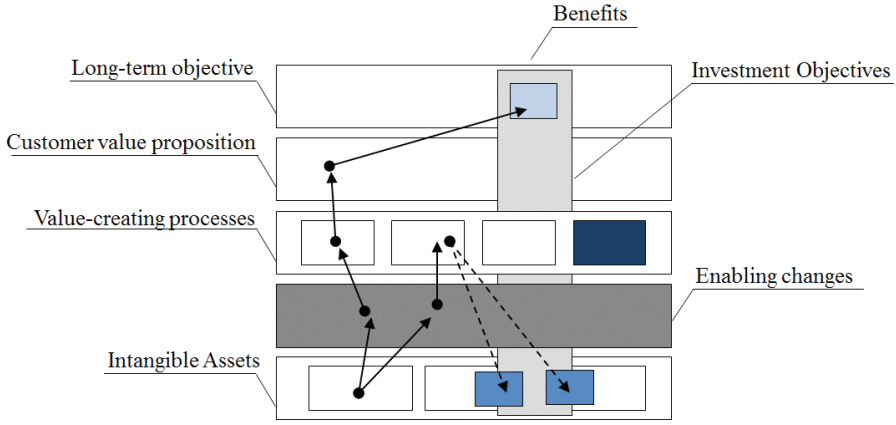

Figure 2. Virtuous process feedback

Source: Mendes, Gomes & Romão (2016).

"Asset synergies" consist of the visual representation of direct dependencies and interrelation between assets. As we explain later, there is evidence that the proposed framework has been revealed as being suitable for communicating organizational strategy, as it allows an understanding of how business value is generated and provides the information needed for an appropriate top-down commitment and sponsorship, which are both essential elements for the implementation of advisable change management and benefits management.

Case study

The Company (CO) used for the case study is one of Portugal's largest private businesses, and up until 2015 it had clients spread throughout various business areas around the world.

The research carried out was based on corporate documentation (communication with shareholders, annual reports, investors' day presentations, internal news magazines, intranet news and internal presentations), literature review and knowledge about the company, which allowed the development of the BDN. These intermediate results were then validated by two of the major stakeholders, according to the selected business changes, to validate their different perspectives. We applied the collected data to the developed theoretical framework and triangulated it with employee climate surveys data. We interviewed people involved in Corporate Communication and Innovation Management. We then analysed the employee climate survey results from 2002 to 2011, to triangulate and confirm the previously gathered data (no responses were received from more than 10,000 employees, with an overall adherence index that increased from 42% in 2002, to 65% in 2005, and continued to grow up until 86% in 2011). Careful analysis of the company Employee Portal timeline led us to conclude that its functional evolution is somehow aligned, but that there is no perfect match, as previous CO intranets were older than the corporate intranet, and they had their own evolutionary path. Analysis of corporate intranet versus maturity frameworks should take into consideration all intranets and the corporate intranet in an integrated viewpoint. We focussed on the full period when analysing alignment and teamwork, but only focussed on the last years when analysing culture. Innovation has always been a characteristic of this company, and its cultural transformation and change in mentality over the past few years has underlined its importance. We found evidence in the reviewed documentation that the employee portal was a tool for guaranteeing the accomplishment of strategic objectives related to culture and alignment.

The BDN depicted in Figure 3 was reviewed by the interviewed people to validate the linkages between the various components and to identify other components which, although relevant, were not so obvious in the evidence gathered. Accordingly, the internal perspective tier of the framework depicted in Table 2 considers those business changes identified in the BDN.

Table 2. Framework correspondence (Mendes, Gomes & Romão, 2016)

"Internal perspective" framework tier correspondence	
Internal Process (Figure 5)	BDN Business changes (Figure 4)
IP1 – Innovation processes	C4 – Improve and enlarge CO offer
SP1 – Internal communication support process	C1 – Create a Corporate Communication Unit with all the inherent communication processes and procedures
"Enabling changes" framework tier correspondence	
Enabling changes (Figure 5)	BDN Enabling changes (Figure 4)
E1 – Implement corporate communication functionalities	E1 – Implement corporate communication functionalities
E2 – Implement collaboration functionalities	E2 – Implement collaboration functionalities
E3 – Carry out an innovation change management programme	E3 – Carry out an innovation change management programme
E5 – Content management and workflow training	E5 – Content management and workflow training
E6 – Plan and implement the communication plan	E6 – Plan and implement the communication plan
E9 - Implement Benefits card website	E9 - Implement Benefits card website
"Learning and growth perspective" framework tier correspondence	
Intangible assets-Organizational capital (Figure 5)	BDN Investment objectives (Figure 4)
OC1 – Corporate culture	O2 – New corporate culture
OC2 – Strategic Alignment	O4 – Strategic alignment of each company with the group
OC3 – Teamwork and knowledge sharing	O2 – New corporate culture (based on CO corporate documentation, we considered culture to include "team spirit" and "information sharing"). The business change identified in BDN as C3 (promote collaboration & information sharing culture) also highlights the importance of this organizational capital intangible asset.
Intangible assets – Information capital (Figure 5)	BDN SI/TI enablers (Figure 4)
IC1 – Employee Portal (communication and collaboration functionalities)	I1 – Corporate Intranet
	I2 – Teams
	I3 – Innovation platform
	I6 – Benefits card website

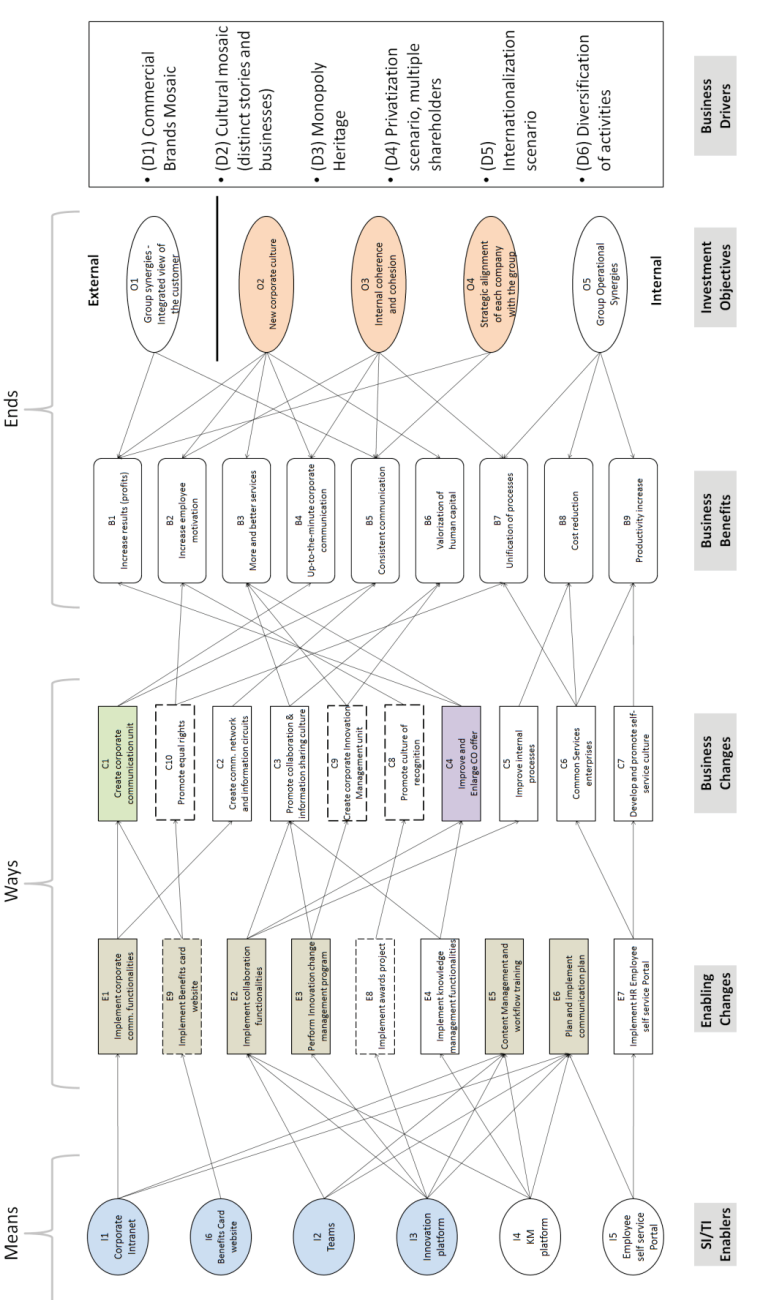

Figure 3. Developed BDN

Source: Mendes, Gomes & Romão (2016).

The Enabling Changes tier of the framework was directly mapped with the identified enabling changes in BDN, which are related to the following selected communication and collaboration Employee Portal areas and functionalities. SM information capital matches the ICT enablers of BDN, and SM organizational capital internally matches the investment objectives of BDN. We focussed our analysis on two main investment objectives: *"new corporate culture"* and "*strategic alignment of each company with the group".*

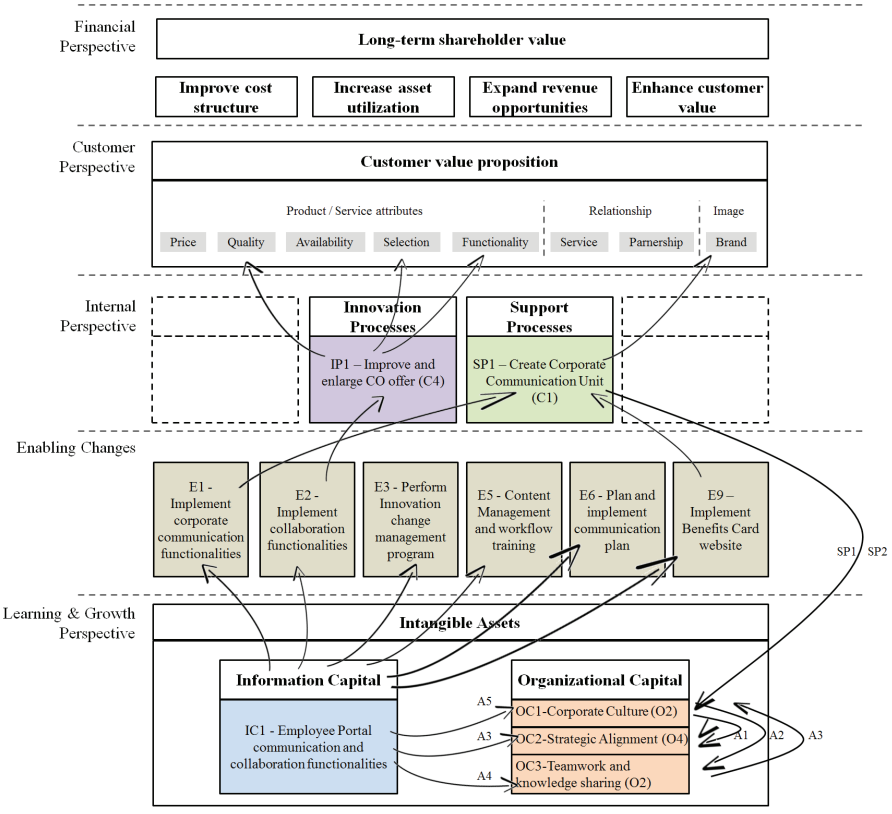

Figure 4. Framework linkage evidence

Source: Mendes, Gomes & Romão (2016).

The fluxes A1, A2, A3, A4, A5, A6, SP1 and SP2 identified in the framework (Figure 4) were identified from the BDN, and also the interviews performed and the employee climate surveys data.

RESULTS AND DISCUSSIONS

This chapter discusses the validity of the achieved results and whether they could be generalised to other domains. The discussion serves as the basis for our conclusions, which will provide an answer regarding the applicability of the theoretical framework. We cross-checked the information, triangulating it with the employee climate surveys results, and found that, in conjunction with the employee portal projects' timeline (Figure 5), it confirmed the previous statements.

However, despite all the validation and triangulation, we understood that CO went through a big cultural transformation with multiple initiatives and a large technological transformation with various distinct projects. The following results show the indicators analysis.

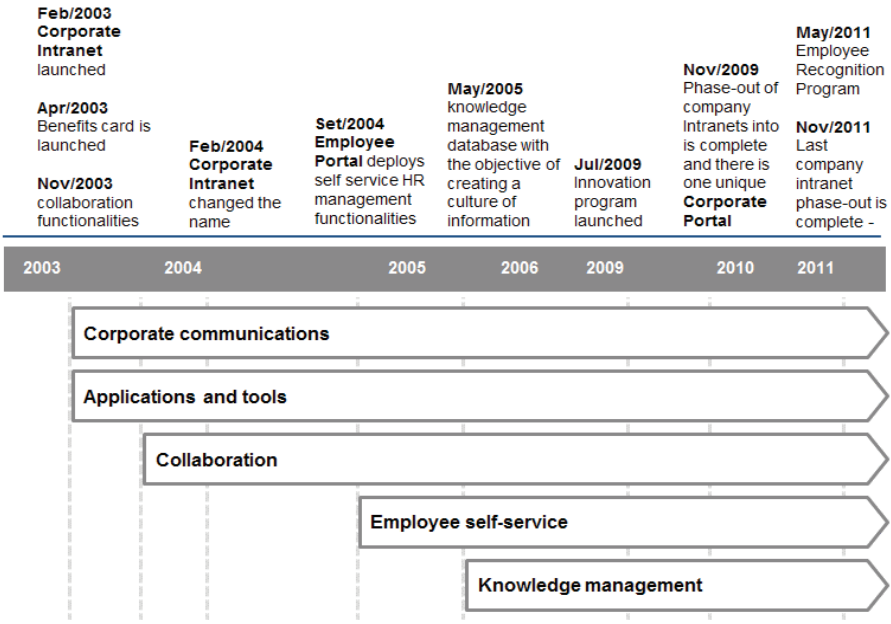

Figure 5. Employee portal projects timeline

Source: Mendes, Gomes & Romão (2016).

Corporate culture - The increase of these indicators during the successive employee portal phases is consistent with the literature (Table 3). These data are also relevant for benefits monitoring, and they evidence the achievement of one of the business objectives.

Alignment - We believe that the general increase of all alignment-related indicators (Table 3) is strong evidence that the employee portal is a tool for promoting alignment between internal communication and corporate strategy.

Teamwork - With regards to teamwork and the importance of the distinct factors that promote it, the interviews recognise that both the commitment and sponsorship of top management are essential aspects for promoting collaboration, and therefore its communication to employees is of major relevance. Considering the relevance of interrelationship between the different organization units of the company and the mechanisms for knowledge distribution, we analysed the following indicators which were evaluated by employees under the employee climate surveys carried out between 2002 and 2011 (Table 3).

Innovation - In 2008, the indicator "*CO invests in developing innovative products and services"* was introduced to the corporate employee climate surveys. From 2008 until 2011, this indicator recorded an increase of 16 points in the employee appraisal (Table 3).

The major intention of this study was to understand how employee portals contribute to intangible assets value creation. We found some evidence corroborating the literature review which establishes that an Employee Portal works as a strategic tool for promoting corporate culture and alignment through information and communication fluxes and teamwork through collaborative functionalities. These findings were identified in the corporate literature and interviews and were validated through the results of the employee climate questionnaires.

From the case study, we can also confirm that communication processes and practices are essential for the implementation of corporate culture, alignment and teamwork, and that corporate culture is very important for creating alignment and for promoting collaboration, sharing knowledge and innovation and teamwork, which can all help to reinforce corporate culture. These findings allow us to conclude that although *"promoting corporate culture"* and *"company alignment"* are not among managers' most frequently-expected outcomes or business drivers for Employee Portal implementations, it should, nevertheless, be strongly considered.

By analysing the Employee Portal implementations and Employee Climate Questionnaires, we have drawn the conclusion that Corporate Communication has positively impacted on alignment, which became even more evident when all company intranets were phased-out between 2009 and 2011.

Table 3. Indicators

	Period	Scale (0-100)
Corporate culture		
There is a common culture shared by the entire organization	2008-11	+17
I identify myself with corporate culture	2008-11	+11
I identify myself with the CO external institutional image	2008-11	+10
I'm proud to work in CO Group	2002-11	+11
Alignment		
There is good communication between the company and its employees	2002-05	+5
Management discusses and disseminates polices and business objectives	2002-05	+6
Business strategies are published in an understandable way with employees	2002-06	+8
My company informs me of the relevant business events before any other source	2002-05	+9
My company informs me of the relevant business events before any other source	2005-11	+19
I know the CO strategy	2008-11	+11
My team knows what is their contribution to achieving CO strategic objectives	2002-05	+1
Acknowledgement of my contribution to the achievement of CO strategic objectives	2005-11	+6
Teamwork		
There is a good functional interrelationship between different areas of the company	2002-05	+7
I can rely on the cooperation and involvement of other departments	2008-11	+5
I am able to get the information I need to perform my job well	2002-05	+4
I am able to get the information I need to perform my job well	2005-11	+11
Innovation		
CO invests in developing innovative products and services	2008-11	+16

We developed a framework that illustrates the path and flows of value-creation. The literature review chapter helped us identify some relevant aspects which we took into consideration when combining Strategy Map and Benefits Dependency Network. This case study allowed us to validate the importance of identifying strategic projects and change management initiatives as *"enabling changes"* and it also allowed the validation of the importance of integrating internal support processes that generate value to intangible assets – mainly organizational capital – into the strategy map

and the representation of flows of value-creation between the *"intangible assets".*

CONCLUSIONS

Many studies have highlighted that the main strengths of employees' portal are, namely its capabilities of categorisation, integration, content publication and management, integrated search, personalisation, goal-oriented interface and navigation and collaboration tools (e.g. Aneja et al., 2000). Others research sources found some weaknesses, which are mainly related to: content quality and change management (Norris & Duray, 2002); team management and integration (Roberts-Witt, 2000), and; security concerns (Rose, 2003). Employee portals are relevant information capital assets which perform an important role in an organization's strategy, and it is essential to understand the role performed by employee portals in organizations' strategies.

The major objective of this study was to understand how an employee portal fosters the creation of organizational value from its intangible assets. We found evidence corroborating the literature review, which establishes that an Employee Portal works as a strategic tool for promoting corporate culture and alignment through information and communication fluxes and also through the teamwork of collaborative functionalities. These findings were identified in the corporate literature and through interviews, and were validated through the results of the employee climate surveys. We confirmed that communication processes and practices are essential for the implementation of corporate culture, alignment and teamwork. Furthermore, corporate culture seems to be highly relevant for creating alignment and for promoting collaboration, sharing knowledge and innovation, and teamwork can definitively help reinforce corporate culture. We concluded that communication positively impacts on corporate alignment, which became even more evident in the case study we have presented.

The study also highlighted the importance of identifying strategic projects and change management initiatives. The importance of integrating internal support processes that generate value from intangible assets was validated in the strategy map, and the representation of flows of value-creation was made between the intangible assets.

These findings allowed us to conclude that, although the promotion of organizational culture and corporate alignment is not among managers' most frequently-expected outcomes, neither is it a business driver for the implementation of Employee Portals, and it should be explicitly considered as being a benefit that helps one understand the value realized from these

investments. To illustrate these challenges, we have shown how to combine SM and BDN in an extended framework that helps organizations enhance their knowledge usage, contributing to capture more value from investment in intangible assets.

Our research unfolds the application and validation of the framework in the above case study, and should be extended to other cases. Further research should include applying the framework to similar projects in the same company, or to similar projects in other companies of the same, distinct industry (e.g. industry and manufacturing, banking, or the public sector). Another possibility would be to evaluate completely different investment projects related to areas such as knowledge management, human resources, marketing or customer relationship management. Future research should also consider a quantitative approach towards the statistical validation of results and include performing workshops with experts to develop BDN.

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Abstract (in Polish)

Organizacje tworząc przewagę konkurencyjną, tworząc większą wartość ekonomiczną niż rywale. Rosnąca konkurencja i rozwój technologii informatycznych doprowadziły zarówno do ogromnych zmian organizacyjnych, jak i zwiększyły znaczenie wartości niematerialnych i prawnych w ramach łańcucha wartości. Tworzenie wartości i sukcesy organizacji w coraz większym stopniu uzależnione są od wykorzystania wiedzy dostępnej wewnętrznie, jako że w dzisiejszych czasach istotne znaczenie ma zrozumienie wartości biznesowej portali pracowniczych i budowanie odpowiednich programów zarządzania zmianą. Balanced Scorecard (BSC) i mapa strategii (SM) przedstawiają cele organizacji, ich osiąganie oraz związek pomiędzy celami różnych podjednostek z ich wspólnym działaniem w celu uzyskania ogólnych wyników. BSC i SM wyjaśniają, jak wartości niematerialne są dostosowane do strategii, aby tworzyć wartość dla organizacji. Jednak obawy dotyczące zarządzania zmianami wydają się niewłaściwe. Autorzy proponują ramy umożliwiające mapowanie związków przyczynowo-skutkowych, które generują wartość biznesową, a także zapewniają kierownictwu i decydentom informacje niezbędne do odpowiedniego odgórnego zaangażowania i sponsoringu, co jest istotne, aby doprowadzić do właściwego zarządzania zmianami i realizacji świadczeń. Mapa strategii SM i korzyści (BDN) zostały połączone, w wyniku czego powstały odpowiednie ramy ułatwiające organizacjom podniesienie ich wiedzy, złagodzenie ryzyka niepowodzenia inwestycji lub niewłaściwego wykorzystania, a także terminowy wkład w zdobycie większej wartości z inwestycji w wartości niematerialne i prawne. Opracowane ramy pomagają organizacjom rozwiązywać ich obawy związane z tworzeniem wartości i zarządzaniem zmianami. Niniejsze studium przypadku pozwala stwierdzić, że propagowanie kultury organizacyjnej i dostosowanie do potrzeb firmy nie są częstymi celami organizacji i nie motywują do inwestycji w rozwój portali pracowników, jednak są powszechnie uznawane za kluczowe narzędzia do podejmowania decyzji i tworzenie wartości.

Słowa kluczowe: *intranet; portal pracowników; wartość biznesowa; zarządzanie wiedzą; mapy strategii; zarządzanie świadczeniami; zarządzanie zmianami; kultura korporacyjna.*

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The Role of Organizational Culture in Knowledge Management in Small Companies

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Abstract

Organizational culture is an important factor influencing knowledge management processes in small companies. Small entities usually have limited resources, both human and financial, to be able to develop advanced knowledge management systems. However, little research has been done so far to investigate the characteristics of organizational culture in small companies, in terms of knowledge management processes. Therefore, the aim of this research is the examination of organizational culture in small Polish companies with the application of a symbolic-interpretive perspective.

Keywords: *organizational culture; small companies; knowledge management.*

INTRODUCTION

Small companies manage knowledge in a different manner than larger entities (Desouza & Awazu, 2006). They are more constrained by resources such as human, financial and time- related, which influence the scope and quality of knowledge management processes. Small companies cannot afford to spend money on human interactions analysis or expensive information systems (McAdam & Reid, 2001). They are more vulnerable to knowledge losses caused by employee rotation (Desouza & Awazu, 2006). In addition, employees from small companies usually have little time to devote to knowledge codification due to multiple responsibilities (Desouza & Awazu, 2006).

Predominantly, small companies manage knowledge without specific procedures. Previous research indicates that, for small companies, organizational culture is one of the most influential factors in terms of knowledge management efficiency (Nunes, Annansingh, Eaglestone &

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Wakefield, 2006). In general, organizational culture affects not only sharing knowledge, methods of searching for it, types of desired knowledge, and types of interactions between employees (De Long & Fahey, 2000; Probst, Raub & Romhardt, 2000), but also influences the choice of technology, evolution of knowledge management, migration of knowledge within an organization, role of leaders and effectiveness of knowledge management (Alavi, Kayworth & Leidner, 2005).

Despite the vague importance of organizational culture in terms of knowledge management (KM) for small companies, little research has been done to investigate its specific characteristics (Suppiah & Sandhu, 2017). Most of the research that investigated the relationship between organizational culture and knowledge management was conducted in large companies (Gold, Malhotra & Segars, 2001; Kulkarni, Ravindran & Freeze, 2006; Yeh, Lai & Ho, 2006). Therefore, the main goal of this research is to outline the characteristics of organizational culture in small companies. Additionally, I decided to further investigate the powers influencing particular organizational culture development by gathering perspectives of organizational members. In the literature, there is an ongoing debate about the extent to which organizational culture can be shaped or constrained by factors such as national culture (Hofstede, 1980; House, Hanges, Javidan, Dorfman & Gupta, 2004) or management (Ouchi, 1980; Peters & Waterman, 1982). From the perspective of small companies, this question is vaguely important as those powers may limit the possibility to a build company's advantage in terms of knowledge management effectiveness (Gerhart, 2009).

The qualitative research was conducted in five rapidly developing small companies from the IT sector in Poland. The choice of companies was purposeful. Firstly, I wanted to examine companies that are perceived by the specialists in their field as successful in terms of knowledge management efficiency. Secondly, according to Glinska-Newes (2007), Polish culture may hamper effective knowledge management, so I wanted to examine the impact of various powers on organizational cultures in these five companies.

The article is constructed as follows. In the literature review part, I have outlined the characteristics of knowledge management in small companies, which indicate the importance of organizational culture as a factor influencing knowledge management. Secondly, I have presented theories about organizational culture and powers that may shape it through a different paradigmatic perspective. Finally, on the basis of previous research on organizational culture enhancing knowledge management, I have described values that are important for knowledge management processes. In the methodological part, I have presented the symbolic-interpretive perspective on organizational culture as the basis of my research approach, which

influenced the decision of research strategy and tools applied in the research. In the results part, I have described the nature of knowledge management in the small companies I examined in order to explain the important role of organizational culture for knowledge management processes. Further, I have presented cultural values and the perspective of organizational members on the emergence and maintenance of organizational culture. In the discussion part, several important findings are presented. Firstly, the key cultural values that were present in the five investigated small companies are outlined, such as: team collaboration, open communication, trust, experimentation, autonomy. Secondly, I have revealed that founders and industry play an important role in shaping organizational culture, whereas the impact of national culture is less visible than indicated in Hofstede's (1980) research.

LITERATURE REVIEW

Knowledge management in small companies

In KM literature, most research has focused on large companies, with only 16% focused on small entities (Prystupa-Rządca, 2014). The investigation of Wong (2005) revealed that there are significant differences between small and large companies in terms of factors shaping knowledge management processes. Key differences between the two types of entities are:

- little importance of organizational infrastructure and motivational aids for small companies;
- little importance of training and education and HRM targeted at knowledge management practices in small companies;
- less importance of information systems from small companies;
- high importance of organizational culture for small companies.

Lack of investment in IT system does not mean that knowledge is not important for small companies. On the contrary, often it is the determinant of their success as they are able to use it more effectively (Desouza & Awazu, 2006; Hutchinson & Quintas, 2008). Those companies which treat knowledge as a strategic resource, develop and apply it more efficiently (Salojarvi, Furu & Sveiby, 2005).

According to Hutchinson & Quintas (2008), small companies manage knowledge in an informal manner. They focus more on the human factor than on the development of robust data bases (Desouza & Awazu, 2006). By putting more emphasis on knowledge sharing and application than storage, they can easily become knowledge intensive. Similar conclusions were delivered by Merono-Cerdan, Lopez-Nicolas and Sabater-Sanchez (2007) who found that small companies which mostly apply a personalization

strategy, focus on practices to help people communicate (Hansen, Nohira & Tierney, 1999). However, to succeed with this strategy, the company needs to develop a specific organizational culture that supports communication and the development of a common context (Haesli & Boxall, 2005).

However, some small companies do not introduce practices targeted at knowledge management (Hutchinson & Quintas, 2008). The research on KM practices in small Polish companies revealed that they are implemented to little extent by entrepreneurs (Perechuda & Stosik, 2003). Knowledge diffusion was evaluated as chaotic and centralized in the hands of the founder. Additionally, the researchers found that entrepreneurs were mostly making decisions by following their intuition, and that knowledge which was accessible in the organization was not exploited.

Organizational culture

Organizational culture can be defined as "the process of construction and interpretation of an organization's social reality in the symbolic and linguistic activities of an individual in a group" (Sułkowski, 2008: 12). It can be observed at multiple levels in an organization, being reflected in values, norms and practices. Organizational culture enables individuals to understand how an organization functions and shapes their behavior (Schwartz & Davis, 1981). Both academics and practitioners argue that organizational performance is dependent on the type of cherished values and the degree to which they are shared among employees (Ouchi, 1981; Peters & Waterman, 1982). Thus, organizational culture may serve as a competitive advantage due to its "uniqueness quality" (Ogbonna & Harris, 2000).

According to Phillips, Goodman and Sackmann (1992), each organization is composed of external elements of culture of: nation, region, industry and profession; and internal: employees. Employees are influenced by various institutions present in their culture before they start to participate in the organization, such as family, society, nation, education and experience, which shape their attitude, behavior, and identity (Hatch, 1997). In the literature, there is an ongoing debate about the extent to which these elements can influence organizational culture. The most commonly discussed are national culture and managerial influence.

In regard to the former, researchers indicate that there is a strong relationship between national culture and organizational culture (Hofstede, 1980; House et al., 2004). As indicated by House et al. (2004), 'companies mirror societies from which they originate' when it comes to culture. What is more, national culture is a constraint variation in organizational culture (Johns, 2006). Therefore, managers need to develop an understanding

of local cultures by learning them, or employing those who have that understanding, in order to adapt management practices (Warrick, 2017). In line with this perspective, various comparative studies have been developed such as Hosftede's index (Hofstede, 1980), GLOBE study (House et al., 2004) or Nelson and Gopalan's (2003) research . However, other groups of researchers have found evidence suggesting that national culture may not completely determine the constraints for organizational culture (Gerhart, 2009). In the re-analysis of Hosftede's data, Gerhart and Fang (2005) show that country variances explain to a little extent the variance at individual level cultural values, which suggests that mean differences between countries are relatively small in comparison to variances within countries. Similarly, Tsui, Wang, and Xin (2006) in their research conducted in China, show a high within-country variation in organizational culture, suggesting the importance of managerial power.

According to Schein (1983), founders play an important role at the inception of an organization as they bring many cultural assumptions with them. They "have a cultural "paradigm" in their heads, based on their own prior experience in the culture in which they grew up" (Schein, 1993, p. 3). Leaders influence culture through their strategies, practices, values, leadership style, and example (Steers & Shim, 2013). The way they behave and in what they believe sets the example for others to follow (Gehman, Treviño & Garud, 2013)

With regard to managerial influence over organizational culture, researchers have discussed whether organizational culture can be managed. Ouchi (1980) and Peters and Waterman (1982) argue that organizational culture can be perceived as a new management tool to influence and supervise employees. In line with this perspective, managers can manipulate organizational norms and values to guarantee the emergence of desired behaviors and other factors influencing performance. The founders of an organization are perceived as creators and managers of organizational culture, as it is developed from their personal believes (Bass & Avolio, 1993). However, the contradicting point of view indicates that norms and values are deeply embedded in basic assumptions and thus their management is limited (Hatch, 1997). From a symbolic-interpretative perspective, it is perceived that managers/founders can act as organizational symbols which represent particular values (Pfeffer, 1981). However, their scope of influence is dependent upon the interpretations delivered by participants in the organization. Managers are part of an organizational culture which means that they may be under its influence when they try to manage it.

Organizational culture and knowledge management

According to De Long and Fahey (2000), there is a strong link between organizational culture and knowledge management. Cultural context is necessary to adequately analyze and apply knowledge. According to De Long and Fahey (2000) and Wei and Miraglia (2017) organizational culture influences behaviors central to knowledge management, i.e.:

- culture shapes assumptions about what knowledge is and, hence, which knowledge is worth managing;
- culture mediates relationships between individual and organizational knowledge;
- culture creates the context for social interaction that ultimately determines how effective an organization can be at creating, sharing, and applying knowledge and to what extent it manages the processes.

Culture shapes the processes by which new organizational knowledge - with its accompanying uncertainties - is created, legitimated, and distributed. Suppiah and Sandhu (2017) presented interesting findings in regard to the influence of organizational culture on tacit knowledge sharing. They applied Cameron and Quinn's (2006) Competing Values Framework (CVF) to analyze which type of culture enhances knowledge processes in an organization. The results of the study revealed that only clan culture, which is characterized by a teamwork approach and high employee commitment to the organization and vice versa, had a positive impact on tacit knowledge sharing. The most negative impact was hierarchy culture, which nurtured the use of standard operating procedures and best practices, and had multiple layers of vertical (position) and horizontal (work units) silos operating relatively in isolation (Suppiah & Sandhu, 2017). The other type of culture which hampered knowledge sharing was a market culture where competitiveness and productivity were the core values. Those findings are consistent with previous research on values that contribute to knowledge management.

Organizational culture regulates two important areas from the perspective of knowledge management: readiness to collaborate and trust between employees. Knowledge sharing requires human interaction, an exchange of ideas and openness (Alavi et al., 2005; De Long & Fahey, 2000; Wong, 2005). It can be difficult in organizations where knowledge is perceived as the source of power, prestige or possible career development (Wiewiora et al., 2013). Therefore, management should promote such values as: a focus on the establishment of collaborative goals and open communication (Cabrera & Cabrera, 2005). Often, it requires the redefinition of such paradigms as employer-employee relations in antagonistic categories and the development of values such as dialogue, partnership and cooperation (Morawski, 2005).

Trust influences the scope of sharing knowledge between individuals (Argote, McEvily & Reagans, 2003; Cabrera & Cabrera, 2005; De Long & Fahey, 2000; Gold, Malhotra & Segars, 2001b; Wong, 2005; Yeh, Lai & Ho, 2006). It decreases concerns about usurpation or wrong application of knowledge (Argote et al., 2003b).

The organizational culture oriented towards effective knowledge management encourages employees to question established practices and search for new possibilities. The development of conditions of freedom of opinion and acceptance for mistakes supports such attitudes (Davenport & Prusak, 1998; Wong, 2005).

Another important dimension is ensuring the autonomy of the employees as this increases motivation and engagement (Lemon & Sahota, 2004; Nonaka, Toyama & Konno, 2000). Employees define the limits of their duties and responsibilities in pursuit of goals set by the organization (Cabrera & Cabrera, 2002). Autonomy deals as well with such areas as the choice of methods for task accomplishment, process monitoring, encouragement to learn, freedom to experiment, and risk taking (Janz & Prasamphanich, 2003) and this can be achieved through the introduction of independent multifunctional teams (Teece, 2000).

RESEARCH METHODS

I decided to follow the symbolic-interpretive paradigm which is based on the epistemological conviction of subjectivity of observed reality and its constructivist and conventional character (Kostera, 2003; Sułkowski, 2009). According to this perspective, the main goal of the researcher is the description and understanding of social reality from the point of view of the participating actors (Konecki, 2000). The application of this approach for the research seems adequate, as its main goal was the development of the characteristics of the organizational culture in small companies, with respect to knowledge management practices. Additionally, in the field of management science, the symbolic-interpretive paradigm is widely applied for the development of theories on organizational culture (Sułkowski, 2013). According to the symbolic-interpretive paradigm, there is no universal model of organizational culture and it is impossible to present a holistic picture of it (Sułkowski, 2008). Organizational members are the creators of culture, as they define its elements by themselves. The role of the investigator is to collect recalls of the participants and develop an interpretation, presenting an image of the organizational culture. Such an approach has been taken in this study.

I developed two main research questions to investigate organizational culture in small companies from the perspective of knowledge management practices:

- What are the characteristics of organizational culture that help small companies with knowledge sharing so as to enhance decision making processes?
- What kinds of actors play a role in the emergence of an organizational culture in small companies?
- The choice of research unit was not random, but deliberate. Poland is an interesting field of research in terms of national culture and its impact on knowledge management. The research conducted by Glinska-Newes (2007) revealed that Polish culture may hamper effective knowledge management causing such problems as:
- communication barriers which restrict freedom and openness inter alia the avoidance of communication of negative information or emotional barriers in the communication between employer and employees;
- high uncertainty avoidance may hinder the application of new knowledge;
- high power distance may preclude effective communication between employees and management.

Additionally, Polish society exhibits a low level of generalized trust which stems from the historic past of the country (Sztompka, 1998). A recent survey in Poland revealed that people have become more aware of the necessity to cooperate, however they were still resistant to take action. Trust is an important factor for knowledge management as it influences the scope and willingness for knowledge sharing (Argote et al., 2003; Cabrera & Cabrera, 2005; De Long & Fahey, 2000; Gold et al., 2001b; Wong, 2005; Yeh et al., 2006) and decreases anxiety about misappropriation, wrong application or authenticity of knowledge (Argote et al., 2003b).

I have conducted my research in 5 small companies from the IT sector which were indicated by experts from the startup environment as successful in terms of innovativeness and consumer-market fit (Table 1). The small companies investigated were diversified in terms of the number of employees, age, number of founders, as well as the nationality of employees. Those differentiators are important from the perspective of knowledge management practices. The differentiation in terms of nationality of employees was the interesting element to investigate from the perspective of the role of national culture in shaping the organizational culture.

I followed the qualitative approach based on grounded theory (Glaser & Strauss, 2009). As primary tools of investigation, interviews and participant observation were chosen. All interviews were transcribed and, along with

other research data, were coded and analyzed using the qualitative research software MAXQDA. I applied a structural coding technique which specifies the coding procedure on the basis of predefined research questions according to which the study was conducted (Saldana, 2013). In order to answer the first research question (what are the characteristics of organizational culture in small companies with reference to knowledge sharing so as to enhance decision making processes?) I analyzed the cultural artifacts and later on these were organized to refer to particular organizational values. As a result, five values were identified: team collaboration, open communication, willingness to experiment, autonomy and trust. In respect to the second research question (what kinds of actors play a role in the emergence of an organizational culture in small companies?) I searched for sources of particular artifacts/values indicated by the interlocutors.

Table 1. Characteristic of examined companies

	Company A	**Company B**	**Company C**	**Company D**	**Company E**
Industry	Game development	Game development	Game development	Software/ Hardware	Software
Foundation year	2012	2012	2007	2009	2005
No. of employees	6	20	30	11	42
No. of founders	2	4	4	2	1
Nationality of employees	Polish, British, Norwegian	Polish	Polish	Polish	Polish, American
Increase in number of employees (year to year)	0%	20%	13%	18%	48%
	Virtual team Multiple locations	One office	One office	One office	Virtual team two locations

To maintain the credibility of the results, the authors used the data triangulation method. The identities of the interviewees in the text are coded according to the agreement between the researchers and the organization under its study.

RESULTS

The research results section is divided into three main parts. The first part presents the nature of knowledge management and KM tools in the small companies which were investigated in the research. This background information is vital for the understanding of the role of organizational culture

in knowledge management. The second part outlines key values supported by the presentation of artifacts cherished in companies that contribute to knowledge sharing. The third part presents various actors that play a role in the development of organizational culture i.e. the founder and culture in the industry.

The nature of knowledge management in small companies

In the companies investigated, the founders stated that they did not apply any knowledge management strategy. In general, the concept of knowledge was very narrowly understood, focusing on specific customer knowledge or technical knowledge.

"It is hard to say that we manage knowledge to develop games. You just need to know the matter, to feel in which direction the trends are going" (M2, company B).

The interlocutors mostly indicated explicit knowledge (websites, documents, forums) rather than tacit knowledge i.e. know-how. Further investigation revealed that product development was a knowledge intensive process. For instance, in company C when the founder described the idea generation process, he often referred to such knowledge processes as: acquisition, sharing and application.

Although companies applied various ICT tools to store knowledge, they were less advanced – none of them applied integrated IT system. The tools gathered documents about project development. Only in company C were there stored procedures for project development as the founders tried to better organize the project development phase. In other entities, procedures were transmitted orally during onboarding or mentoring and were embedded in the organizational culture.

Table 2. Knowledge storage and sharing methods in investigated companies

	Company A	Company B	Company C	Company D	Company E
Knowledge storage	Online forum	Intranet website	Data cloud	Data cloud	Intranet encyclopedia Blog
Knowledge sharing	Online forum	Basecamp Emails	Online communicator Emails	Emails	Online communicator Emails

ICT tools were however heavily applied in the companies to enable efficient communication between employees. In the case of companies A and E, those means were especially important as the companies based their functioning on virtual teams. Therefore, employees had few chances to communicate in

person. Other companies applied online communication tools to easily reach a wider group of employees. Interlocutors from companies B, C, D underlined the high importance of the possibility to interact informally on an everyday basis at work.

Organizational culture

Team collaboration

All the companies investigated attributed a high value to the development of team identity. Greater importance was put on working together than on individual accomplishments, which was especially visible during team meetings. In company B, at the initial stage of new product development, all employees were invited to participate in the idea generation session, where everyone could present his/her project. After each presentation, the team discussed the idea's potential and added its own suggestions. In this way, several projects were moved to the stage of prototyping in smaller teams. A similar situation was found in companies A and C, where all employees were invited to comment on the progress of game development after each milestone implementation. In company C, managers recalled the story about one organizational dilemma that the company endured for a month. Finally, thanks to the work of the whole team, they came up with the idea of how to solve it. In company E, the management organized a video conference every two weeks – a joint meeting of their two offices: Warsaw and San Francisco. All employees gathered next to one table (at each location) and the aim of it was to discuss current issues and progress, share achievements and doubts.

> *"We don't want people to feel that there is one decision-making center, here or there, or that here is the main office and there only the peripheries. We care to develop a feeling that it is one team. We care as well not to have divisions between tech vs non tech." (COO, E company)*

Additionally, in company E, the development team had a brainstorming meeting every Wednesday. This was a special meeting during which one of team members shared his knowledge in the area of his specialty.

In company D, the common team identity was especially visible when the company underwent a financial crisis. The company, despite the acquisition of new investor, needed to survive for 4 months without any financial resources. Additionally, employees needed to work harder to be able to finish the product for the Startup Competition.

Open communication

All companies believed that open communication was necessary to develop innovative products. It was especially evident in the practice of feedback delivery. In company A, the employees, together with the founders, discussed recent project progress. They often gave suggestions for improvement, even towards the work done by the owner. They admitted that sometimes being critical led to arguments. However, they stated that it was profitable for the final product outcome. In company B, the employees often shared their work with their peers in order to gather feedback. Those who advised did not expect special privileges in return. This was an unofficial norm which was set up by employees without the interference of the management. In company E, open and straightforward communication was part of the organizational values chart, in which it was written:

> *"It may not be easy to criticize openly and it may be unpleasant to communicate strong feelings, but as long as you are respectful, it helps others to understand you and it defuses many tensions. We are adults and we understand that sometimes people feel angry or disagree. Also, if you admire or enjoy somebody's work or idea, don't keep it just to yourself, show the appreciation to your mates! It helps to keep everybody's spirits high!"*

Trust

Both employees and owners showed trust towards each other in their behavior. For instance, none of the companies introduced any formal prohibition of work for competition or disclosure agreements. In all companies, the owners seemed surprised when I asked them about their fear that the employees could reveal confidential information to a competitor or when I asked about the need to confirm information delivered by an employee. In company E, the management stressed that each employee was given the credit of trust. They perceived trust as the important facilitator of effective collaboration.

In company D, the co-founder admitted that at the beginning of the company functioning, he made a mistake. He did not inform the employees about his financial problems which caused a breach of trust among team members. As a result, some of them left the company. After several years, he faced a similar situation - he knew that the company needed to work for four months without financing and he was not able to pay the salaries. He warned the employees about the situation and, in this way, he was able to maintain the whole team working on the project.

Experimentation

All the companies investigated developed products in accordance to methodologies based on experimentation. In companies A, B, C, they frequently presented parts of their product to verify it with customers' needs. For instance in company C, the team iterated the product every two weeks, delivering even small parts of the product to customers for tests. In company D, the owners tested various business models in order to find the most profitable solution. Being aware that innovativeness requires testing and different approaches, they had left some space for the programmers to experiment.

In company E, the employees in the development team, once every few months, had a so called hack week, i.e. the week during which they could develop their own ideas using the company's resources. This event proved to be very profitable for the company as many creative solutions were developed.

The apprehension of experimentation was associated with another value – learning from mistakes. In company E, it was visible in the organizational value called "It is OK to make a reasonable mistake". Employees were not punished for committing mistakes, but were encouraged to share their experience in a way to make it less likely for others to make a similar mistake.

The positive approach to learning through mistakes was strengthened by recalling the histories of the founders who, through hard work and learning, and through mistakes, achieved spectacular success. For instance, in company B, younger employees were able to describe in detail the history of founders' failures from a previous company.

Autonomy

In all these companies, the employees had relative autonomy. In companies B and C, employees worked in independent interdisciplinary teams. In company B, the employees received a precise list of tasks to accomplish, however they could decide about the ways to achieve their accomplishment. As was mentioned by one of the managers.

> *"You cannot kill someone's creativity and treat him as a robot. You need to give him some freedom. And everyone will add something from himself."*

In company E, the programmers needed to deliver solutions to given problems and were free to decide how to do it.

As the interlocutors stated – the autonomy could not be misled with a laissez-faire approach. In company D, at the stage of idea generation,

the founders admitted giving too much freedom to employees. They had not interfered with programmers' ideas on how to develop the software. As a result, they designed software which was very expensive to develop. Similarly, in company E, the COO described that the employees have the autonomy to decide when they want to work. However, at the same time, they were responsible for being in good health and maintaining a work-life balance. In cases when the founder observed that the employee had failed to comply with the value - 'take good care of yourself', he was reminded to do so.

Development and maintenance of organizational culture

During interviews with the employees, I uncovered that the founders were perceived as role models in terms of knowledge management practices. Founders were recognized for their reputation in the IT sector and past experiences that build their heroic stories of company establishment. As one of the employees recalled about his superiors:

> *"They are the veterans of the industry. They created this industry in Poland." (E3, company C)*

They served as the indicator of desired organizational norms and values. Founders played an important role in enhancing knowledge sharing by being engaged in various process of knowledge management. In companies B, D and E, the founders were engaged in mentoring new employees. In all companies, during team meetings, founders shared their knowledge and created room for others to participate in the discussion.

On the basis of acquired results from the interviews with employees, I conducted interviews with the founders to ask why they cherished particular values within the organization. In company D, the co-founder attributed high importance to his visits to Silicon Valley in the United States, where he faced a different business culture. Those trips induced change to his approach to running a business.

> *"Since my visit to the United States, I've stopped being ashamed of failure and started to expose it. (…) In order to do anything, we need to test it. (…) [In the United States] there is such an approach to help each other. Because Polish people, as I saw it, they don't want to share information with others."*

In company A, the founder was surprised with the question about organizational values. He perceived his team behavior as the natural way of

functioning in an online gaming community, of which he has been a member for many years. Later on he further explained:

> *"I was working in one of the biggest game development studios and I did not like the atmosphere. Constant surveillance, different levels of access permissions and constant suspicion towards employees."*

When he decided to open his own company, he introduced norms that he got acquainted with when he was a member of online community. His employees also belonged to the same community. They never experienced any cultural differences among themselves even though they belonged to other national cultures. The management team from company E had the opposite experience, where national cultural differences sometimes led to conflicts. For instance, once, the American team member publicly criticized the Polish employee through the communicator. The latter felt offended and resentful. The management intervened and managed the conflict but similar situations reoccur from time to time. The founder of company E consciously tried to shape the values of the organization. Having gained international experience in the IT sector, he knew which values secure a good atmosphere at work and high effectiveness. However, the implementation of particular values required effort and were not always successful.

The strong impact of the global industry characteristic to the organizational values cherished by the employees was also observed by the co-founder from company C.

> *"We don't wear suits; we don't have rigid working hours. (…) This is a group of guys who are grown-ups but are still big kids. They like to play games and they need a big imagination because this is a creative industry."*

In all the companies examined, except company E, the growth in terms of employee number was gradual or none in year-to-year comparison (see table 1). The appearance of a new organizational member required his socialization with other employees and transmission of organizational values. In companies B and C, mentoring was introduced. The new employee needed to work for a few months with a senior employee and learn how to manage tasks and collaborate with the rest of the team. The growth of company E was more dynamic and therefore the management had issues with maintaining cultural coherence among new employees.

> *"It takes 3-4 month for the employee to start understanding why we function in a particular manner and in what we really believe. This is troublesome sometimes." (COO, company E)*

In company E, the socialization process was initiated at the stage of recruitment, where interviewers were not only asking a candidate about his experience, but explaining the norms and values cherished in the company as well. The process was multistage and involved meetings with employees from different departments. As said by the Chief Operation Officer:

> *"It is not only our decision to employ someone, but it is his decision as well to collaborate with us".*

The new employee had a so called on boarding procedure – a meeting with the founder during which he learnt about the company's history, values and goals. Later, he/she was given a mentor.

DISCUSSION

In respect to knowledge management practices, the five small companies presented a level of KM implementation typical for an SME: low IT systems advancement (Wong, 2005), high informality of KM (Hutchinson & Quintas, 2008) and the prevalence of a personalization strategy (Merono-Cerdan et al., 2007). As indicated by Hansen et al. (1999), one of the most important tools for a personalization strategy is organizational culture. This is also the case for the companies examined, who can be characterized as a clan culture following Cameron and Quinn's (2006) typology. The values cherished by both management and employees supported knowledge management processes (Suppiah & Sandhu, 2017) which were visible in several ways. Firstly, they attributed a high value to team collaboration and open communication. Recognition of common goals (Cabrera & Cabrera, 2005), partnership and open dialogue (Morawski, 2005) enhance knowledge sharing among employees. Secondly, the value of trust has key importance to create grounds for easy knowledge exchange and application (Argote, McEvily & Reagans, 2003; Cabrera & Cabrera, 2005; De Long & Fahey, 2000). Both employees and founders tried to behave in a manner to create conditions for trust development and maintenance. In the case of a breach of trust (company D), employees lost motivation to contribute to the project. As a result, only a few stayed in the company. Thirdly, all companies valued highly experimentation and learning from mistakes. Employees were not afraid to acquire new

knowledge and try to apply it. As a result, they were able to create innovations from the mix of new knowledge (Davenport & Prusak, 1998; Wong, 2005). Lastly, founders provided autonomy to employees in terms of the fulfillment of given tasks. Thus, they could search for knowledge on their own and apply it differently. In turn, employees become more engaged and motivated to contribute (Lemon & Sahota, 2004; Nonaka et al., 2000).

In regard to the second research inquiry about the actors that play a role in the emergence of the organizational culture of small companies, the research brought as well an interesting insight. The founders' 'cultural paradigm' shaped the initial organizational values, which is consistent with Schein's (1983) research results. Both international and industry experience were vital for the development of particular values which were transmitted later on to the organization. The founders served as symbols for the employees representing particular values and behaviors. However, serving as an example in some instances did not bring the expected results. The founder tried to implement more explicit methods to organizational culture management which had a limited impact (case of company E). This is in line with the symbolic-interpretative perspective which states that founders/managers can act as symbols of particular values, however, the interpretation of their actions lies in the hands of interpreters (Hatch, 1997). The rapid growth of the company in terms of employee numbers was a threat to organizational culture coherence and sometimes led to conflicts between employees. This, in turn, influenced organizational performance. Such instances confirmed that not only the types of values are important but also the degree to which they are cherished by the employees. The founder of company E introduced various techniques to improve cultural coherence. Firstly, he searched for candidates who followed values similar to those present in the company and through recruitment he wanted them to become aware of the characteristics of organizational culture. Secondly, he was personally involved in the onboarding procedure where he recalled the key organizational values. Finally, he introduced mentoring to ensure that the employee received immediate feedback on his/her behavior. Thus, he enhanced the development of common context necessary to develop the common symbolic structure (Hatch, 1997).

The research results indicated as well that national culture played a less vital role in shaping cultural values in these small companies than expected from Hofstede's research (1980). Outlined values differed significantly from the profile of Polish national culture (Hofstede, 1980). Firstly, Polish society is perceived as hierarchical with a need to create the impression that 'everyone is important'. However, in these companies, the management tried to avoid unequal treatment of employees, which was visible for instance during team

meetings. Knowledge delivered even by junior team members was equally appreciated. This further encouraged knowledge sharing (Davenport & Prusak, 1998/2000). Secondly, in Poland, there is the high preference for avoiding uncertainty (Hofstede, 1980). However, in these companies, there was a visible acceptance for risk taking and learning from mistakes. The founders openly shared their failures with team members and with other stakeholders, showing that success was developed through managing many failures. Thirdly, Poland is considered to be a masculine society, which means that the society is driven by competition and achievement (Hofstede, 1980). Being competitive, one may perceive knowledge as a source of power and thus be unwilling to share it (Alavi & Leidner, 2001; Morawski, 2006; Nonaka et al., 2000; Probst et al., 2000). However, among the investigated companies, there was observed to be a rather cooperative than competitive behavior. The employees were willing to share information not expecting to receive special privileges which would indicate the development of communities within companies (Jemielniak, 2008).

Table 2. Hofstede's dimensions

Dimension	Characteristic	Score for Poland
Power Distance	The extent to which the less powerful members of institutions and organizations within a country expect and accept that power is distributed unequally	68
Individualism -collectivism	The degree of interdependence a society maintains among its members	60
Masculinity-Feminity	The fundamental issue here is what motivates people, wanting to be the best (Masculine) or liking what you do (Feminine)	64
Uncertainty Avoidance	The extent to which the members of a culture feel threatened by ambiguous or unknown situations and have created beliefs and institutions that try to avoid these	93

Source: based on Hofstede (1980).

The divergence between the obtained results on organizational culture in small Polish companies and the Polish national culture profile supports Gerhart (2009) results which stated that the link between those two factors may not be so strong and "greater within-country variance in individual level cultural values will provide more room for the operation of managerial strategy and differentiation." (Gerhart, 2009, p. 255). Differences between national cultures were visible only in the case of company E where Polish and American employees had some misunderstandings in regard to communication patterns. The other company which employed multinational

staff did not experience any such situation. However, the founder indicated that they followed values and practices that they experienced while being part of the online gaming community. Therefore, the findings indicate another important power for organizational culture such as industry, being in line with Chatman and Jehn's (1994) research, who found that the industry had an impact on the variance in organizational culture.

CONCLUSION

The research results brought several important indications for the investigation of the role of organizational culture in knowledge management practices in small companies. Firstly, organizational culture played an important role for knowledge management as the investigated small companies followed a personalization strategy and did not invest in advanced IT systems. Cultural values present in these companies enhanced the knowledge management processes in various dimensions. Secondly, the research underlined the importance of the founder and the industry as actors that play a role in shaping organizational culture. However, it should be remembered that the control over the characteristics of organizational culture is limited and attempts to introduce conscious changes are time-consuming and may bring unexpected results. Further, results indicate that national culture does not need to be the constraint for organizational culture as the aforementioned actors may have a more vital importance. This is an important indication for founders and managers as it shows that they need to take an active role as the role-models in shaping organizational culture. The study also brings attention to the critical moment for cultural coherence such as organizational growth. Despite dealing widely appreciated by management it can constitute a threat to organizational performance if not well managed from the perspective of organizational culture.

The research results present a limitation stemming from the qualitative character of the research. A qualitative approach does not allow for a statistical generalization of the data. Therefore, further research should be conducted in order to be able to verify it on a larger sample of small companies. Future research should examine in more detail the role national culture has on different levels of organizational analysis, and give a more precise indication under what circumstances it is more or less important.

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Abstract (in Polish)

Kultura organizacyjna jest istotnym czynnikiem wpływającym na procesy zarządzania wiedzą w małych przedsiębiorstwach. Małe firmy mają ograniczony dostęp do zasobów ludzkich oraz finansowych by rozwijać zaawansowane systemy zarządzania wiedzą. Mimo wszystko część z nich sprawnie zarządza tym zasobem. Dotychczas niewiele badań poświęcono charakterystyce kultury organizacyjnej małych przedsiębiorstw z perspektywy zarządzania wiedzą. Zatem, celem przedstawionego w artykule badania jest zbadanie kultury organizacyjnej w polskich małych firmach przy wykorzystaniu perspektywy symboliczno-interpretatywnej.

Słowa kluczowe: *kultura organizacyjna; małe firmy; zarządzanie wiedzą.*

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