ON RELATIONSHIP OF FUTURES FORESIGHT AND KNOWLEDGE MANAGEMENT

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Abstract: Knowledge management modelling has lately mostly focused on taxonomies for contents of knowledge action (e.g. creation, protection, exploitation, dissemination) and resource-requirements for KM (e.g. chief knowledge officers´ role, Intellectual Capital, KM systems). The literature on KM does contain individual remarks on the dynamic nature of knowledge and its management, but does not include the time-dependency in its frameworks. The concepts of agility and increased volatility propose that a firm´s knowledge and processes on it are in a flux. Knowledge is not only accumulative but knowledge also inflates over time. Anticipation of future knowledge has rarely been inbuilt into KM frameworks.
Some researchers (e.g. Kaivo-oja & Laureaeus, 2017; Rechberg, 2018) have presented reasoning as to how the futures-dimension should be incorporated into KM. Berry and Johnston-Jewell (2014) proposed a link in the opposite direction, proposing that KM approach and practices have the potential to improve futures foresight. The time-moderation (of futures) on knowledge and KM is thus a required dimension for framework building.
This paper reviews the prior-art literature on the topic in the form of a brief bibliographic study. The research database Google Scholar is screened for relationships between KM and time/future-related concepts in research titles through Boolean search. The paper summarizes the findings of the analysis with a proposal of elements and their relationships needed for a dynamic knowledge management framework, where the axis of time is interwoven into the framework. A prospective framework for dynamic KM process is depicted for further study and elaboration to continue the KM framework development further from the proposals made by Saukkonen (2020).

Keywords: knowledge, foresight, anticipation, change, dynamics

1. Introduction

The current interest towards knowledge represents a successive step ahead from the information era. The new era has been widely called the Knowledge Economy (Adler, 2001; Powell and Snellman, 2004; Antonelli and David, 2015). Powell and Snellman (ibid) define the new economy as a system of "…production and services based on knowledge-intensive activities that contribute to an accelerated pace of technical and scientific advance, as well as rapid obsolescence". Parallel concepts, such as Knowledge Capitalism (e.g. Burton-Jones, 2002), underline the key role of knowledge as a source of advantage and wealth. Knowledge is a fundamental asset – capital – for companies to succeed. This stresses the importance of knowledge asset that also has a destructive capacity, since adjusting to the new environment can cause organizational crises (Freeman and Perez, 1998). Simultaneously, knowledge intensity creates entrepreneurial opportunities. Firms can capitalize on knowledge in various ways – they can search for a competitive advantage by unique knowledge creation and its protection, thus creating a differentiated offer advantage over the competition (Moore, 2000). Alternatively, a firm can actively sell, acquire or interexchange knowledge with other stakeholders in the economic system.
Boisot et al. (2007) made a remark on both the importance of knowledge in today´s world, as well as the difficulties of elaborating on it: "With the rise of the knowledge economy, the knowledge content of goods and services is going up just as their material content is declining. Economic value is increasingly being seen to reside in the former - that is, in intangible assets - rather than in the latter."
This intangibility of knowledge poses the first dilemma for knowledge management (KM) for a modern firm: Knowledge is potentially a more valuable asset for competitive advantage, survival and success than ever before. Yet, it is difficult to define and frame, which naturally causes resulting difficulties in managing it. The richness and non-specificity of the concept can be seen e.g. in the definition by Gamble and Blackwell (2001) that depicts knowledge as information that has been processed further from sets of different information items, such as experiences, values, contextual information and expert insight. The same information has a different knowledge

value when the context changes. This paper studies and builds a framework for knowledge by looking at it as an asset pertaining to an organization, despite the understanding that knowledge within an organization is ultimately bounded to individuals belonging to the firm and interaction within the firm and their counterparts in other firms in the collaboration networks.
The second dilemma is the non-static nature of knowledge. As Castaneda et al. (2018) reported in their analysis concerning advances of organizational learning and KM literature: the two fields are increasingly including each other's vocabulary. Knowledge is a volatile asset for a company and its networks.
The two dilemmas pose a challenge for KM research and framework development. KM can be defined e.g. (CEN, 2004) as "purposeful management of activities and processes for leveraging knowledge to keep and improve competitive positioning by using well individual and collective knowledge resources of the firm and its stakeholders". If knowledge cannot be framed in its content, nor its value in a volatile (future) environment be assessed, the targeted purposefulness in the KM is difficult to reach.
In management research, questions implicitly address the phenomena of change (Bono and McNamara, 2011). Yet, KM research has yielded models that are static and, hence, do not reflect the dynamic development of firms in the knowledge economy.
The research questions for this paper are:
RQ1: How has the KM literature until now dealt with (future) time as a moderator in KM processes and frameworks?
RQ2: What elements and how should embedded in the prospective framework(s) of KM dynamic in its elaboration on time?
This paper contributes to the KM research by introducing the concepts of change and anticipation to the KM frameworks that would thus be more dynamic than the models introduced so far. The paper studies a sample of KM articles that have embedded time-dependency in their research scope and/or findings to understand the current knowledge on the issue of KM dynamism to elaborate on.

2. Literature review

Defining modern KM

KM is multidisciplinary and the terms used within the field are adaptations from other disciplines and despite having distinctly different meanings they are often used interchangeably (Beasley and Cooper, 2008). When new angles are added, like in this case Change and Anticipation as moderators to KM, further confusion may arise.
The definability of knowledge as a construct has been a topic of ontological and epistemological discourse for a long (Halpern et al., 2009). The difficulty of definition arises of knowledge residing in many layers of an organization and of its nature of taking both explicit forms like knowledge artefacts (patents, designs, agreements) and implicit forms. Knowledge resides in a firm´s structural capital (Kianto, 2008) like processes and relationship (Nahapiet and Ghoshal, 1998), in the capital of trust between the participants of collaboration (Mayer et al., 1995) as subsets of Intellectual Capital. Zack (1999) divided "knowing" for an organization into: a) Knowing what (possession of knowledge artefacts: Data, patents etc.) b) Knowing how (processual competence) c) Knowing why (recognizing goals and paths to them) d) Knowing who (having in place the needed relationships) e) Knowing where (understanding the potential sources of added knowledge and application areas for the knowledge possessed). This study defines *knowledge as an organization´s ability to act successfully in its environment*.. Knowledge is information that has been processed further from sets of nformation, such as experiences of the past, contextual information and expert insight (Gamble and Blackwell, 2001).

The concept of time-bound dynamism for KM

Dynamics is a common word found across disciplines in science (e.g. thermodynamics, hydrodynamics, electrodynamics), as well as in the daily professional and personal usage (team dynamics, market dynamics, interpersonal dynamics etc.) so it is contextually bound in its content and the connotations surging from it. A bibliographical definition (as in Merriam-Webster, 2020) of dynamics contains 1) dynamics as a branch of mechanics that deals with forces and their relations, primary in terms of motion but sometimes also equilibrium 2) Dynamics as a pattern or process of change and growth and 3) Dynamics as a variation and contrast in intensity.

When applied to the field of management studies, dynamics contains all of the three elements above. If an activity within business organization is dynamic, its nature is being in motion instead of expressing it as a static entity. It varies over time in how intense it is and what it contains in the function of time that is represented in the processes of growth and change of the organization, its knowledge processes and knowledge assets that those processes act on. Two research streams in studies of management and knowledge management have been very explicit on the idea of dynamics. Firstly, the construct of *dynamic capabilities*, pioneered in early 1990s by Teece, Pisano and Shuan and followed e.g. by Amit et al. (1993) and Collis (1994), has gained wide popularity. Secondly, various approaches have tried to capture the nature of a firm as an evolving organism that experiences various transformations in its trajectory of (both internally and externally imposed) change and growth. These trajectories have already been depicted since the 1970s and 1980s (e.g. Greiner, 1972; Scott and Bruce, 1987) as models of development stages. Lately, these sequential or stage-gate models have been challenged by views that firms are in a constant and multidimensional flux between *dynamic states*.

Why should KM research care of dynamism, then? If we define knowledge as an ability of an individual and organizations to utilize information and capabilities in a relevant way for their business activity and context, the naturally static view on knowledge and knowledge management is not suffice to illustrate the way that modern firms and management in them operates. While knowledge can be regarded to a certain extent as a resource in its own right (e.g. Penrose,1959), the way in which knowledge gets managed and used will affect from the leverage of each resource owned by the firm (ibid.). Thus, both of the elements – knowledge itself and its management – are likely to live through changes when the knowledge possessors and processors evolve. Another view on knowledge management is seeing it as the coordination mechanism converting resources into capabilities (Nelson and Winter, 1982; Darroch, 2005). If capabilities are truly of a dynamic nature, then the process of conversion or the resources used for conversion (or both) need to change over time. Hence, research focusing on time-dependent alteration to KM is required for both theoretical and pragmatic contributions.

Dynamic Capabilities

Koryak et al. (2015) identified two broad forms of capabilities that firms can deploy: substantive capabilities that enable firms to compete in current conditions and dynamic capabilities, which enable extending, modifying or creating new substantive benefits for the future. Another dichotomy for current vs. change-focused capabilities is to make a division into operational capabilities for earning a living in the present (Winter, 2003) vs. dynamic capabilities that allow a firm to purposefully create, extend and modify its resource base (Helfat et al., 2009). Dynamic capabilities take a distance to resource-based view paradigms, that largely build on the limits set for a firms' future by its current positions and paths of the past (Helfat et al., ibid., p. 39, p.115). An organization can widen its range and depth of capabilities via the acquisition an sharing of knowledge.

Anticipation as a potential element of KM

Knowledge for a company may include "tangible" knowledge artefacts (conceptual or material), such as practices, ideas, models, representations of information etc. (Paavola and Hakkarainen, 2009). Bell (2003) also proposes dispositions to the future as knowledge objects. Firms can identify situations that may become actual if they are properly activated. Thus, KM should include objectives and practices for acquiring information that may potentially become relevant when it materializes in the future. This anticipation is a neighbouring concept to foresight process that is a "joint effort of stakeholders to explore futures and interpret them to present actions" (Dufva and Ahlqvist, 2014).
Despite the fact that both knowledge exploitation and exploration (searching for knowledge of future relevance) are seen to be important for a firm's success, companies often face a trade-off between the two. This obliged choice of emphasis is due to the limits of managerial attention and organizational resources. (Yan et al., 2016.) Typically, firms focus more on exploitation while paying less effort to exploration. (ibid.) This imbalance is potentially self-destructive, as organizations with a minor investment in knowledge exploration become exposed to the risk of future obsolescence or weakening of competitive position in the future (March, 1991). Kuwada (1998) suggests a systematic, continuous and processual approach to map out the discontinuous environments. Organizations should develop temporal ambidexterity – the ability to act on immediate and anticipative time scales - to gain and sustain a competitive advantage (Wang et al., 2019).

3. Results – Bibliographic study

To cast light on time-oriented considerations within KM field, a six-year time span was studied by using Google Scholar as a source. Boolean search started from the widest thematic area and drilled down to more specific topics of the issue area. As the quest for knowledge was to chart the papers with contributions to the issue(s) under study, meta-analyses i.e. papers that were literature reviews themselves were excluded by using the excluding Boolean operator for "Literature" and "Bibliometric", "Meta-Analysis and "Review" in the paper titles. The findings are summarized in Table 1.

Table 1: Results of the bibliographic review

Boolean search words (for title) in Google Scholar	Nr of articles	Subthemes within the category – in order of volume	Subdivision to publication years	Exemplary papers on the theme
Knowledge Management AND Time OR Temporal	34	Knowledge Management in real-time Managing/Shortening time cycles via KM Temporal/Time-based nature of KM	2014: 6 2015: 3 2016: 4 2017: 6 2018: 5 2019: 8	Callaghan, C. W. (2016). Knowledge management and problem solving in real time: The role of swarm intelligence. Zekri, A. et al. (2017). Temporal schema versioning in τOWL: a systematic approach for the management of time-varying knowledge.
Knowledge Management AND Dynamic	90	Dynamic capabilities and KM KM in dynamic environments Dynamic Models for KM	2014: 10 2015: 12 2016: 21 2017: 14 2018: 14 2019: 19	Jalali, Z., & Rezaie, H. (2016). Analyzing the effect of dynamic organizational capabilities (organizational learning) and knowledge management in achieving the objectives of health reform plan. Fu, Z et al. (2018). Modeling Conceptual Design Process for Dynamic Knowledge Management and Reuse. Santoro et al. (2019): Do knowledge management and dynamic capabilities affect ambidextrous entrepreneurial intensity and firms' performance?
Knowledge Management AND Change	118	KM as an instrument for organizational change Changes in KM strategy/Process Managing (External) change via KM	2014: 24 2015: 20 2016: 24 2017: 15 2018: 26 2019: 19	Barker, R. (2016). Knowledge management and knowledge leaders as change agents during transformation in emerging knowledge organizations: A theoretical framework. Milivojević, N. (2019). Critical factors to BIM team development: applying innovation, knowledge and change management perspectives.
Knowledge Management AND Future	79	Future of KM Future directions for KM research KM´s role for futures view	2014: 9 2015: 14 2016: 15 2017: 12 2018: 10 2019: 19	Rechberg, I. (2018). Knowledge Management Paradigms, Philosophical Assumptions: An Outlook on Future Research. Katiyar, S. (2015). Role of knowledge management for future perspective. Lauraeus, T. (2019). Digital Twins Approach and Future Knowledge Management Challenges: Where We Shall Need System Integration, Synergy Analyses and Synergy Measurements?.
Knowledge Management AND Foresight	13	Foresight on the development of KM The role of KM in (strategic) foresight process	2014: 1 2015: 0 2016: 0 2017: 4 2018: 5 2019: 3	Berry, M., & Johnston-Jewell, D. (2014). The Role of Knowledge Management in Fortifying Foresight. Kaivo-oja, J., & Lauraeus, T. (2017). Knowledge Management and Triangulation Logic in the Foresight Research and Analyses in Business Process Management. Bootz, J. P., Durance, P., & Monti, R. (2019). Foresight and knowledge management. New developments in theory and practice.

Summary - current research streams and approaches

The review indicates that the interest on time-based moderation in and for KM has been relatively static over the studied time-span of 6 years. Theme of change has had a continuous flux of papers, such as the involvement of the time dimension and dynamics into KM studies that is, however, low in volume in comparison to change management topic. The widest body of literature is aimed at describing the role and impact of KM to the change management. Kunisch et al. (2017) state that time is prevalent in strategic change. Yet their meta-analysis also revealed that quite few empirical studies addressing strategic change are anchored in the time literature.
Also, the role of KM in building and developing dynamic capabilities is widely approached. Longitudinal studies on these subjects are still, understandably, rare. The low volume of longitudinal research may be caused by a lack of available register data that would suffice as a proxy for knowledge and its management. Furthermore, since a large part of firms´ knowledge resides tacitly in the people´s experiences and expertise, the current fast turnover of personnel may also complicate following the knowledge evolutions as survey- and interview-based methods of data collection may lead to high levels of attrition.
One approach that shows an increasing (yet still low) volume of scholarly research is bridging of futures and foresight approaches with KM. The attempts have so far (e.g. Kaivo-Oja and Lauraeus, 2017; Lindsey, 2017; Rechberg, 2018) laid down conceptual reasoning as to why the future-dimension should be incorporated into KM. Frameworks regarding inclusion and empirical support for such models are largely lacking. However, as in the recent work Bootz et al. (2019) state that 1) KM is an emerging field that requires a foresight reflection and 2) KM and foresight have an increasingly strong link.
To summarize, KM literature up to now has acknowledged the inherent futures-dimension of KM and listed foresight as one process within KM. At the same time, KM is increasingly accepted to be dynamic, it evolves as a company or knowledge assets in scope develop. Change and anticipation could, thus, be seen as moderators of KM action that takes places in a changing environment and with other stakeholders of KM. The latest developments - not yet numerous but qualitatively important - show an increasing interest in bridging or mutually including the paradigms of foresight and knowledge management. At the same time, modelling of interaction and co-existence is scarce both in academia and in practice.

4. Conclusions

Figure 1 below depicts the elements that the authors recognized for dynamic KM Modelling and their key relationships to the elements surging from prior-art frameworks of KM. The model is a further development of a framework for dynamic KM by Saukkonen (2020). The model depicts how, at the “current” time, the firm knowledge consist of knowledge assets (KA) that together form the firm’s knowledge portfolio (KP). This firm-specific portfolio is elaborated on with network partners with their respective portfolios. These portfolios are optimized (in the boundaries set by resources) for the current environment consisting of features of a Political, Economical, Social, Technological, Environmental and Legal context (PESTEL). The knowledge moderators internal to the firm (growth and change), as well as internal to the network, that the firm is part of (change) will lead to renewed future knowledge assets (KAFs) and future portfolios (KPFs) that the assets form. Anticipation – both at firm and network level is an activity that aims at foreseeing the future environment and, thus, inform growth and change processes for future relevancy.

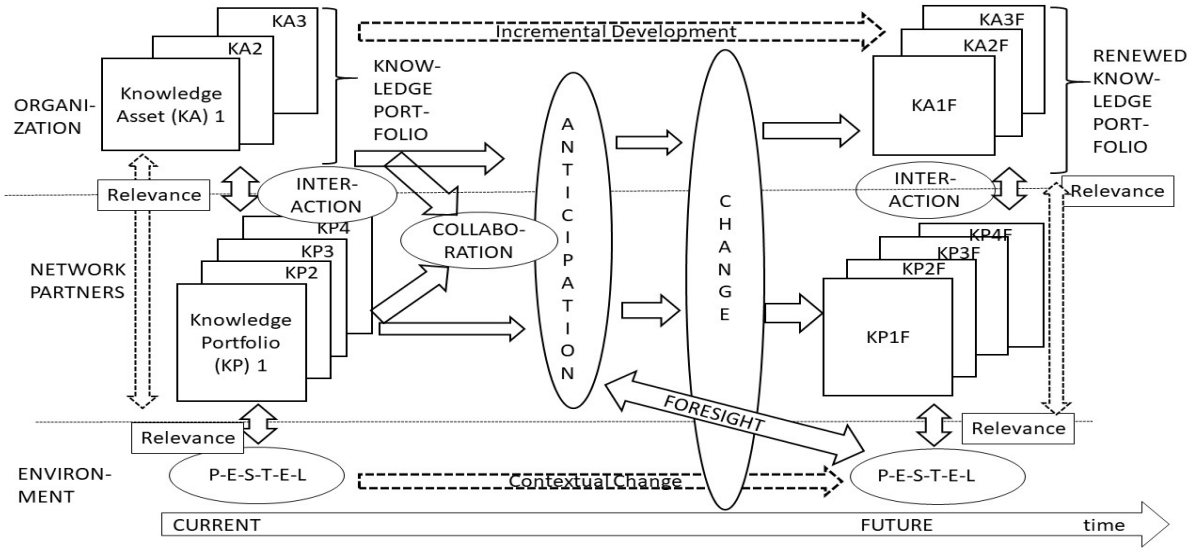

Figure 1: Proposal for a KM framework containing time-based moderation

The framework that consolidates the findings proposes that:

- the firm operates a set of current knowledge assets (KAs) that constitute a knowledge portfolio (KP) that can be shared with its network partners in interaction
- the relevance of KPs is assessed in relation to KPs possessed by the partners and in relation to the settings of the current operating environment (that can be described e.g. with PESTEL (political, economic, social, technological, ecological and legal attributes)
- the change of KAs and resulting KPs can happen a) as an incremental development as a continuum of present knowledge and b) as a result of purposeful anticipation of the future environment and knowledge of networks partners' KPs
- the perceived relevance of future Ks and KPs initiates a change process in current time
- the anticipation can also be a collaborative effort that has multiple beneficiaries and, thus, improves the likely mutual relevance of KAs and KPs of the participants of the knowledge anticipation process

The framework containing time-dependent moderation to KM presented in Figure 1 is born out of conceptual research that aims at synthetizing concepts and constructs previously treated separately and, at times, even in separate fields or streams of science – knowledge management (knowledge assets and knowledge portfolios), strategic management (environmental analysis) as well as futures research (anticipation). As Helfat et al. (2009, p. 120) state, the development of dynamic capabilities concerns strategic change and organizational learning, as well as operates in the intersection of resource-based and knowledge-based views on firms. Testing and further development of the framework will need inputs of various streams within the management science, as well as collaboration between (knowledge) management scholars and futures researchers. A dynamic environment sets demands for dynamics in all operations of a firm, and KM is not an exception. Reactive dynamism is likely to be less efficient than a proactive stance towards change and growth, and anticipative approaches within KM, and likely to serve the latter option. The proposed collaborative practices in anticipation are at least in SME context a recognized yet largely unused potential, most likely to be found in value networks with a leading actor "forcing" the joint view on future knowledge (Saukkonen & Kreus, 2018).

5. Discussion

Future research on the topic would welcome practical instantiations of the framework. Case studies that follow the transformation of a firm and its KM over time would give detailed inputs and add time toggles to the processes depicted in the framework. Industries also differ in their dynamism, and industry-specific frameworks built on the initial framework presented in this paper would deepen and sharpen the focus and actionability of the framework(s). Lastly, KM, in itself, is an asset for a company, forming a part of a firm´s capability portfolio. Future pathways of KM action and research, which the KM research community has actively been elaborating on, could also use the model to depict the future developments of contents and processes of KM itself.

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