

Proposal framework for strategic alignment of knowledge management systems in a business context

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Abstract. Managing company knowledge and using it effectively is more than ever a strong competitive advantage in the business world. The scientific area of knowledge management and knowledge management systems have been intensively studied in the last years; however, we still see the unstructured implementation of knowledge management systems in organizations, the misalignment of knowledge management systems from the business model and the frustration non-use, lack of systems integration and/ or non-return on the investment made either in technology or spent on heavy implementation processes. The state-of-the-art conducted during this study showed that most knowledge management systems alignment models in the business context have a strong focus on the organizational dimension, e.g., culture, organizational processes, organizational structure, and leadership, having identified only three models that also cover, simultaneous, the technological and strategic dimension. Our final objective in this study is, following the research survey methodology, to develop a proposed framework for the strategic alignment of knowledge management systems that can support company managers in their decision-making, and contribute to the development of scientific knowledge in this area.

Keywords: Knowledge Management, Knowledge Management Systems, Learning Content Management Systems, Corporate Strategy, Business Context.

1 Introduction

Organizational knowledge management remains on the strategic agenda and is critical for organizations [1]. In the contemporary business environment, managers increasingly recognize that the ability to create (or acquire), retain, store, protect, disseminate, and reuse knowledge is crucial to gain a competitive advantage for the organization [2, 3]. Knowledge management (KM) emerged as a discipline that aims to enable organization members to acquire, share and collectively leverage knowledge to achieve business objectives [2, 4]. Alavi and Leidner [5] highlighted that it is not often the lack of

knowledge that hinders organizational performance, but the lack of ability to transform knowledge into effective action. The authors then suggest that an important but lacking area of knowledge management research would encompass “the identification of these factors and the development of organizational practices and systems to fill the knowledge application gap”.

Knowledge management systems are a system, or set of information systems, applied to manage organizational knowledge, supporting, and improving the organizational process of creation, storage/ retrieval, transfer, and application of knowledge [5]. This type of information systems has as main objective to facilitate the sharing and integration of knowledge. For the implementation of knowledge management systems, the organization requires a significant number of arrangements. If the process is not adequate, it will not only make the knowledge management system inefficient and unprofitable, but it will also incur harmful effects for the organization [8]. The development of e-Learning has made it possible to sustain knowledge management systems in organizations. e-Learning and e-Knowledge are just two sides of the same coin, whose objective is to manage something that has a high value for the organization – the skills of employees. “Knowledge is information that gains value in interaction with intellectual capital. The same is to say that it gains value after being processed by the collaborators. Therefore, we cannot dissociate online training from knowledge management” [10].

In this context, this study aims to (1) understand how organizations position knowledge management in their corporate strategy; (2) knowing the importance of the strategic alignment of knowledge management systems for the performance of organizations, identify and understand what support models are available, (3) based on this study and after the identification of the gaps, to propose a conceptual framework for the strategic alignment of knowledge management system in the companies, which can be used by managers of the relevant areas in the organization. To this end, and as a starting point, was carried out a Systematic Literature Review based on two research questions, the first, to understand how companies position training and knowledge management in defining their corporate strategy, and the second, to identify the current models that support the strategic alignment of knowledge management systems or learning content management systems in the business context and understand the current gaps. Based on the learned from the literature, and with the combination of the model CommonKADS [11], an initial framework proposal for strategic alignment of knowledge management systems in a business context was presented. Following, to obtain information and improve the conceptual framework, an online questionnaire [12] was made. In the end, were made the adjustments and a final framework proposal was presented, enumerating the limitations and future works.

2 Methodology

This study applied two methodologies, (1) for the state-of-art study, a systematic literature review (SLR) followed Kitchenham’s [13] approach; (2) to obtain information

and improve the conceptual framework, a research survey, following Glasow fundamentals was adopted [14].

2.1 Systematic Literature Review (SLR)

The systematic literature review followed Kitchenham's [13] approach, consider three steps: planning, conducting, and reporting [15].

On the planning, it was identified one previous SLR from Iskandar et al. [16] and was summarized all existing information about the phenomenon in a complete and unbiased way. For this, two research questions were specified and a review protocol was established. The research questions are the follow:

- RQ 1: How do companies position training and knowledge management in defining their corporate strategy?
- RQ 2: What models or artifacts exist to support the strategic alignment of knowledge management systems in a business context?

In the review protocol, first, were defined the search string based on the PICOC criteria [15] and chosen the data sources. The data source used for the research was the Scopus (<https://www.scopus.com/>) and the b-on platform (<https://www.b-on.pt/>) provided by Universidade Aberta, to which the following search string was applied:

((CIO OR CEO OR "Chief Learning Officer" OR "Corporate Directors") AND (strategy OR "learning systems") AND (KMS OR LCMS OR LMS) AND (framework OR model OR artefact) AND ("business organization" OR "business corporation" OR business)). The second step, in the review protocol, was defined the inclusion and exclusion criteria that was applied to the set of papers that were obtained in the first step. The defined criteria are shown in Table 1:

Table 1. Inclusion and Exclusion criteria

Inclusion	Exclusion
Research papers or academic papers	Papers prior to 2006
English or Portuguese papers	Incomplete papers
Papers available in the search platform	Subject not correlated
Papers reviewed by peers	Without citations
	Duplications

The selected papers were analysed to assess their relevance to the research, which was read in full in the next step, to obtain the final set of selected works. In the next figure, we present the outcome, of the conducting step, by applying our review protocol. In the end, twenty-six final papers were selected to be used to answer our research questions.

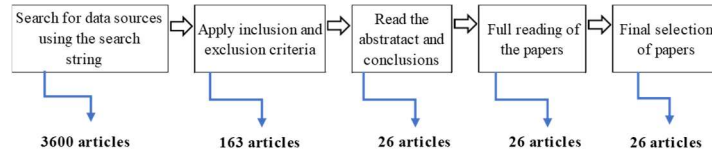


Fig. 1. Applying the Review Protocol

As per Fig. 2, there was a greater interest in this specific topic in the years 2012, 2013 and between 2015 and 2017, with an increase in the number of studies in 2020. The search string brought papers in the year 2018 and 2019, that after reading the abstract and conclusions, were rejected as they were not directly correlated to the study scope.

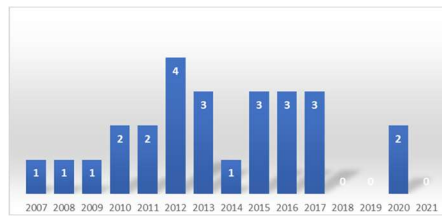


Fig. 2. Quantity of selected papers per year

On the reporting, and based on the twenty-six selected works, an investigation was conducted to answer **RQ1: How do companies position learning and knowledge management in defining their corporate strategy?** Of the twenty-six final works selected, five are related to information systems strategy and indirectly to knowledge management, and how this reflects in business or corporate strategy. The selected works were grouped using three elements, namely, organizational structure, processes and governance and correlated to the information systems strategy. All the selected studies focus on organizational structure, showing the influence of the top information technology executives [17] and the understanding of the CEO and CIO in facilitating the alignment of organizations' information systems with business strategy and the contribution of information systems to business performance [18, 19]. During this investigation, two instruments were identified, to address the integration of knowledge initiatives with the business strategy. One instrument, called Strategy Alignment Maturity Model (SAMM) [20], that measures the maturity of the alignment between business and information technologies, with the objective of identifying the main gaps and a second instrument [21], addresses the effects of the strategic alignment of information technologies, the business, and their governance, on company performance, and investigates the curvilinear relationship between alignment, misalignment, and company performance.

Related to the answer to **RQ2: What models or artifacts exist to support the strategic alignment of knowledge management systems in a business context?** The data collected was organized and analysed to correlate the KMS models or frameworks proposed by each paper, with the three main dimensions of knowledge management implementation [22]: organizational, technological and strategy.

From the analysis of the 22 papers, was identified three, whose proposed models consider the three dimensions of implementation of a knowledge management system. These models are: (1) Baloh et al. [23], the authors propose a model to guide the design of knowledge management systems based on knowledge needs. The model consists of “ideal” combinations of knowledge needs and characteristics of knowledge management systems, which should result in improvements in the use and creation of knowledge; (2) Mehregan et al. [24], takes a different approach, using Critical Success Factors (CSF) as a method to define knowledge management systems evaluation criteria and uses the Gray Relational Analysis (GRA) matrix to score and prioritize knowledge initiatives; (3) Khaiata et al. [20], the study approach proposes an instrument that measures the maturity of the alignment between business and information technologies, with the objective of identifying the main gaps. The proposed instrument was based on the “Strategy Alignment Maturity Model” (SAMM). The instrument proposes that IT-Business alignment can be captured according to six areas of maturity, namely: communication maturity; value measurement competency / maturity; governance maturity; partnership maturity; scope and architecture maturity; skills maturity. These areas of maturity model classify the alignment between business and information technology at five levels, such as, initial/ad hoc process; committed process; established/focused process; improved/managed process; optimized process.

In conclusion, while knowledge management is about people and human interaction, support systems have evolved far beyond an optional part to become a critical component today. The establishment of an effective knowledge management system (KMS), inseparable from the business context, also requires a clear strategy, reflecting the different dimensions mentioned to be successfully implemented and aligned with the corporate strategy. As a result of this study, there is a gap of an existing model or framework that represents the alignment between: company strategy, knowledge management strategy and the strategy of the systems that support it.

2.2 Research Survey: Questionnaire

The final objective of this study is a proposal for a conceptual framework for the strategic alignment of knowledge management systems in a business context, useful for decision-makers involved in defining the strategy of information systems (IS), namely, in the articulation of what are the business objectives, the information or knowledge of the business and the definition of support management systems. Based on our SLR and the literature, we have established an initial proposal for our conceptual framework. To collect information and improve it, the research survey methodology was followed [25], as per Glasow's [14] fundamentals, which involve two steps, (1) development of a sampling plan and (2) establishment of procedures for obtaining population estimates from the sample data and for estimating the reliability of those populations.

This study had as its target population the business sector. The survey was carried out on different people, positions, geographies, and areas of activity in the automotive sector, due to the ease of access to professionals in this area and involved 42 persons, being 32 from the same economic group. This point is considered a limitation of this

research study since it is only about an industrial segment in a business context and the sample size for this proposal is limited.

The questionnaire was constructed following the guidelines of Roopa and Rani [26]. As media for the survey was chosen an online questionnaire, with closed questions and using the “Likert” scale for the answers. The google forms tool was used for this purpose, allowing quantitative data to be collected in a standardized way so that the data is consistent and coherent for analysis and had the advantage of providing a statistical treatment. The construction of the questionnaire had per base four main objectives, by evaluating from the participant's perspective: (1) the relevance of the three levels of alignment: business strategy, knowledge management, and systems; (2) the relevance of the existence of a knowledge management systems strategy and impacts on the results and/or the performance of its functions; (3) the need for information technologies and/or differentiated systems, for differentiated knowledge strategies (codification or personalization) and (4) importance of the standardization of processes for the codification of knowledge and transversality of the systems in the group of companies.

3 Results and Discussion

The results obtained from the questionnaire reinforce (1) the importance of positioning the information systems strategy at the highest level of the organization, as a pillar of support for the business strategy; (2) the information systems (IS) architecture must be aligned with the management model and organizational model adopted by the company; (3) the IS, and its proper use, are fundamental for the efficient and effective performance of the work/task and consequently affect the company's competitiveness; (4) IS and/or information technologies must be appropriate for the knowledge to be managed, aligned with a coding or personalization strategy; (5) knowledge codification demands standardized processes.

From the responses obtained, and taking into account that this is a limited sample, we also obtain the following information (a) the IS strategy adopted by the companies involved in the survey is not clear; (b) there is no unanimous position that companies have a concern in the strategic planning of IS; (c) some lack of knowledge was identified regarding which systems to use in certain tasks; (d) a majority are unaware of the existence of online education and training tools in the company in which they work, including the tools that integrate the management model.

Bearing in mind these insights and given the initial framework, the following changes were made, (a) between the dimension of business strategy and knowledge strategy: (1) direct alignment of an efficiency strategy with the codification of knowledge, which in turn implies the standardization of processes; (2) direct alignment of an innovation strategy with the personalization of knowledge. b) In the dimension of knowledge management systems (KMS) strategy, the setting of the contextual analysis phase of the CommonKADS model (organization model, task model and agent model) as a fundamental part of the strategic planning of information systems (IS). The second and third phases of the CommonKADS model are not part of the strategic definition of KMS, but are part of the roadmap for mapping, designing, and implementing them.

They are mentioned in the proposed global framework, just because they are part of the original CommonKADS model.

The conceptual framework for the strategic alignment of knowledge management systems, adjusted, is shown in figure 3.

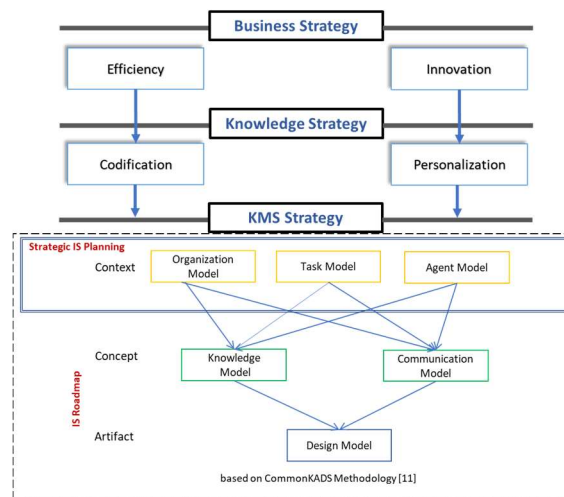


Fig. 3. Proposal framework for strategic alignment of KMS in a business context

The business strategy dimension, considers two distinct aspects, focus on efficiency and innovation. These two aspects are based on the generic strategy of the organization defined by Porter (1985) [27]. Efficiency focus, the company seeks to be the most efficient in the production of products and services in its market, so that it has a competitive advantage over its competitors. This can be achieved with, e.g., economies of scale, access to cheaper raw materials, design to cost, efficiency in the value chain including production processes and technology, efficiency in consumption, etc. This type of strategy means that processes need to be well defined and standardized (knowledge codification). Focus on innovation is in line with the generic differentiation strategy, that is, having products or services with unique characteristics in the perception of its customers, which allows it to charge a higher price in the market. Differentiation can occur in the perceived quality of the product, in the service, in the style of the product, in the brand, etc. To this end, we will clearly find the need to have a process and systems to support innovation. The business strategies of companies may not have this sharp boundary in terms of their product objectives or way of positioning themselves in the market. For the most part, there may even be a combination. Leading through product or technology innovation, for example, but having an efficiency and entry strategy also through the lowest cost, and therefore, in parallel, an efficiency strategy in the areas of production and profit maximization. The distinction between these two aspects is, however, important for alignment with the knowledge strategy and knowledge management systems.

The strategic dimension of knowledge considers two distinct aspects, codification, or personalization of knowledge. The two aspects mentioned above are based on the study by Greiner et al. [28] and Hansen et al. [29] who define that coding has the objective of collecting knowledge, storing it in databases and providing the available knowledge in an explicit and codified way, with the objective of reusing knowledge and explicit solutions. Database design, document management and workflow management can all be considered as part of this strategy. Codification assumes that there is a standardization and structuring of knowledge. In this type of systems, knowledge can be located through efficient indexing and can be distributed to all branches of the company through data networks. Examples of information systems for this type of knowledge are ERP, LCMS, CRM, among others. The personalization strategy is not to store knowledge, but to use information technology to help people communicate their knowledge. The purpose of the personalization strategy is to transfer, communicate and exchange knowledge through knowledge networks such as discussion forums and is clearly in line with a business strategy that focuses on generating new or customer-specific solutions or product innovations.

The strategic dimension of knowledge management systems encompasses the definition of systems or groups of systems and technologies that will allow capturing, codifying, storing, managing, and disseminating knowledge. At this stage, strategic planning of information systems (IS) is essential, defining which systems and technologies are used for the different knowledge strategies. For the definition and construction of the knowledge management systems strategy, we propose to follow the CommonKADS methodology [11], specifically the first phase, called the contextual analysis phase, by applying the tree modules: organization model, task model, and agent model.

4 Conclusions and future work

Knowledge is an "asset" that becomes one of the main competitive and differentiating advantages in organisations. Knowledge management systems are the information systems that allow the creation, storage, dissemination, or application of this knowledge. This study aimed to understand how companies position knowledge management in the definition of their corporate strategy and which models exist to support the strategic alignment of the management systems that support it. The final objective is to obtain a framework of strategic alignment of the knowledge management systems that can support the companies' managers in the best articulation of the business objectives, the business information or knowledge and the definition of the management systems or supporting information.

The initial phase of this study, relied on a bibliographic review of the topics under study, followed by a systematic literature review, based on two research questions, being the first, to understand how companies position knowledge in their corporate strategy and the second, which models or artefacts exist to support the strategic alignment of knowledge management systems in a business context.

Was concluded, regarding the first question, that it is fundamental to position the IS strategy decision making function, close to the business strategy decision making function, typically CIO or CKO and the CEO. This has to do with the need for a clear alignment of IS strategic planning with business goals. In response to the second question, was identified three models, but all of them do not fully meet the objective of this study, so there is room for a proposed conceptual model that encompasses the overview of alignment between corporate strategy of the company or economic group, knowledge management and the management systems that support it. Thus, we propose a conceptual framework that interconnects these three strategic areas. The information obtained from the literature and SLR was the basis for the initial concept.

For the improvement and refinement of the conceptual framework, the research survey methodology was followed, and an online survey was conducted to obtain information. Although there are major limitations to the study, related to the size of the sample and to the fact that it involves a very specific sector, we obtained important insights, which validated the need for the interconnection of the three strategic areas, as well as the integral components of the framework.

This study could be the basis for several other studies, namely, the replication of the research in other industries and organizations, including other sectors, expanding the sample number and the feasibility of its application independent of the industry and tested in a real environment, allowing to make the necessary improvements and adjustments so that its applicability be easy and “friendly”, namely in the dimension of knowledge management systems, where the application of the CommonKADS methodology, may require deeper knowledge of knowledge engineering.

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