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Knowledge Management: Any changes in the Research Agenda?

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ABSTRACT

The concept of knowledge management formed at the end of the 20th century. At the same time, the vector of this concept is evolving due to the emergence of new business models, technologies, and the recognition of the "soft" components of success or the so-called "soft skills", and changes in the strategies of organizations.

The article is a systematic scientific review, the **purpose** of which is to identify the mainstream in the field of economics and knowledge management. The **methodology** of the article is based on a set of approaches, including the knowledge-based theory of the firm, the concepts of knowledge engineering, organizational learning, dynamic capabilities and knowledge transformation, etc., and the research methodology is based on taxonomic and cluster analysis of the most cited English-language publications using tools embedded in the VOSviewer software product. The information base consisted of articles for 2018–2024, selected according to the research topic and keywords "Knowledge Management", and placed in the Dimensions database. As a result, we identified 6 clusters and formalized the directions of modern research in the field of knowledge management. In each cluster, a content analysis of the most cited articles was carried out. The research agenda is currently focused on two main issues: the impact of digitalization and digital technologies on the choice, generation and dissemination of knowledge in an organization; the impact of knowledge on innovation as a mediator of business performance, including its environmental and social aspects. In fact, a consensus has been found in understanding the basic postulates of knowledge management. However, the problem of finding the "good" metrics for assessing the knowledge of an organization and the impact of their level on business performance remains relevant. It is shown that among the theoretical frameworks in knowledge management, the most popular are knowledge engineering and knowledge-based theory of the firm. The results of the study will be useful to managers-practitioners and researchers in the development of effective knowledge management systems.

Keywords: knowledge; knowledge management; knowledge economy; systematicc literature and scientific review; organization efficiency and effectiveness

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INTRODUCTION

Over the last half a century, management as a scientific direction has been developing rapidly, which leads to the emergence of many separate theories and approaches in managerial thought. Changes in institutional contexts and the emergence of new forms of business organisation determine not only the development of terminological apparatus, but also the evolution of already established well-known theoretical trends. One of them, which in many ways determines the fundamental research platform of modern management, is the ***concept of Knowledge Management***.

The term "knowledge management" was introduced in 1986 by K. Wiig [1], and the concept itself is broadly based on the idea that knowledge is a special, unique resource that creates and further maintains sustainable competitive advantages of an organisation.

There are a number of trends changing the knowledge management system in companies [2, p. 15–17]:

in terms of knowledge acquisition — mandatory mastery of information and digital technologies as a means of accessing data processing and integrating them into the company's business processes;

in terms of knowledge generation and dissemination — development of the phenomenon of information clustering, decision-making and delegation of authority;

in terms of knowledge commercialisation — attention to improving the legal protection of transactions, cybersecurity, as well as the formation of new mechanisms of interaction between agents in the markets of intangible goods (where the risks associated with the asymmetry of information are high).

Transformation of markets and mechanisms of their functioning, emergence of decentralised management technologies (blockchain) and development of network resources, intensification of regional competition will be the drivers shifting the focus in knowledge management in an attempt to find relevant answers to two questions: 1) what knowledge should be generated; 2) how to retain and develop general corporate knowledge in the conditions of an open economy.

In this regard, the authors of the article aim to identify the main directions of research in the field of knowledge management using the method of systematic scientific review of publications for the last 5 years (2018–2023). The intermediate sections (tasks) of the work are: clarification of the general terminology and theoretical framework of the knowledge management concept; description of the methodology of systematised scientific review; identification of research directions in the field of knowledge management by clustering method and their content analysis. Due to the limited scope of the study, the research is focused on the study of English-language publications in the Dimensions database.[1]

ORIGINS AND BASIC TENETS OF KNOWLEDGE MANAGEMENT

According to the definition by J. Probst et al., knowledge is a combination of information and abilities that individuals use to solve problems. Knowledge consists of theoretical and practical cognitions, as well as routines (rules of behaviour) and is based on data and information, but unlike them it is always connected with a certain person, as it is derived from his / her expectations [3, p. 22].

Transformation of knowledge into competitiveness (efficiency) of an organisation consists of four stages: "obtaining — generation — dissemination — materialisation". [4]. Ideally, these

[1] Dimensions — is a digital scientometric database covering hundreds of millions of publications, grants, strategy papers, datasets, and patents. It makes it possible to analyse not only publication activity and citations on a particular topic, but also to study the volume and dynamics of research grants in selected fields with the accuracy of specific teams and scientific organisations.

processes are self-organising and occur simultaneously at the levels of employees, departments, and intercompany interaction.

The modern methodological framework of approaches to the unified concept of knowledge management is heterogeneous. Back in 1979, P. Drucker introduced the concept of "knowledge worker" (the worker, who is creating knowledge) [5]. He also proposes the first provisions of the knowledge management theory [6–8]:

- knowledge is a key resource, and its distribution among business structures is shaping the new global socio-economic order;
- the main measure of knowledge, which determines the ability to compete, is information and communication and other high technologies; hence, it follows that high-tech companies will be the market leaders, creating the "face" of the world economy;
- the mental worker is a generator of knowledge; knowledge work is defined not by quantity, but by its results;
- mental labour workers require new rules and approaches to management; their main feature is the ability to manage themselves, self-analysis, and autonomy. In the process of development of P. Drucker's ideas, the key fundamental-theoretical directions of Knowledge Management were formed: the so-called knowledge-based theory of the firm, as well as the concept of organisational learning, dynamic abilities and knowledge transformation, knowledge engineering, intellectual capital and human resource management, and a number of others. Let us dwell on them in more detail.

Studies devoted to knowledge-based resources as sources of firm competitiveness appeared at the end of the 20th century and are embedded in the theoretical and theoretical framework of the resource-based approach (resource-based view). On its basis, in 1996 R. Grant [9] developed the *theory of the firm based on knowledge*, according to which it is the key resource of the organisation, and the company itself is considered as a bundle of specialists' knowledge materialising into products.

The development of research within the framework of this theory is aimed at finding answers to two main questions: 1) what properties should knowledge as a resource have in order for it to lead the organisation to better results? 2) how strong and sustainable is the link between knowledge and organisational performance?

In search of an answer to these questions, knowledge has been categorised in certain ways, in particular (and most importantly) by distinguishing between codified (explicit) and uncodified (implicit) forms. Explicit (formalised) knowledge is easily transferable. Implicit [informalised (know-how)] knowledge includes skills, experience of the firm's employees, mental models, organisational routines. In addition, there is the so-called "highly unformalised knowledge" [10], which, as a rule, relates to individual skills that a person cannot express verbally, but according to which he/she operates or acts.

This classification gave rise to the study of the well-known replication paradox [11], which states that a company, in an effort to increase the speed of knowledge sharing within the organisation, codifies it, but at the same time increases the likelihood that it will become available to competitors due to formalisation. Accelerating the replication of knowledge in order to activate the growth rate of the firm, it is necessary to exercise strict control over its dissemination in order to maintain its market position.

In addition, knowledge differs in its ability to support the competitiveness of the organisation. Adhering to this point of view, M. H. Zack [12] divides them into 3 groups:

1) basic knowledge (core knowledge), characterised by a minimum set and level. It does not form a long-term competitive advantage. All industry participants have such knowledge;

2) advanced knowledge, which allows an

enterprise to be competitive due to their differentiation by specific content;

3) innovative knowledge, which can become the basis of leadership of the enterprise in the industry and allow it to change the rules of the game.

It is this classification that attempts to form a logical chain of transformation of knowledge into efficiency through innovation.

Both of these classifications have become the basis for many empirical studies devoted to the analysis of the impact of different categories and types of knowledge on the performance of organisations. For example, [13] proved a significant positive relationship between the management of tacit knowledge and the firm's production results, and articles [14, 15] provided convincing evidence of the transformation of knowledge into innovation, which, in turn, had a positive impact on business performance.

Competitive advantage depends on how effectively knowledge is integrated into business processes. The scientific *school of organisational learning* focuses on learning as a basic mechanism for creating competitive advantage in a constantly changing environment [16]. At the same time, specialisation and simplification (easing) are proposed as stimulation or incentive tools [17].

Two basic mechanisms have been identified for knowledge integration: instructions (orders) and routines (established practices). The importance of the former increases with the complexity of their action, dissemination, and the diversity of final results.

One of the basic articles within the framework of this theoretical approach is the article by L. Argote and P. Ingram [18], which links the competitive advantages of an organisation with the process of knowledge transfer. According to the authors, the quality of transfer depends on the embedding of information in one of the so-called "repositories" (employees, groups, units/departments/divisions), and the quality of embedding, in turn, depends on the level of socialisation of employees, organisational culture and other factors.

The theory of organisational learning is complemented by *the concept of "learning organisation"* developed in the works of P. Senge [19] and D.A. Garvin [20]. Judging by the name, the concept implies that learning is not just the accumulation of knowledge, but the meaningful development of skills to use it. A learning organisation has inherent features of the internal labour market and is characterised by the following attributes:

1) an organisation's strategy is the result of its approach to learning;

2) the principles of participation, awareness and involvement of employees in the organisation's strategy become key to the organisation's activities;

3) the existence of constant internal knowledge sharing and encouragement of business process flexibility;

4) benchmarking — analysis (a kind of "scanning") by lower-level employees of the entire information field on the topic of the environment.

The development of the so-called "organisational" branch of the knowledge management concept (a branch focusing on business processes of knowledge management) has led to the understanding of the importance of behaviour, motivation of employees, the need to compile and study their personal and psychological portraits. [21, 22].

There are works linking the generation of ideas by employees and organisational factors that affect the effectiveness of innovation [21–23]. Their authors show that the most important factor determining the level of innovative knowledge generation is motivation. In its turn, the condition for high motivation is the application of management practices oriented at maintaining the psycho-physiological health of employees (health-oriented leadership, HoL)

[24], as well as organisational fairness, the level of trust [25] and a number of others.

Taking into account the principles of human resource management theory and resource-based approach, the ideology of *intellectual capital* as a set of knowledge, information, intellectual property and experience that can be used to create wealth is developing in parallel [26].

In the conditions of external shocks at the turn of the twentieth and twenty-first centuries, firms increasingly had to rely on the internal potential of knowledge management. Therefore, the dynamic capabilities theory [27] which was being developed during this period and the *knowledge transformation approach* [28] that was based upon this theory, focus on the mechanisms of resource transformation.

Research authors who hold this view of the knowledge management concept focus on an organisation's ability to "capture" both internal and external knowledge and to retain it over time within the firm [29].

Thus, a classic work is the model of creating new organisational knowledge developed by Japanese scientists I. Nonaka and H. Takeuchi [28]. They build such a logical relationship of knowledge management: "creation of organisational knowledge — continuous innovation — competitive advantages" and link the effectiveness of this transformation of knowledge to both the dynamic capabilities embedded in the organisation and the possibility of mutual "flow" of explicit and implicit knowledge into each other.

Nonaka and Takeuchi identify 4 ways of knowledge transformation: socialisation (from informalised to informalised); externalisation (from informalised to formalised); combination (from formalised to formalised); internalisation (from formalised to non-formalised).

Since knowledge as a category has a pronounced interdisciplinary character, there are a number of "related" approaches to the concept of knowledge management. One of its most prominent areas is *knowledge engineering*, which focuses on the human being as a carrier of knowledge, as well as technical solutions that facilitate its extraction. Accordingly, the main vector of research is focused on digital and information technologies as a support system for knowledge management [30–32].

All existing theories and approaches together represent the theoretical framework of the modern concept of knowledge management,

Table 1

Algorithm for taxonomic study of publications on knowledge management topics

No.	Stage	Stage content
1	Data collection	Formation of a sample of publications in the international scientific database Dmensions by the keyword phrase "knowledge management". Mapping cross-bibliographic links between publications
2	Selecting a software product for conducting analyses	Analysis of available software products that allow working with English-language publications. Selection of VOSviewer software program as the most relevant to the research objectives
3	Data processing	Selection of 2500 publications using the Bibliographic coupling function. Clustering of publications according to cross-bibliographic coupling. Selection of the most cited publications in each cluster
4	Interpretation of results	Identification of research areas within the framework of knowledge management in English-language scientific publications

Source: compiled by the authors.

however, depending on the current agenda, they are adjusted under the influence of new practices and challenges of the external environment that can globally change the methodological platform of management science: these include the COVID-19 pan-demic, active deglobalisation, and at the same time the rapid development of global digital platforms.

MATERIALS AND METHODS

Systematic literature review is a method of taxonomic study of publications, the algorithm of which is presented in *Table 1*.

The information basis of the study was the English-language papers published in the period from 2018 to 2023 in the international scientific database Dimensions and selected on 6 June 2023 by the keyword combination "knowledge management". Over the entire period of its existence, the database contains 10,597 thousand articles on the topic under study, which indicates a long-standing and active attention to it.

We assume that the citation rate can serve as an indicator of the scientific community's interest in the ideas presented in a particular paper, and the most cited articles represent the main directions of research in the current period of time.

Using the Bibliographic coupling function of the VOSviewer software, the text of 2500 most relevant articles according to Dimensions was analysed — a graphic visualisation of the matches is shown in the *Figure below*. 127,265 links and 1000 key patterns were identified. A pattern represents an individual publication that is the target of citations or links. The patterns are linked together (based on citations or references) to form a link graph).

Further, all articles (1000 patterns) were combined into clusters using VOSviewer software (*highlighted in the figure*). The clustering results are presented in *Table 2*.

Table 2 data shows that the research agenda on the topic of knowledge management is formally differentiated into 6 areas. At this stage of the research, a number of intermediate conclusions can be drawn.

Firstly, the main topics of publications are related to two primary issues:

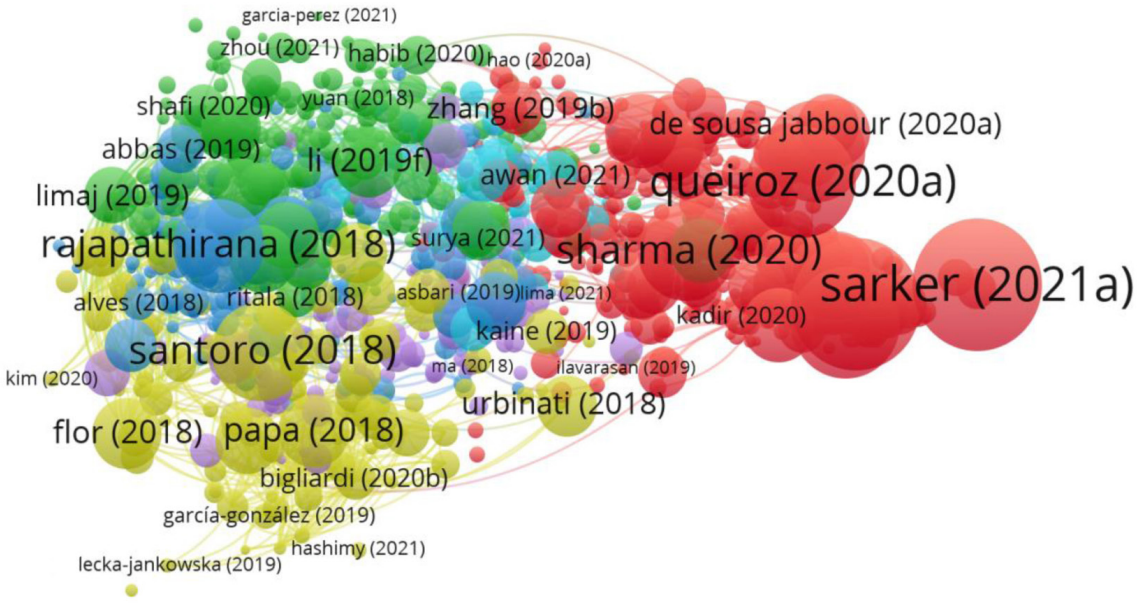

Fig. **Bibliographic coupling map**

Source: compiled by the author with the help of VOSviewer.

Table 2

Clustering of English-language studies on knowledge management in International scientific metric database Dimensions

Cluster	1 (red)	2 (green)	3 (blue)	4 (yellow)	5 (purple)	6 (light blue)
Number of articles, units. (%)	365 (36.5)	218 (21.8)	173 (17.3)	109 (10.9)	106 (10.6)	29 (2.9)
Research topics	Industry 4;0	Impact of innovation potential on the company's performance	Innovations	Digital technologies	Environmental responsibility and corporate innovation	Big-data analytics
Related fields of research defined by keywords	- Machine learning; - manufacturing industry; - Industry 4;0; COVID-19; - supply chains; - digitalisation; artificial intelligence; - data science; predictive analytics; - intelligent applications; - digital strategy	Corporate environmental responsibility; - corporate innovation; - firm value; - encompassing capacity; - cultural balance; - research innovation; - operational innovation	- Innovation potential; - innovation efficiency; - market indicators; - financial indicators; - meta-analysis; - eco-innovation barriers; - digital business models; - sustainable innovation; - absorptive capacity; - circular economy	- Internet of Things; - knowledge management system; - innovation potential; - open innovations; - small and medium-sized businesses	- Innovation in companies; - Autonomy; - management experience; - geography of innovation; - absorptive capacity; - emerging markets; - firm performance; - green innovation; - small and medium-sized businesses; - business transformation; - employee training	- Big data analytics; - Internet of Things; - strategic management; - knowledge-based theory; - dynamic capabilities theory; - closed-loop digital eco-economy; - competitive advantage; - internationalisation; - small and medium-sized business

Source: compiled by the author

Table 3

The characteristics of the most cited publications on knowledge management in International scientific metric database Dimensions as of 06.06.2023

Source	Number of citations	Type of article	Essence and results of the study
I. H. Sarker (2021)	733 (red)	Review article	An overview of machine learning algorithms is provided. It explains the principles of different types of machine learning and their applicability in areas such as cybersecurity systems, smart cities, healthcare, e-commerce, agriculture, etc.
J. Rjapathirana, Y. Hui (2018)	363 (blue)	Empirical	The relationship between firm's innovation capability, type of innovation and market and financial performance of insurance companies in Sri Lanka is investigated
G. Santoro, D. Vrontis и A. Thrassou (2018)	403 (yellow)	Empirical	The impact of Internet of Things (IoT) technology on knowledge management systems and open innovation opportunities is explored. IoT is seen as key, capable of transforming the way organisations manage knowledge and stimulate innovation processes. Structural equation modelling is used on a sample of 298 Italian firms
Z. Li, G. Liao, K. Albitar (2019)	208 (green)	Empirical	Investigates the impact of corporate environmental responsibility (CER) dimensions on business value, and the role that innovation plays in this process, on a sample of 496 publicly traded Chinese companies
N. Côrte-Real, P. Ruivo, T. Oliveira (2019)	127 (light blue)	Empirical	Investigates the relationship between the quality of big data analytics and value extraction through IoT technology in 618 European and American companies
N. Nuruzzaman, A. Gaur, R.B. Sambharya (2017)[1]	99 (purple)	Empirical	The prerequisites for the innovation performance of subsidiaries of multinational corporations or enterprises (MNEs) are investigated using a micro-foundation analysis approach. It is argued that managerial characteristics such as previous experience in similar corporations influence subsidiaries' innovation. A sample of 228 MNE subsidiaries from 11 countries was used

Source: compiled by the author.

*The article was published in January 2018 (the official issue date of the journal is December 2017), hence it was included in the sample.

• How and to what extent is knowledge transformed into innovation, and how does the latter affect the company's performance? In other words, the fundamental ideas of I. Nonaka and H. Takeuchi, as well as the knowledge theory of the firm, continue to form the basis of research in recent years.

• What is the significance of digital technologies and digital strategies (primarily data management strategies) in the field of knowledge management?

The above indicates that of the available research areas, the concept of knowledge engineering and the theory of the knowledge-based firm have received the most attention in the current period.

Secondly, a significant number of works are devoted to the development of medium and small enterprises (SMEs), which is observed in the three identified clusters out of six. It is obvious that in the case when a business cannot use mass-scale as its main competitive advantage, knowledge management technologies and the design of innovation management system are fundamental for its successful functioning.

RESULTS OF THE STUDY

Clustering results: selection of the most cited papers

The final stage of the study involves the selection and content analysis of the most cited works from each cluster (*Table 3*).

Content analysis of the most cited papers

Let's analyse in more detail the most cited papers published in International scientific metric database Dimensions on the topic of knowledge management in 2018–2023. Let us note that the first in this list is the article "Machine Learning: Algorithms, Real World Applications and Research Directions" [33], which represents such a direction as *knowledge engineering*. It was published in 2021, when, due to remote work during the COVID-19 pandemic, there was another surge of interest in digital technologies.

The paper convincingly proves that in the conditions of Industry 4.0, systematic data processing and the use of new intellectual technologies are embedded in the practice of business processes of organisations, as well as in entire spheres of social life. This predetermines the development of machine learning systems and necessitates the development of new procedures of "worker-machine" interaction. The management of machine learning algorithms changes the strategies of organisations and society in terms of knowledge management.

Since we observe a new stage in the development of digital technologies — the active use of artificial intelligence, augmented and virtual reality tools, the gradual transition from digital platforms to meta-universes [34], the theoretical framework and terminological apparatus of this direction are being comprehended. That is why review articles, for example, by the Australian scientist I.H. Sarker [33], are relevant in this context.

However, the most interesting, in our opinion, research on the subject of knowledge engineering is the most cited in the yellow cluster article by G. Santoro, D. Vrontis and A. Thrassou "The Internet of Things: Building a knowledge management system for open innovation and knowledge management capacity. Technological forecasting and social change" [35]. It should be noted that it retains a unified approach that incorporates the scientific achievements of the theory of knowledge transformation and the theory of the knowledge-based firm.

The main objective of this research paper is to investigate the relationship between knowledge management systems and open innovation type. The authors apply a structural equation modelling approach to a sample of 298 Italian firms in different industries, and their findings are very non-trivial and do make a tangible contribution to organisational knowledge management:

Firstly, the case of the Internet of Things (IoT) is used as an empirical example to demonstrate the changing mechanisms of knowledge management in organisations. In fact, IoT influences the company's approach to innovation and how it creates a new value proposition and therefore changes its business model.

Secondly, it is shown that the knowledge management system alone is not a key driver of competitive advantage. It contributes to the formation of the organisation's innovative potential.

Thirdly, it is reflected that the combination of explicit and implicit knowledge leads to better results.

Fourthly, it is stated that the development of intra-company knowledge on the basis of IoT contributes to the increase in the innovation potential of the organisation in terms of its successful embedding and functioning in open ecosystems due to institutions of more effective data exchange and commercialisation of data.

Thus, a conceptual model is developed based on the assumption that firms can use IoT as an effective tool to develop, implement and maintain a knowledge management system and to achieve higher innovation performance. The latter implies the ability to introduce new products/services, processes, or open new markets.

The most cited article from the blue sector, "Leveraging internet of things and big data analytics initiatives in European and American firms: is data quality a way to extract business value?" [36] is also related to the use of big data analytics (BDA) and Io T. Using econometric modelling on a sample of 618 companies, the authors argue that investment in these tools is critical to the competitiveness of organisations.

The second main direction of research is still the relevant topic of the *theory of the knowledge-based firm*. It is characterised by a well-developed analytical apparatus, so the articles written within these theoretical boundaries represent an attempt to clarify the specifics of the relationship between the categories "knowledge and business performance" in specific conditions: country, sectoral, socio-economic, etc. In addition, such works expand the tools of analysis and data volumes, as well as highlight additional factors and mediators that influence this relationship.

This is the approach in the article "Relationship between innovation capability, innovation type, and firm performance" [37], which is a serious empirical study. Based on microdata from a survey of 379 managers of insurance companies in Sri Lanka, the authors try to solve the dilemma, which is as follows: the development of organisations most often involves the use of open type of innovation; at the same time, insurance companies use closed information, which is considered a trade or commercial secret. Are these companies able to generate this type of knowledge into innovative capabilities and how does this affect their effectiveness?

The results of the study confirmed the hypotheses that the innovation potential of insurance companies has a positive and strong influence on the performance in terms of product and marketing strategies development; however, in relation to the organisation of business processes (organisational culture) such a relationship is not observed. These conclusions contradict to those expressed earlier within the framework of organisational theories.

The article by Z. Li, G. Liao, and K. Albitar [38] touches upon the problems of comprehensive measurement of employees' involvement in the processes of corporate environmental responsibility to study its relationship with the firm's value. Knowledge management system is also considered as a factor in the development of corporate innovation. Using data from a sample of 496 Chinese listed companies from 2008 to 2016, it is shown that innovation plays a mediating role.

The article "A Micro-Foundations Approach to Studying Innovation in Multi-national Subsidiaries" [39] also states that the knowledge management system is a micro-foundation of innovation activity and innovation efficiency of business. The authors use the approach to human resource management, explaining the dependence of innovation and knowledge management system development on the socio-demographic characteristics of managers. Using a sample of 228 subsidiaries from 11 countries, it is demonstrated that experience in the industry gives managers the competences of working with subsidiaries.

Thus, the formal clustering of the most cited publications (6 segments), while clarifying the essence of research by means of content analysis, allowed us to establish two basic trends that define the main directions of development of knowledge management.

Firstly, it is a comprehensive blending of the basic principles and achievements of all approaches within the concept of knowledge management. Moreover, interdisciplinarity is a mandatory criterion for worthy research in this area of management. The authors a priori (antecedently) build them on the postulates that knowledge is a key factor in the development of innovation — the type of knowledge and its successful incorporation into business processes determine the competitive advantages of business.

Secondly, active study of the technological component of the knowledge management system as a key factor of its effectiveness.

It is believed that these trends will continue to increase.

CONCLUSIONS

Perspectives on the concept of knowledge management

Despite the fact that the concept of knowledge management has existed for quite a long time, as in any dynamically developing field of scientific knowledge, it has both gaps in terminology and problems related to a common understanding of the methodology of solving research problems. The search for the "right" metrics to assess the knowledge of an organisation and the impact of its level on business performance is still relevant. At the same time, a rather stable framework of theoretical approaches containing tools for analysing the processes occurring in the economic and managerial spheres of organisations' activities has been formed.

The current problematics of scientific works within the concept of knowledge management is focused on clarification of variables and factors influencing the construction and development of the knowledge management system. This is partly due to the interdisciplinary nature of research and linking of different approaches within one work: engineering, organisational psychology and sociology knowledge, resource approach, etc., and to some extent — to ambiguity in the interpretation and dual nature of knowledge as such, the properties of inseparability from the object and blurring of property rights, the essential role of the non-codifiable part, etc.

All of this, we believe, will further develop the concept of knowledge management and motivate scholars and practitioners to continue research in this area.

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