TOWARDS INCREASED LOGISTICS EFFICIENCY BY MEANS OF KNOWLEDGE MANAGEMENT

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Abstract

While in the industrial age the competitiveness of a business entity was typically correlated with its productivity, in the information age, also known as the knowledge age, it is correlated with the efficiency with which information and knowledge are used. In this context, information represents a dynamic interpretation and understanding of the relationship between time-dependent datasets, while knowledge comprises relatively timeless data or information, i.e. data that enables one to understand specific situations. Due to the significance of information and knowledge in the modern era, it is important for a business entity to manage not only its material resources, but also information and knowledge. One of the business processes where information and knowledge management is an essential factor in achieving efficiency is logistics. Today, the collection and use of information is in the domain of relatively high-quality information systems that enable the efficient management of logistics chains. Thus, it may be said that the efficiency of logistics chain management is proportional to the quality of the information system that manages information relating to logistical processes. On the other hand, if the efficiency of logistics in a business entity is proportional not only to the efficiency of information management, but also to the efficiency of knowledge management, the question arises as to which systems are used for knowledge management in the age of information and knowledge. While information management systems are highly developed and widely used, knowledge management systems are still in their infancy. It is a fact that, to an extent, information systems are used for knowledge management; however, they represent only one segment of knowledge management. Thus, when it comes to logistics it is essential to consider and develop, in the form of an application model, a portfolio of programme-type tools that need to be interpolated and used in a modern

business entity with the aim of increasing the efficiency of logistics by means of knowledge management.

Keywords: logistics, knowledge, information systems, knowledge management systems, knowledge management.

1. INTRODUCTION

Knowledge management is normally construed as a relatively homogeneous concept that focuses on knowledge, i.e. its management. However, it is a relatively new and very broad concept that encompasses a variety of technologies, techniques and tools, and focuses on the organisation of knowledge for the purpose of reusing it and thereby increasing the efficiency of its use, as well as on capturing, documenting and distributing it. A modern society that relies on information and communication technologies uses digital repositories of knowledge. Therefore, in addition to focusing on tacit knowledge, i.e. knowledge stored in human minds, knowledge management focuses on the methods of knowledge externalisation and digitisation. Knowledge management is used in many areas of human activity. In addition to being a cornerstone of information science, it lies at the heart of philosophy, psychology, sociology, economics, etc. For instance, contemporary information science, in particular library science, is based on knowledge management.

Knowledge management is of particular importance for economic sciences because, conditionally speaking, it originated in economic research. In 1961, Kenneth J. Arrow noticed that learning increases the productivity of a business system (Arrow, 1961). Drucker has introduced the concept of knowledge workers and explored their productivity (Drucker, 1999). Numerous authors have considered the impact of knowledge on the efficiency of a business organisation. However, knowledge is essentially a phenomenon from information science, and, similar to wisdom, is viewed as a derivative of data or information. (Hoppe at al., n.d.) In particular, during a business process, the transformations of material and energy occur under the influence of information and knowledge while, at the same time, producing information and knowledge themselves. The management subsystem of a business system manages a business process by transmitting information and knowledge and receives information and knowledge through a feedback system. Knowledge is a key factor in the decision-making process in the domain of management processes that take place in a subsystem that manages a business system, but at the same time, it is a key factor in ensuring and increasing the productivity of a subsystem responsible for business operations. Therefore, especially in the contemporary business environment where information and knowledge are key resources in ensuring the competitiveness of business systems, it may be concluded that knowledge is a critical factor in the survival of business systems and in increasing their efficiency. Similarly, knowledge is a key factor in achieving logistics efficiency. It is therefore essential to determine how knowledge management functions, which technologies, techniques and tools it utilises, and how they can be used to improve logistics efficiency. Given the fact that logistics is essentially a material and information process, but also a knowledge-based process,

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the work at hand focuses on defining a model that will exploit the potential of knowledge management to boost logistics efficiency in the modern business environment.

2. RESEARCH METHODOLOGY

Logistics can be viewed as critical support for efficient business process implementation. It is common knowledge that Napoleon's victories, in particular the one at Austerlitz, were won due to good planning, mobility and efficiency of the logistics that successfully followed and supplied Napoleon's troops (Toole, 2011). Similarly, business entities today depend greatly on logistics efficiency. As logistics essentially involves tangible and intangible activities, its intangible component encompasses information and knowledge used both in the decision-making phase and in the implementation phase. Thus, it may be concluded that logistics efficiency is correlated with the efficiency of organising information and knowledge. The research at hand has been carried out in an effort to help business entities optimally use information, and in particular knowledge. The main goals of the research are to:

1. consider the concepts of knowledge management and knowledge, and explore how they affect logistics efficiency;
2. consider the technologies, techniques and tools used in knowledge management that can help organise knowledge with an aim of increasing logistics efficiency.

In order to achieve the research goals, a vast variety of scientific methods was used, among which the following should be mentioned: deduction, abstraction, classification, generalisation, specialisation, aggregation, combination, systematic analysis and synthesis, causal conclusion, analogy, descriptive and symbolic modelling, as well as other scientific methods.

3. RESEARCH RESULTS

One of the theories of human society distinguishes between two major technological revolutions that have dramatically changed the world. The first great revolution took place about 4,000 years BC when human society learned how to grow grains, which led to a sedentary lifestyle and the establishment of a social organisation that still exists in the form of class societies commonly referred to as states. The first technological revolution owes its name to the fact that human society had to discover and adopt a number of technologies, such as production and processing of metal, calendar, script, cartography and the like, in order to increase the efficiency of grain production. The impact on the evolution of the human society of the second technological revolution, which started during the Second World War, was as profound as that of the first revolution, if not more so. The research undertaken for military purposes has led to the development of two major technologies that are essential for the modern era: rocket technology, which has enabled the exploration and conquest of space, and information-communication technology, which has

brought about revolutionary changes in the principles of functioning of the contemporary human society. While rocket technology, also known as space technology, is still in its infancy, information and communication technology has had a massive impact on the development of human society and has changed our modes of functioning to such an extent that the modern society can rightfully be considered the new era in the evolution of human society.

Unlike in the agrarian and the industrial era, the focus of the society in the new era is no longer on the management of material goods, but rather on the management of data as the basic raw material for generating information, knowledge and wisdom. Virtually everything that can be digitised will be digitised. Given the industrial potential of the society and the ubiquitous globalisation enabled by the development of transportation, and, in particular, the development of telecommunications, since the mid-20th century there has been a marked increase in competition among producers. As a result, the focus in the contemporary business environment has been shifted from solving technological problems in the field of production and minimisation of production costs to solving issues relating to market positioning and business operations optimisation, an integral part of which is the optimisation of logistics processes as it is a vital success factor for contemporary business entities. Given that artificial intelligence-driven machines are increasingly used to automate business processes, the proportion of manual labour has been decreasing as the proportion of intellectual work has been increasing. In contemporary society, competitive advantage is gained through information and knowledge superiority as a key factor in the successful functioning of the business rather than the ubiquitous information and communication technology. Regarding this, Carr states: "Behind the change in thinking lies a simple assumption: that as IT's potency and ubiquity have increased, so too has its strategic value. It's a reasonable assumption, even an intuitive one. But it's mistaken. What makes a resource truly strategic—what gives it the capacity to be the basis for a sustained competitive advantage—is not ubiquity but scarcity. You only gain an edge over rivals by having or doing something that they can't have or do. By now, the core functions of IT – data storage, data processing, and data transport – have become available and affordable to all. Their very power and presence have begun to transform them from potentially strategic resources into commodity factors of production. They are becoming costs of doing business that must be paid by all but provide distinction to none." (Carr, 2003).

Given the significance of information and knowledge to contemporary business systems in gaining a competitive advantage, it is necessary to make a distinction between these two concepts and recognise their role and potential in building competitiveness in the current market environment. In the field of information sciences, information and knowledge are commonly viewed as a derivative of data as indicated in the DIKW model. Figure 1 shows the relationship between information and knowledge in the DIKW model.

Figure 1. DIKW model
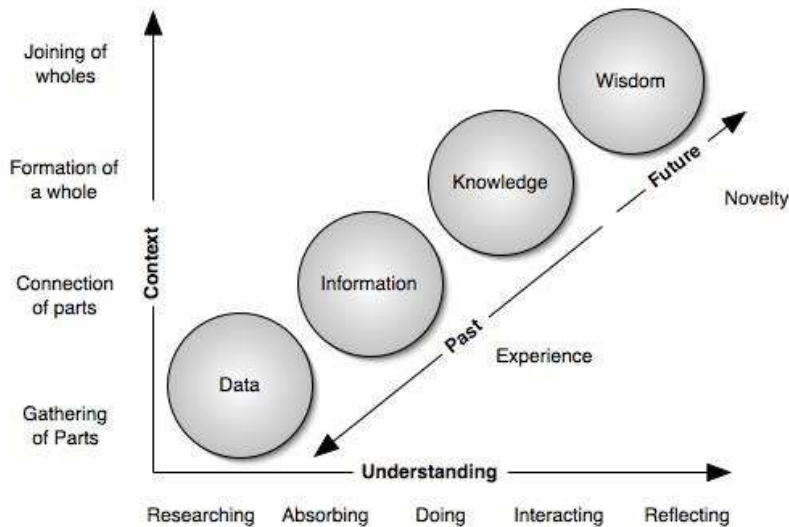
Sources: Fogarty, T.: The Learnings Typhoon, 2006,
http://knowledgetyphoon.blogspot.com/2006/, according to: Clark, D, Continuum of
understanding, 2004, http://www.nwlink.com/~donclark/performance/understanding.html
(14.12.2016)

Based on the relationship between information and knowledge, two scientific
approaches have been developed. Information management focuses primarily on
information, while knowledge management focuses on knowledge. The differences
between these two approaches are shown in Table 1.

Table 1. Differences between Knowledge Management and Information Management

S/N	KNOWLEDGE MANAGEMENT (KM)	INFORMATION MANAGEMENT (IM)
1	The KM process includes "Knowledge creation" as part of the KM framework. Knowledge is created through interactions amongst different individuals and different types of knowledge	IM process does not include knowledge creation. It is limited to capturing, processing preserving, storage and distribution of information.
2	KM is more concerned with managing experiences, know-how, skills to create a learning cycle. The knowledge gained can be used to make predictions	IM is focused on managing of information about a particular context, and storage of information in repositories for easy retrieval and distribution.
3	KM involves managing information (inform explicit knowledge), managing process and managing people, creation of innovation and managing of intellectual assets	Information management involves managing information only (this includes all processes from capturing to dissemination of information)

Source: Edosio, U.: Knowledge Management Concept, Research gate, 2014,
https://www.researchgate.net/publication/264129318_Knowledge_Management_Concept , p.
5, [1.3.2018]

Information and knowledge form the basis of a business entity's market superiority. Hence, information primarily facilitates the following:

1. market positioning and identification of consumer needs;
2. awareness of the situation and changes at the social, economic, technical, technological and legislative level;
3. economical business decision-making at all levels of decision making;
4. the implementation of business activities in a business entity by means of management information and the flow of information through the feedback system;
5. monitoring of business events and sustaining the business using the information collected and processed by the accounting information system;
6. informing consumers about the business entity and product range through activities in the framework of communication with the market;
7. sale and distribution of products to consumers;
8. informing the relevant bodies about business results as well as other organisations that an entity wishes to inform out of business interest;
9. economical procurement of raw and other materials based on information collected in the supply market and by sourcing the appropriate workforce in the labour market;
10. management of production processes and logistical support;
11. management of payment transactions within and outside the business system;
12. functioning of the value chain, i.e. functioning of a business system by means of formal communication of the business process actors in the form of written or oral work orders and oral and written reports on successful performance of tasks;
13. fostering of good working relationships among co-workers in an organisation through formal and informal communication, i.e. creating a team spirit that defines the perception and organisational culture of a business organisation;
14. fostering of good working relationships between people in the organisation and those outside the organisation through formal and informal communication, i.e. creating partnership and friendly relations, which enables market and social positioning of an organisation and defines the public perception of the organisational culture of a business organisation.

On the other hand, knowledge primarily allows the following:

1. understanding and use of information to create new insights and knowledge concerning the functioning of the social, economic and legal environment of a business system;
2. defining of a mission and vision, and creating of a superior business strategy through business planning, by means of knowledge combination and wisdom;
3. establishing and building of a business system by defining technical and technological processes and technical and technological transformation (evolution) of the business system, thereby organizing the business system and establishing organisational culture;

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4. establishing of the organisational structure of a business system and the hierarchical relationships between the management (subsystem responsible for managing) and the subsystem responsible for implementation;
5. creating of legal, economic and other content in the form of various business documents;
6. human resources activities in all segments of the value chain that defines the business process;
7. allocation and development of human resources in terms of their technical and technological (professional) competence and adoption of and adherence to organisational culture;
8. increase in the value of human capital through human resources training, and as a result an increase in the value of the business system;
9. increase in reproductive labour productivity;
10. increase in the value of the manufacturing programme of the existing products and/or the development of new products through creativity and innovation of human resources;
11. understanding of consumer needs and behaviour, and the finding of optimal ways to meet these needs, based on market information;
12. communicating and solving of tasks put before the business system by the environment (social, economic and legislative segments of the system);
13. processing of internal and external information for the purpose of decision-making at all levels by using the knowledge of decision-making techniques and models, i.e. sound decision-making by using decision models containing knowledge and information as input values for the variables of the decision-making model;
14. operation and valorisation of the results of the accounting information system (understanding and use of accounting information);
15. proactive and reactive action of management through the transformation of information collected from the system (feedback information) and the environment into management decisions (information);
16. avoidance and resolution of crisis situations;
17. prudential management of finances (in particular investment policy) and optimal functioning of the payment system
18. optimal conduct in the business, i.e. production process and in logistics activities as support;
19. reaction of each individual to the received information in an effort to maintain the value chain, adhering to the code of conduct and organisational culture;
20. reorganisation of business processes (e.g. transformation from mass production to production based on customer knowledge, i.e. small-batch production and one-off production).

As evident from the above, information and knowledge are intertwined in the business process. Hence, it may be concluded that information without knowledge is almost worthless and vice versa. Unlike data, both information and knowledge are products of the human mind, i.e. they do not exist beyond the human mind. As a rule, knowledge allows one to understand and use information. While information tells the

recipient "who", "what", "where", and "when", knowledge answers the question "how". However, both information and knowledge are focused on the past, i.e. tell about past events, while wisdom that answers the question "why" enables one to understand the problem and use that to envisage future events (Bellinger, n.d.).

Fotache notes the following concerning knowledge management and how it relates to information management: "So KM is not an entirely new discipline and has a positive impact on management theory and at the same time on the management information (MI). KM represents a shift from emphasis on information to focus on individuals who create and own knowledge. The challenge is the development of coherent, comprehensive, systemic and systematic KM, which takes into account the constant interaction between organisational strategy, values, human capital and information infrastructure. Finally, it must be pointed out that supporting knowledge creation and dissemination processes are not new concepts. However, after comparing IM and KM, it is important to note that the KM practice was deeply influenced by improving the ability to process information and communicate, synchronous and asynchronous, using new devices and technologies. In the new economy, knowledge productivity is the determining factor of the competitive position of a company, of an industry, of a nation, totally democratic, in the sense that any country, any industry or any company does not have a 'natural' advantage or disadvantage. The only advantage you can have 70is the ability to exploit knowledge that is everywhere, because the value is now created by 'competitiveness' and 'innovation', both of which are applications of knowledge." (Fotache, 2013). Figure 2 shows the elements of knowledge management.
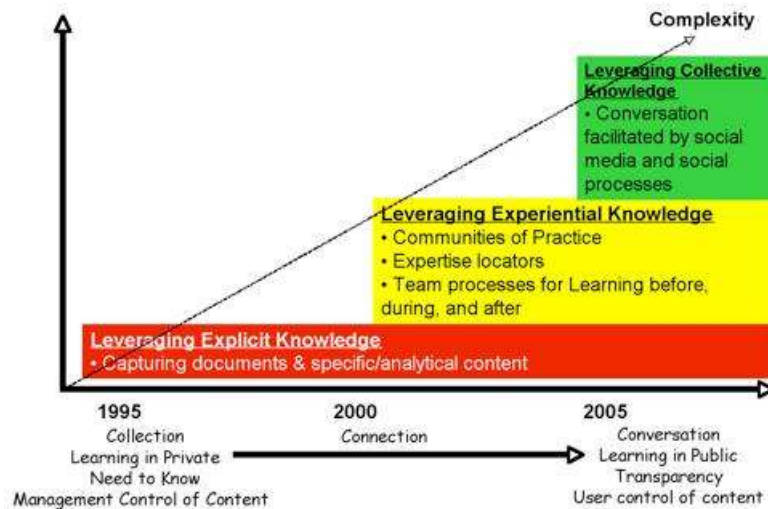
Figure 2. Elements of knowledge management
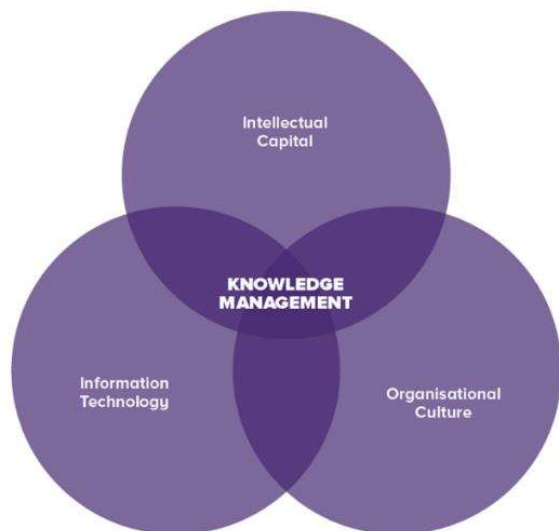
Source: Knowledge Management, KB manage, https://www.kbmanage.com/concept/knowledge-management (10.6.2018)

Although knowledge management is not an entirely new concept, it is constantly evolving which means that knowledge management paradigms have changed over time. Figure 3 shows knowledge management evolution.

Figure 3. Knowledge management evolution

Source: Dixon, M.: Welcome to Conversation Matters, Blog, 2009,
http://www.nancydixonblog.com/2009/03/welcome-to-conversation-matters.html [23.5.2016]

Human society has been using knowledge since its beginnings. Knowledge management focuses on the use of knowledge at the level of a business organisation. As can be seen from Figure 4, the multiplicative effect of the use of knowledge at the business level leads to the creation of a knowledge economy, and the generalisation of this process will ultimately result in a knowledge society whose origins are visible today. This is why, perhaps ostentatiously, the contemporary society is called a knowledge society, although, admittedly, it is headed in that direction.

Figure 4. From usage of knowledge to knowledge society
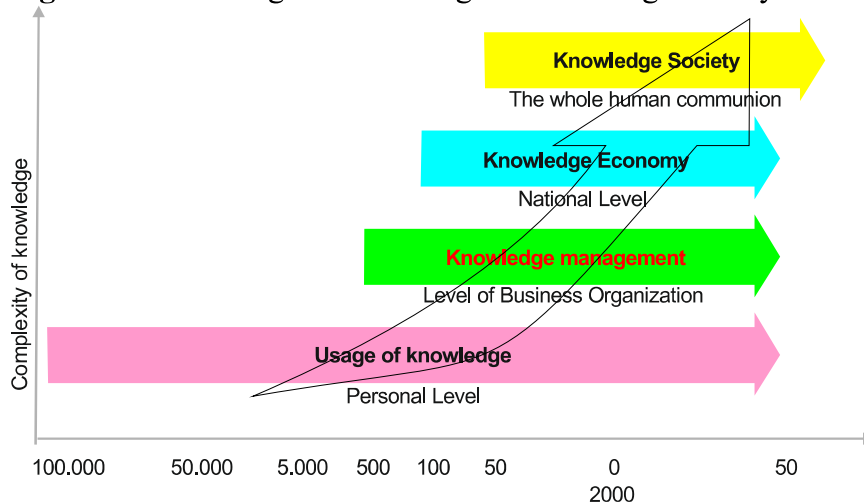
It should be noted that knowledge management is aimed at:
1. Optimising the use of human resources to enhance organisational efficiency
2. Defining models for knowledge externalisation especially in digital repositories, mainly for the purpose of:

a. reducing the impact of human factors on the efficiency of access to and use of knowledge;
b. increasing the efficiency of decision-making;
c. enabling knowledge to grow in an organisation by means of knowledge internalisation;
d. group problem solving.

Knowledge management is essentially the management of intangible assets of a business entity, as shown in Figure 5.

Figure 5. Management of tangible and intangible assets of a business entity

Source: Tangible vs. Intangible Strategies Playmaker,
https://www.playmakersystems.com/wp-content/uploads/2018/02/Tangible-vs-Intangible-Strategies.jpg

Knowledge management is a complex interdisciplinary approach and thus cannot be considered one-dimensional, or viewed as a single programme tool or a single target group of tools. It is a broad, complex, and multi-layered concept. The interdisciplinary nature of knowledge management is illustrated in Figure 6.

Figure 6. Interdisciplinary nature of knowledge management
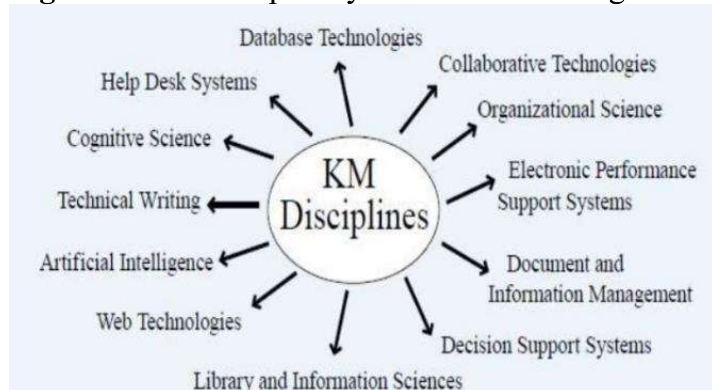
Source: Marisennayya, S.: Knowledge Management Theories,
https://www.slideshare.net/M.Senapathy/akm-ppt-c2-km-theories [12.5.2018]

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To achieve the goals of knowledge management, especially those relating to knowledge externalisation in digital repositories for its reuse, various techniques, tools and technologies are used. Table 2 provides an overview of the major knowledge management techniques, tools and technologies.

Table 2. Major knowledge management techniques, tools, and technologies

Knowledge Creation and Capture Phase	Knowledge Sharing and Dissemination Phase	Knowledge Acquisition and Application Phase
Content creation ■ Authoring tools ■ Templates ■ Annotations ■ Data mining ■ Expertise profiling ■ Blogs	Communication and collaboration technologies ■ Telephone ■ Fax ■ Videoconferencing ■ Chat rooms ■ Instant messaging ■ Internet telephony ■ E-mail ■ Discussion forums ■ Groupware ■ Wikis ■ Workflow management	E-learning technologies ■ CBT ■ WBT ■ EPSS
Content management ■ Metadata tagging ■ Classification ■ Archiving ■ Personal KM	Networking technologies ■ Intranets ■ Extranets ■ Web servers, browsers ■ Knowledge repository ■ Portal	Artificial intelligence technologies ■ Expert systems ■ DSS ■ Customization–personalization ■ Push/pull technologies ■ Recommender systems ■ Visualization ■ Knowledge maps ■ Intelligent Agents ■ Automated taxonomy systems ■ Text analysis–summarization

Source, Knowledge Management, blog, 2011, http://knowledge-management-hendy-1101080113.blogspot.com/2011/05/rangkuman-kedelapan-km-tools-culture.html

A comprehensive overview of KM tools and techniques is provided in Table 3.

Table 3. Comprehensive overview of KM tools and techniques

Category	Specific Tool or Technique
Creation	Creativity Techniques - not just brainstorming but 50+ ways to stimulate creativity Creative abrasion - generating discussion through challenge and opposing views Research / Analysis - new knowledge from experimentation and data analysis Simulation / Modelling - modelling systems to gain better insights Skilful dialogue - a structured way of generating knowledge through discourse
Discovery	Concept mapping - visually linking to concepts to identify their relationships Content Analysis - analysis of key words in documents to reveal issues and trends

	Data Mining - using AI tools to discern patterns and relationships hidden in Text Mining - similar to above but working with text; often uses statistical analysis
Identification	Expertise profiling - know-who: identifying subject matter experts <u>Knowledge audit</u> - using a combination of methods to identify knowledge assets Needs analysis - identifying core knowledge needed for people to do their job 'Yellow pages' - a directory of people organised by their skills, not name
Capture (tacit knowledge)	Knowledge harvesting - eliciting and capturing knowledge from an expert Entry interview - structured interview to capture knowledge from a new hire Ethnography - a systematic study of people at work <u>Exit interview</u> - capturing knowledge before an employee leaves or retires Observation - recording (e.g. by video) how a set of tasks is carried out
Acquisition (existing knowledge)	Alerting - using emails or 'pop ups' to alert users to new or changed information Browsing - browsing online or offline content in a semi-purposeful way Filtering - using key words or terms to discard less relevant information Searching - purposefully seeking out information on a specific topic
Organizing	Card sorting - using labelled cards to sort topics into categories Classifying - categorizing content according to its various attributes Mapping - showing relationships between items of information Metadata - defining descriptors (title, topic, keywords etc.) for content Tagging - adding descriptors (metadata) to items of online content Taxonomy - developing a hierarchy of subject categories Thesaurus - a controlled vocabulary, a list of preferred terms for keywords
Sharing (techniques)	Away days - networking events away from the office <u>Communities of Practice</u> - informal knowledge networks focussed around a specific topic Co-location - locating people from different departments together, typically for a project Cross-functional team - bringing together people with different perspectives Facilitated workshops - sessions which bring a variety of perspectives to specific issues Knowledge centre - an enhanced corporate library: a repository of knowledge and know-who OpenSpace - a form of meeting in which participant set the agenda Share Fair - corporate 'trade shows' that show outputs from across the organisation Sharing best practices - replicating good practices throughout the organisation Storytelling - using narrative to disseminate knowledge in a memorable way Wallcharting - different ways of posting words /pictures on a wall in response to question Workspace design - using office layout to create 'caves and commons'
Sharing (tools)	Blog - personal diary of knowledge experts that allow user comments Audio conferencing - conversation (by phone or online voice) in a group in multiple locations

	Email - the most widespread form of online knowledge exchange, but often badly misused Discussion group (message board, forum) - an online focal point for knowledge conversations Instant messaging (chat) - a real-time dialogue using typed words Intranet (portal) - corporate network holding structured easy-to-find information LinkedIn - an online professional networking tool, giving access to contacts, discussion groups etc. Videoconferencing - online conversation where participants can see each other (e.g. Skype) Wiki - an evolving body of knowledge into which anyone can contribute
Learning	After Action Review (AAR) - a structured post-event review to learn lessons Benchlearning - an extension of benchmarking to take learning into day-to-day work Corporate university - a learning centre that mixes traditional teaching, e-learning and on-the-job training Decision Diary - recording the assumptions and feelings after a decision has been made Lessons Learned - a database of situational lessons, often the synthesis of AARs Learning Networks - knowledge networks specifically focussed to review and learn from events Log Books - routine recording of activity and outcomes, so that later review can enhance learning Post project Review - a formal review of the process and outcomes of a project; could be an AAR Structured Dialogue - a meeting where conversation is structured to a learning outcome
Using/ Applying	Combining - assembling disparate information and knowledge to create new insights Personal Knowledge Management (PKM) - individual methods based on tasks and preferences Sense-making - assimilating knowledge into individual mental models
Exploiting	Commercializing - the end-to-end process of converting knowledge into products and services Licensing - licensing proprietary knowledge to others, including competitors Packaging - restructuring information and knowledge into saleable products Productizing - turning a service or set of competences into a more tangible 'product' Trading - selling knowledge in various forms on knowledge markets
Protecting/ Preserving	Archiving - using different media / locations to preserving knowledge not currently actively used Intellectual Asset Management - pro-active use of intellectual property - trademarks, patents, copyrights etc. Records Management - managing business records in a systematic way for current and future use

Evaluating/ Measuring	Benchmarking - comparing performance across different organisations and learning from the results Benefits tree - assessing outputs and outcomes in a hierarchy of benefits Intellectual Capital Measurement - measuring various factors in an IC model KM assessment - assessment of the quality and effectiveness of KM initiatives Knowledge audit - identifying sources and uses of knowledge
Governance	KM Accreditation - certifying individuals as competent KM practitioners Knowledge Ethics - applying ethical standards to the way that knowledge is shared and used KM Governance - the overall framework for effective oversight of KM within an organisation KM Leadership - senior individual or champions that promulgate good KM practices KM Role and Skills - creating career structures and job descriptions for KM practitioners KM Standards - best practice guidelines endorsed by national / international standards bodies KM Strategy - developing an overall approach that delivers business benefits through KM KM Structures - the way that KM and KM roles are organised within an organization Knowledge audit - identifying sources and uses of knowledge Recognition and Rewards - ways of rewarding individuals, teams and networks for good KM

Source: Skyrme, D. J.: KM Tools and Techniques,
https://www.skyrme.com/kmpractices/techniques.htm [12.5.2018]

There are many definitions of the term logistics. One of them defines logistics as "an engineering science that deals with the flows of resources between their point of origin and the point of consumption in order to meet some requirements. The resource can be anything. It can be a physical item, such as food, materials, equipment, staff or liquids. It can also be an abstract item, such as time, information, particles or energy. All of those items need to be delivered from their point of origin to the point of consumption as fast as possible, and with a minimum of resources used for their delivery."(What is Logistic?, n.d.) The same source distinguishes the following types of logistics (What is Logistic, n.d.):

- Procurement logistics – consists of activities such as market research, requirements planning, make-or-buy decisions, supplier management, ordering, and order controlling. The targets in procurement logistics might be contradictory: maximizing efficiency by concentrating on core competences, outsourcing while maintaining the autonomy of the company, or minimizing procurement costs while maximizing security within the supply process.
- Production logistics – connects procurement to distribution logistics. Its main function is to use available production capacities to produce the products needed in distribution logistics. Production logistics activities are related to organisational concepts, layout planning, production planning, and control.

- Distribution logistics – has, as main tasks, the delivery of the finished products to the customer. It consists of order processing, warehousing, and transportation. Distribution logistics is necessary because the time, place, and quantity of production differ with the time, place, and quantity of consumption.
- After-sales logistics – the main task of after-sales logistics of customer satisfaction, consisting of exchange logistics, which covers the warranty issues; return logistics, which covers the delivery of returning the products to the factory, for example, and service parts logistics, which covers the service network, so the repairmen can have the parts they need right on time.
- Disposal logistics – whose main function is to reduce logistics cost(s) and enhance service(s) related to the disposal of waste produced during the operation of a business.
- Reverse logistics - denotes all those operations related to the reuse of products and materials. The reverse logistics process includes the management and sale of surpluses, as well as products being returned to vendors from buyers. Reverse logistics stands for all operations related to the reuse of products and materials. It is "the process of planning, implementing, and controlling the efficient, cost effective flow of raw materials, in-process inventory, finished goods and related information from the point of consumption to the point of origin for the purpose of recapturing value or proper disposal. More precisely, reverse logistics is the process of moving goods from their typical final destination for the purpose of capturing value, or proper disposal. The opposite of reverse logistics is forward logistics."
- Green logistics – describes all attempts to measure and minimise the ecological impact of logistics activities. This includes all activities of the forward and reverse flows. This can be achieved through intermodal freight transport, path optimisation, vehicle saturation and city logistics.
- Global logistics – can be defined as the challenges and opportunities presented to various organisations worldwide to achieve global excellence. It allows for competition and growth.
- Domestics logistics – can be defined as the challenges and opportunities presented to various organisations domestically to achieve domestic excellence. It allows for competition and growth.
- Concierge Services are offered to those who need assistance whether it be for pleasure or out of necessity. From hotel guests who want a specific meal not listed on the menu to senior citizens who need companionship, concierge services are available to take care of your needs.
- RAM logistics – combines both business logistics and military logistics since it is concerned with highly complicated technological systems for which Reliability, Availability and Maintainability are essential, e.g. telecommunication systems and military supercomputers.

As already mentioned earlier in this paper, logistics, similar to other business processes, integrates the transfer and transformation of matter, energy and information. Logistics is managed by means of information and knowledge. The logistics process comprises a series of events that produce information, i.e. records that enable the documenting and monitoring of the logistics process. Knowledge is an

intangible component of the logistics process that allows the overall functioning of logistics on the one hand and the management of the logistics process on the other. The elements of the logistics process are shown in Figure 7.

Figure 7. The logistics process
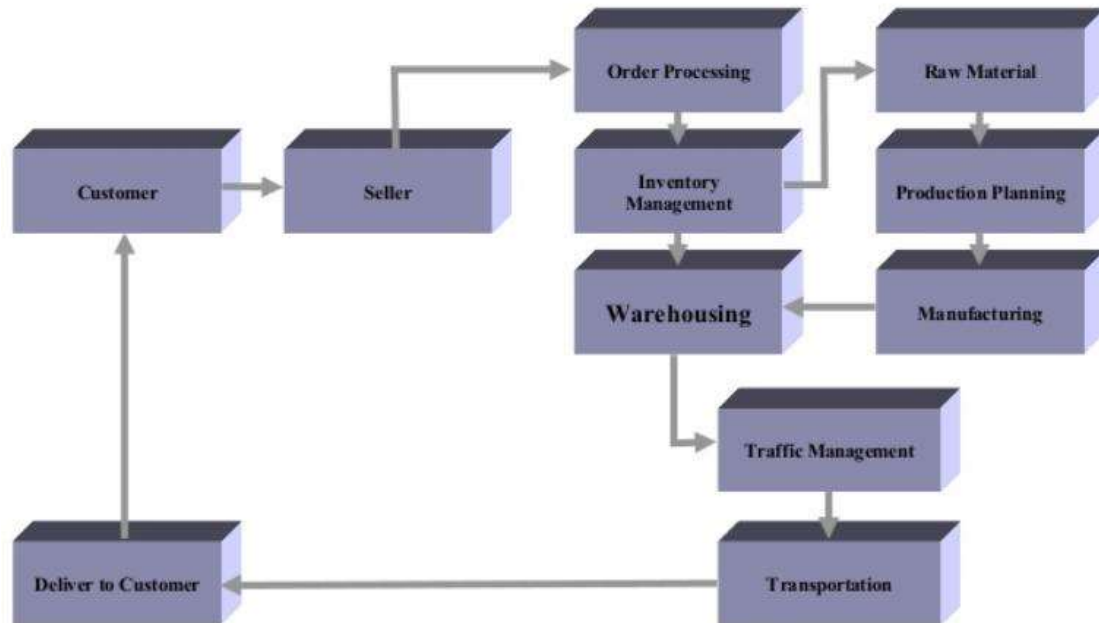
Source: Tanel, T.: International Logistics & Warehouse Management, https://www.slideshare.net/Tanel/international-logistics-warehouse-management [14.5.2018]

Logistics may be defined as the vital support to a business process, i.e. to a business value chain. Thus, logistics represents the application-oriented part of the supply chain. Figure 8 shows the main differences between logistics and the supply chain.

Figure 8. Logistics as an element of the supply chain management of a business entity
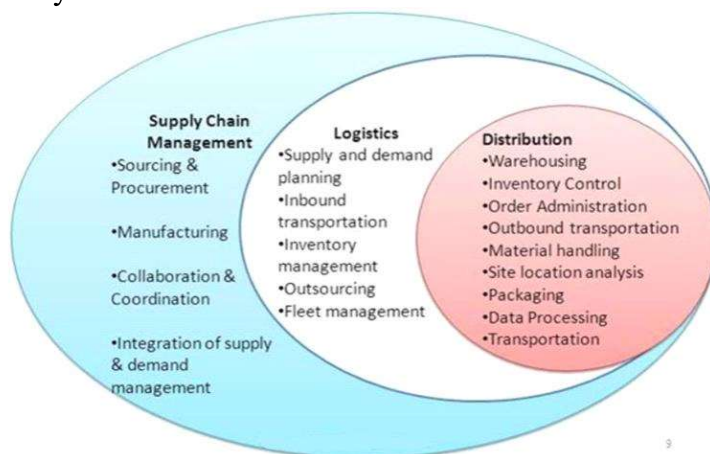
Source: Kumar, A.: Logistics Vs Supply Chain Management, http://www.authorstream.com/Presentation/anupamkr-1968947-logistics-vs-supply-chain-management/ [27.3.2018]

Logistics management encompasses a number of components as depicted in Figure 9.

Figure 9. Components of Logistics Management

Source: Logistics and Supply Chain Management, https://shasuncollege.edu.in/wp-content/uploads/2017/11/Logistics-and-supply-chain-managemnet_03_2017-18.pdf [11.6.2018]

The organisation and operation of logistics in a business entity depend on a number of factors. We differentiate between the following approaches to the organisation of logistics services (Chetak Logistics, n.d.):

- 1PL - A first-party logistics provider is a firm or an individual that needs to have cargo, freight, goods, produce or merchandise transported from a point A to a point B. The term first-party logistics provider stands both for the cargo sender and for the cargo receiver.
- 2PL - A second-party logistics provider is an asset-based carrier, which actually owns the means of transportation. Typical 2PLs would be shipping lines which own, lease or charter their ships; airlines which own, lease or charter their planes and truck companies which own or lease their trucks.
- 3PL - A third-party logistics provider provides outsourced or 'third party' logistics services to companies for part or sometimes all of their supply chain management functions.
- 4PL - A fourth-party logistics provider is an independent, singularly accountable, non-asset based integrator who will assemble the resources, capabilities and technology of its own organisation and other organisations, including 3PLs, to design, build and run comprehensive supply chain solutions for clients.
- 5PL - A fifth party logistics provider will aggregate the demands of the 3PL and others into bulk volume for negotiating more favourable rates with airlines and shipping companies. Non asset based, it will work seamlessly across all disciplines.

The central ethos of 5PL is its commitment to collaboration and to obtaining a higher degree of resource utilisation in order to achieve savings and open up opportunities to secure the best possible solution at minimum cost/carbon etc.

The aforementioned information about logistics, its position, functioning, management components, and approaches to organizing it indicate that it is a complex concept involving a large number of components. Similar to knowledge management, it is an interdisciplinary concept because in addition to economic components it includes the technical component, transport, ecology, legal dimension, cultural component, etc. Efficient operation of logistics requires a wide range of differentiated knowledge. This sets high standards, in terms of the breadth and depth of knowledge, for logistics professionals, especially those involved in logistics management who have adopted a holistic approach to logistics. Thus, it is difficult to keep such a complex and demanding process functional and economical without using all available resources that facilitate the efficient creation, capture, documentation, processing and distribution of knowledge. Hence, a logical conclusion would be that knowledge management may and rightfully should play a key role in ensuring logistics efficiency. It may also be concluded that knowledge management has the potential to increase logistics efficiency primarily in terms of:

1. sourcing and recruiting of the highest-quality candidates for logistics positions;
2. increasing employee skills for performing day-to-day tasks through e-learning;
3. encouraging employees to be creative and innovative in their job;
4. using the existing experience and best practices in solving situations that occur repeatedly;
5. defining the decision-making model with the aim of facilitating optimal decision-making related to logistics issues;
6. use of KM techniques, tools and technologies with the aim of creating, collecting, documenting, processing and distributing knowledge;
7. building performance- and business-focussed organisational culture in the logistics subsystem of a business system;
8. learning and adopting cultural values and customs of suppliers, consumers, i.e. markets where interactions with other cultures and customs are taking place;
9. developing awareness of, adopting and complying with legislative requirements and other frameworks set by different areas and frameworks in which logistics operates;
10. creating team spirit for the purpose of facilitating the exchange of experience among logistics staff through conversation and socializing.

Logistics cannot function effectively in the contemporary business environment without knowledge management techniques, tools and technologies. There is probably no logistics system that does not use some of the components of knowledge management. Given that knowledge management is a complex concept comprising a large number of components, an increase in the number of components used, i.e. a wider application of knowledge management in logistics systems will increase the

efficiency of knowledge management itself. The abovementioned applications of knowledge management aimed at increasing logistics efficiency represent the minimum on which the model for application of knowledge management in logistics should be built.

4. CONCLUSION

Historically, human society has been changing constantly since the emergence of the earliest civilisations. While in the early years of human civilisation the changes may have seemed small and almost indiscernible to a person witnessing them, the pace of societal changes taking place today is extremely fast due to a significant increase in the general level of knowledge that is reflected in the development of a number of technologies that have changed the way the human society functions. One of the major drivers of current changes is the modern information and communication technology that has fundamentally changed the way knowledge is created, captured, stored, processed, and distributed. Vast amounts of knowledge and information and issues relating to their organisation and optimal use have prompted the development of two new scientific concepts - information management and knowledge management. While information management has become, more or less, a comprehensive concept in the corporate sphere owing to integral business-information systems and databases, in particular after the emergence and development of Enterprise Resource Planning Systems, knowledge management integrates a multitude of techniques, tools, technologies and approaches and can therefore not be observed as a one-dimensional concept. However, regardless of its breadth and complexity, knowledge management is the key to knowledge superiority, as one of the key competitive factors in the contemporary business environment.

Knowledge, be it in the form of higher-quality workforce or decision-making models, technologically superior products, or greater knowledge of consumer habits and needs, has become one of the key success factors for contemporary business entities. It increases the efficiency of business processes and thereby the efficiency of logistics. The work at hand has identified KM techniques, tools, and technologies that can be used in contemporary logistics, as well as areas where they can be used to enhance logistics efficiency. The research results provide the basis for further research into the application of knowledge management in logistics. In addition to identifying the optimal tools for each of the potential areas of KM application in logistics, further research needs to consider and define a knowledge management model for logistics as a separate scientific field that will provide a systematic approach to the harmonisation of knowledge about logistics processes.

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