



## Knowledge management in enterprises in the context of Industrial Revolution 4.0 knowledge management in the context of industrial revolution 4.0

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### Abstract

This article presents the context of the industrial revolution 4.0, the opportunities and challenges posed for Vietnamese enterprises. The article emphasizes the importance of knowledge management and related areas and issues of management, the interaction between them, as a core success factor for enterprises in today's business.

**Keywords:** industrie 4.0, knowledge management

### 1. Introduction: Industrial revolution 4.0

The term "industrial revolution 4.0" or "fourth industrial revolution" was first mentioned in 2011 at the Hannover fair to introduce industry programs 4.0, to promote automation and traditional mechanical engineering of Germany. The Industry 4.0 Expert Group presented a series of recommendations on the realization of Industry 4.0 for the German federal government. Members of this expert group have been recognized as the founding fathers and the driving force behind Industry 4.0 [3].

According to Gartner, the Industrial Revolution 4.0 stems from the concept of "Industrie 4.0" in a report submitted to the German government in 2013. "Industrie 4.0" connects embedded systems and intelligent manufacturing facilities to create integration and digital convergence between industry, business, functions and internal processes [3].

The first industrial revolution began in England in the second half of the 18th century. Up to now, there is a unified view of the three industrial revolutions that have occurred, each of which is characterized by substitutional change in the nature of the production process and this change is caused by breakthroughs of science and technology [4]. The first industrial revolution (1.0) used water and steam energy to mechanize production. The second industrial revolution (2.0) took place thanks to the application of electricity to mass production. The third industrial revolution (3.0) used electronics and information technology to automate production processes. Currently, the fourth industrial revolution is arising from the third revolution, which combines technologies together, blurring the boundaries between the physical and digital worlds (the virtual world) and the biological world (the world of life).

According to Mr. Klaus Schwab, the breakthrough speed of Industry 4.0 has no historical precedent. When compared to the previous three industrial revolutions, Industry 4.0 is progressing exponentially rather than with linear speed. Moreover, due to the interdisciplinary nature and with information and communication technology as a background,

it is now disrupting most industrial structures of every single country. It foreshadows the transformation of both the breadth and depth of the entire production, business and management system on a global scale. Table 1 presents in detail the content of the aforementioned revolutions.

**Table 1:** World industrial revolutions

Industrial revolution	Time line	Content
1.0	1820-1870	Transportation. Steam engine (also called internal combustion engine).
2.0	1870-1913	Traditional industries (agriculture, heavy industry, mechanics, chemicals, mines, metallurgy) in developed countries. Electric motor.
3.0	1913-1950	New technologies such as energy, aviation, space, biotechnology, military engineering, information technology and communications. Computerization, automation.
4.0	1950-now	Integrating technologies together based on information and communication technology. - (Social Network) - (AI – Artificial Intelligence, Machine Learning) - (IoT – Internet of Things) - (Big Data) - (3D Printer) - (VR – Virtual Reality) - (Cloud and Cognitive Computing) - (Driveless cars), (Drones) - (Smart robot, factory and city) - (E-Learning, Telemedicine)

Source: [1], [2]

Currently the industrial revolution 4.0 is taking place in developed countries such as the US, Europe and some Asian countries. Besides the new opportunities, Industry 4.0 also presents mankind with many challenges. Table 2 presents

some outstanding opportunities and challenges related to Industry 4.0 for society and the economy.

**Table 2:** Chances and challenges due to industrial revolution 4.0

	Chances	Challenges
1	Many new professions, start-up opportunities and new jobs appear	Unrest, inequality, imbalances in the labor market.
2	Increase labor productivity and production. Economic growth is based on a new business model.	The issue of training a new human resource in terms of converging skills and appropriate competence.
3	Personalization is at a high level, connecting society in new ways.	Change in the way of production, distribution and consumption.
4	Promote the initiative and creative spirit of individuals and businesses	Developing countries will lose the advantage of cheap labor.

Source: [3, 4]

## 2. The goals, roles and functions of knowledge management

Knowledge management is one of the important concepts of modern management. The role of knowledge management is increasing because managers have gradually become aware that knowledge is one of the most important assets of an enterprise, its role in the formation, impact and contribution to the building and strengthening the competitiveness and value of businesses in the market in the knowledge economy today. From the above characteristics of knowledge management, we can clearly see its close relationship with other categories in management, specifically as follows [6]:

-Knowledge management and business strategy - knowledge management needs to be systematically and strategically approached, associated with corporate management practices, goals and business strategies.

-Knowledge management and information technology - advances in information and communication technology will make knowledge management work better. Information technology provides effective storage, transfer and sharing of knowledge widely and widely applied by businesses.

-Knowledge management and creative culture - people, or more precisely managers, are subjects of knowledge use and are the subjects of creativity in seeking new knowledge. The creative culture in the business will help the stakeholders inside and outside the business share the content of ideas, deploy their applications and commercialize them effectively.

-Knowledge management and human resource management - people and organizational learning mechanisms at different levels are at the heart of knowledge management and at the same time, human resource management, in particular. In the field of training and development, it is one of the three main functions (of human resource management).

-Knowledge management and value management - knowledge management, an intangible and extremely valuable asset of an enterprise, contributes greatly to the consolidation and enhancement of expected values for businesses and for stakeholders to be able to develop sustainably.

-Knowledge management and management of innovation and change (innovation and change management) - businesses

cannot create and innovate and change to develop without relying on appropriate knowledge sources. Argument analysis shows the close relationship between the nature of knowledge and the nature of creativity and innovation. The correlation relationship between them affects the efficiency of the process of innovation and restructuring business model. Innovation here is not merely related to products, using new technologies in production. Innovation also needs to be understood such as creating within a specific creative work environment, where decisions are made more quickly, and innovation processes are more effectively implemented.

Knowledge management and project management - one can use knowledge management tools in project management. The role of knowledge in project management is very large, especially from the perspective of distributing and sharing knowledge to be able to implement projects successfully. Deploying knowledge management methods in project management will bring certain benefits, issues arising during the project implementation process can be quickly solved together by the parties involved.

The emerging problem of the vast majority of organizations today is related to the "memory of the organization", which means how to store the knowledge in it and how to prevent it from becoming lost and forgotten over time. Information, knowledge and skills are often closely related to each specific activity of the business, each organizational department or even an individual, but they do not exist at the whole organization level. Therefore, businesses waste a lot of time and effort searching outside the knowledge that one part of them needs, while this knowledge is located in another part (s). Instead of taking advantage of previous experiences (previous projects, joint ventures with previous partners), businesses often repeat old mistakes. Because no formal solution exists to allow the storage, aggregation, updating and dissemination of information, knowledge, experience and skills related to the projects that have been implemented. Businesses have not yet implemented mechanisms to prevent uncontrolled leakage of knowledge that is already owned. When key employees often come with great loss not only the knowledge and experience that they have gathered during the work process, but the business will lose a customer network due to them. For small businesses, this can lead to operational stagnation and even business dissolution.

Information in today's world is the most valuable commodity and is an advantage compared to competitors. Therefore, information management, the way companies find, transfer and use these knowledge resources is considered a key point in corporate management. Using sources of information owned in the management process can significantly affect its effectiveness. An effectively managed organization can learn from itself, using employee experiences and insights from outside. The properly controlled creation process will make the implementation of new projects quick, effective leadership of highly creative people will help to make the best use of their intellectual capacity. Knowledge management methods, organizational problem-solving principles, new ways of thinking, arguments from personal experience and knowledge management of employees are issues that knowledge managers are responsible to deal with in their enterprises.

From this fact and from the goals set out of knowledge management, we see its importance for businesses today. In the age of knowledge economy, the rapid and effective use of knowledge will determine the survival (to be or not to be) of the business. In the opinion of many experts in the field of management, in the future it is only possible to distinguish businesses into two categories, namely:

- Enterprises that apply knowledge into their knowledge (knowledge intensive) processes such as decision making, handling of situations, solving problems
- Enterprises with all processes of operation are based on knowledge (totally knowledge based).
- Knowledge management helps businesses to:
  - Innovate, create good ideas, harness the intellectual potential of the organization;
  - Gather experiences and turn them into useful knowledge for each individual in the organization to use when needed;
  - Promote cooperation, knowledge sharing, continuous learning and lifelong progress;
  - Understand the value and contribution of intellectual property to growth, organizational efficiency and resonance power;

The ultimate and most fundamental goal of knowledge management is the formation of an ongoing learning structure, in which individuals will work closely with each other, continually learning and sharing knowledge to improve the intellectual capacity of the organization to new heights in the ever-changing business environment today. There are many views and models of knowledge management, but the ultimate goal that knowledge managers aim to: create, share, store, develop and make optimal use of the knowledge resources inside the organization.

### **3. The need for knowledge management in vietnamese enterprises**

#### **a. Demand for knowledge management in personnel management**

From the perspective of human resource management, the increasing need for communication, sharing and creativity in working groups related to many different fields is one of the reasons leading to the need for knowledge management. Businesses, due to the fierce competition in the market, tend to work together to consolidate and increase competitiveness. Therefore, employees of different businesses often have to work together. Moreover, to develop a product, it requires a close combination of ideas from many different fields (innovation, design, production and marketing). In other words, the members of a working group are often employees of different departments, even of different businesses. They often only know their areas of expertise and are very ignorant in other areas. Differences in organizational culture can hinder communication and make group collaboration difficult. Therefore, it is essential to increase the ability and effectiveness of teamwork, including sharing and exchanging experience of team members. Knowledge management can help businesses solve this problem through the use of discussion-promoting tools to come up with new ideas and share knowledge within the group and within the organization

[6, 7].

In addition, the need to increase the ability of employees to handle complex situations and to retain knowledge when working groups, project teams disintegrate or re-establish also makes building management systems. Tri's knowledge becomes urgent. Currently, working groups are often set up to solve problems and projects within certain time limits. After the task is completed, these groups will disband themselves, members return to their regular work or join other work groups, where their expertise is of greater value rather than value. The data collected in other areas of the projects they were previously involved in. Shortly thereafter, this knowledge is not stored to become an intangible asset of each employee and the entire organization. Knowledge management can help businesses solve this problem effectively, such as through the process of preserving and visualizing these hidden knowledge during the exchange and cooperation [6, 7].

In the era of fierce market competition, time is the decisive competitive factor among all businesses. Businesses face unexpected changes, innovations and innovations from competitors, and unpredictable and unpredictable moves in the market. Businesses, if they want to survive and grow, must keep up with the changes taking place in the external environment. Therefore, the reaction and decision making of employees before certain situations need to be done quickly and accurately. This requires staff awareness levels to be developed at a higher level, with timely information provided. If knowledge management is good, this problem can be solved.

#### **b. Demand for knowledge management in enhancing enterprise value**

All tangible assets of an enterprise are depreciated over time, which is the exact opposite of knowledge. The laws governing knowledge are different from those that govern the physical world. A legal asset may be used by more than one person at the same time and its value increases with time of use. It is one of the rules relating to intangible assets of an enterprise. The growing gap between market value and total assets of successful companies such as Facebook, Coca-Cola, and Samsung is a manifestation of the power of knowledge assets and the boundlessness of it. Unlike limited resources such as land, capital, energy, materials and labor, intellectual property (intellectual property) is an unlimited resource that can contribute to the production of profits for businesses and society if they are combined to use effectively [6, 7].

Knowledge helps businesses to get multi-dimensional and comprehensive recognition and interpretation of the same problem, phenomenon, and market situation. From there, businesses can propose countermeasures and solutions. To do so, businesses must constantly be creative and innovative to keep up with the general trends of the times. Just like that, the treasure of human knowledge is increasingly expanding and expanding faster, becoming rich in diversity and computer. Knowledge management helps businesses systematize the knowledge that they own, discover new knowledge, thereby building for themselves a sustainable competitive advantage, creating market values [6, 7].

### **c. Demand for knowledge management in technology development**

The strong development of information technology helps businesses to collect and store large amounts of information easily, conveying them to necessary places for those in need quickly. More and more jobs in the organization are handled by computers. The importance of technology is undeniable, but technology itself does not create competitive advantages for businesses, because it is easy for competitors to create similar technologies or buy them in the transfer market. Then the competitive advantage of the business will be lost. In today's knowledge economy, the technological race is getting shorter and technology itself is no longer considered a sustainable competitive advantage <sup>[6, 7]</sup>.

Technology can help businesses collect, store and transmit information very effectively. But in order to turn information into knowledge, into the right business decisions, businesses need their people, knowledge, skills and experience.

By effectively combining technology with knowledge management, businesses can create new competitive advantages and enhance their sustainable competitiveness in the market. Thanks to the rapid development of technology, tasks, processes, procedures are implemented more quickly and effectively. The product life cycle from the moment the idea is formed, which goes through the stages of research and development, production, distribution and after-sales, is therefore shortened. Products are constantly being improved, perfected and upgraded, and the market and consumer trends are constantly changing <sup>[6, 7]</sup>.

Knowledge, not technology, directly helps employees make effective decisions in business. Exam management, with the help of technology, can help businesses operate more efficiently, make smarter business decisions, minimize mistakes and satisfy customers at the highest level.

### **d. Demand for knowledge management in corporate restructuring**

Like technology, with current developments in the business environment, today organizational structure changes so quickly that businesses need an effective, flexible knowledge management system to respond to those changes.

Today, businesses are organized and operate in a project-oriented manner. Each member of the project is recruited from different functional parts of the organization to form a unique task force. These teams, after fulfilling the mission, are usually dissolved so that members can participate in carrying out other projects together with other members. The knowledge, experience and skills acquired during the development of products and services within the previous projects are not passed on to the next project teams in charge of the following versions. that product and service evolution. In addition, with the operational organizational structure to serve the projects, the skills developed in the cooperation process will often be lost when the team dissolves and the acquired knowledge will not have the opportunity for the future reuse <sup>[6, 7]</sup>.

A knowledge management system in this case will help businesses capture the knowledge of completed projects, allowing it to be reused in the future. Corporations around the

world, in order to produce products and provide services, often cooperate with their affiliates and partners around the globe, so their knowledge is scattered throughout many places in the world. Therefore, they also need an effective knowledge management system.

### **4. The importance and awareness of the importance of knowledge management**

The values and competitive advantages of businesses in the world are gradually changing. The era of information technology and knowledge has really taken shape. The factors that create a competitive advantage and strength of each business are no longer machines, equipment, land, energy, raw materials, financial resources but rather the knowledge and its usability in the most effectively way. Knowledge management is becoming a global trend, with its position increasingly confirmed by the success of the world's leading corporations in applying the concept of knowledge management. Knowledge management is a process of promoting innovation, generating ideas, fully exploiting intangible knowledge assets in the organization. Knowledge management is also a process of sharing, developing and preserving knowledge continuously to provide them to the right place, at the right time, for the right users to make quick business decisions, carry out effective and the most appropriate actions for the market situation unpredictable evolutions. Knowledge management is a way to prevent "brain drain" in the business. When the key personnel of the business leave, they bring with them the experiences, business secrets, relationships and then to become the personnel and knowledge sources of the competitors. Knowledge management helps unlock hidden intangible assets in the minds of talented people to become existing knowledge through sharing and restructuring so that everyone can update and refer. The result of this process is to create an "existing treasure of knowledge" that every employee in the business can use. Thanks to that form of sharing, the value and power of knowledge in businesses will constantly increase. Knowledge management is the creation of a continuous learning structure with high adaptive capacities. Overcoming the limits of traditional management methods, exam administration helps each individual in the organization to constantly learn, continually create new knowledge, create a culture of sharing among members, promote the sense of self-study of each individual and form a lifelong learning mechanism of the enterprise. In such an environment of knowledge culture, employees' capacity is increasingly strengthened, increased, and the quality of knowledge is constantly being improved. The consequence of this process is a dynamic team of employees, working through knowledge sharing in an organization that is highly adaptable in the context of economic integration. Knowledge management contributes to the organization's decision-making ability. In today's information age, information is no longer exclusive to anyone but it is the ability to use and turn it into new knowledge, new products, new technologies, which are the key factors for success of the business. Knowledge management will address issues such as lack of information, knowledge constraints and lack of experience in decision making. Knowledge management is the best way to turn

customers into loyal friends of the business through best meeting their needs. In knowledge management, through the CRM (Customer Relationship Management) model, relationships with the organization's customer network are shared with all members. Customer's opinions about the quality of products and services are kept. All are sources of intellectual property of the business. Based on this source of knowledge, businesses have the basis to constantly improve the quality of service. Knowledge management has become an indispensable trend in the knowledge economy and information society. Up to 80-90% <sup>[1]</sup> of the value of an organization or business lies in intangible assets that are human factors, knowledge, experience, initiatives and business ideas <sup>[6]</sup>.

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