

Virtual Work in the Supply Chain in E-Economy

Sabina Wyrwich-Płotka
University of Opole, Poland

The problem that is taken under consideration in the following article concerns the implementation, use and effectiveness of virtual work in the supply chain in e-economy. Any solution concerning employee mobility or the use of mobile technology are due to growing market competition and constant search for new solutions that may enable the companies in the supply chain to be more efficient than their competition. In the supply chain the e-business creates for the companies new challenges they have to face. One of the possibilities to improve your business in the supply chain is to use virtual work. The new challenge facing the e-economy needs to be met. The aim of the article is to refer the virtual work that is used by selected links in the supply chain to meet the e-economy requirements, identify the key factors that characterize e-economy and refer them to the possibilities and benefits of using virtual work in the supply chain.

Keywords: virtual work, supply chain, globalization, e-economy.

1. INTRODUCTION

The functioning of modern supply chains is determined primarily by the globalization of economies and the information revolution. Market subjects, which operate under the conditions of enormous dynamics changes, diversity, uncertainty and risk, are constantly looking for an algorithm that will function on the best point. They use different ways to improve their performance to gain additional competitive edge.

Increasing competition between supply chains is the key feature of modern business. The results of supply chain companies depend on the efficient and effective flow of products, information and money within an enterprise and throughout the supply chain. E-economy creates new conditions for global competition.

E-economy has become one of the most developing sectors of the world economy in recent years. E-economy means the use of information technology in the processes of market economy: production, sale and distribution of products through tele- internet networks. This includes the transfer of information by electronic means among different stakeholders in the market.

Virtual work understood as working outside the company's premises, using mobile devices with reliable Internet access, is an appropriate form of providing work in conditions that create e-economy. Off-site work is becoming increasingly popular, especially in countries that lead the way in e-business solutions¹. The study aims at describing the essence of using virtual work in the supply chain in e-economy determinants. The text was prepared on the basis of literature research, observation and empirical research carried out in the form of a case study.

2. THE ESSENCE OF VIRTUAL WORK IN THE SUPPLY CHAIN

The operation of a modern enterprise without the access to the telecommunications network and to various IT systems is practically impossible This is confirmed by the fact that in 2007 nearly 95% of companies in Poland used computers, and about

¹ Waśniowski M., *Rozwój techniki a nowe formy zatrudnienia*, www.wsz-pou.pl, accessed on 14.04.2017

93.7% of enterprises² had computers with the Internet access. By using a variety of IT systems, virtually all supply chain management areas have been evolving towards virtualization. The supply chain does not work in the empty space, its activities require cooperation, coordination of processes, management of both the company and the suppliers and customers. Employees are the most valuable capital in the supply chain³. The need for cooperation at the functional level, but also with the nearer environment subjects comes from the basic idea that guided the concept of supply chain management, which is integration. Supply chain managers are facing new challenges due to shaping value-driven supply chains and using new capabilities to change customer

of performance or the need for physical presence. However, as a result of the progressive computerization of different areas of the economy and society, more tasks can be realized in the virtual world using mobile communication devices. Virtual work, according to the definition presented above, concerns performing tasks outside the company's premises, in the space, at the customers' and contractors' locations. It requires mobile devices to keep in touch and access corporate data. In case of such a form of work, employees are oriented towards the realization of the objectives and tasks to be performed, while the working time and place have less meaning. Describing areas of the supply chain where virtual work is possible to implement, refers to only those opportunities and

Table 1. Virtual work according to flow phases in the supply chain.

Virtual workstations	Possibility of implementation of virtual work	Examples
SUPPLY		
Provider	Searching for new suppliers	Mobile work, search for new suppliers
Investment advisor	Joint ventures, Penetration and market exploration	Mobile work. Making decisions, for example, regarding storage or optimization of stock flows
PRODUCTION		
Project manager	Designing new solutions using the knowledge from the suppliers	Creating new solutions, mobile, at home, in the space
Technical consultant	Consulting and intermediation between suppliers, manufacturers and retailers regarding the use, value and use of the product	Organizing training sessions with suppliers and customers, customer service and customer advice
DISTRIBUTION		
Commercial Adviser	Advisor for product use and new solutions	Work by the customer or on-line
Database operator	Searching for and processing of market information	Searching information about new trade markets
RETURNS		
Refund dispatcher	Search for reuse possibilities, waste management and returns	Acquiring information about waste recipients, cooperation with their customers

relationships. The introduction of virtual work requires a deep analysis of the conditions of its implementation and job specifications. Certainly not all workstations allow them to be carried out in the space or at home, it may be limited by the time

restrictions associated with the transfer of part of employee occupations to virtual space. Table 1 presents the options for using virtual work in different phases of flows inside a supply chain.

Improvements in the supply chain result from the efficient and rapid flow of information and access to them in real time. It may be achieved by connecting the supply chain to IT systems, but this has some limitations due to the lack of trust between the partners, the risk involved, and the high costs involved. The second way to

² Polish Central Statistic Office (GUS) Research, Warszawa 2016

³ Fawcett S.E., Ellram L.M., Ogden J.A., *Supply Chain Management. From vision to implementation.*, Prentice Hall, New Jersey 2007, p.436.

communicate current market information is through the employees who penetrate the market while doing their work outside the companies. Due to the increasing importance of interpersonal relationships and the need to "be close" to the customer and the contractor, access to this information, thanks to virtual workers, can be much easier and more effective. Virtual work can be used wherever there is a need for gaining information, contacts with customers and suppliers, and it does not require physical attendance at the company. Competing supply chains in e-economy need to find new solutions that will positively influence them. E-economy makes it necessary to search for such new solutions suited to these conditions. The high level of employees' mobility, as well as the ability to acquire information from various supply chain areas confirm that virtual work in today's market environment can be an effective and anticipated form of streamlining the supply chain.

3. CHALLENGES TO THE SUPPLY CHAIN IN E-ECONOMY

Supply chains, influenced by market events, need to adapt to these dynamically changing conditions. Dependence on market events and relationships within it make supply chains not static but dynamic. The environment (in particular customers and suppliers) that influences the functioning of supply chains determines certain directions of action that define and will determine their future direction of acting. According to H. Brdulak the most important areas are the following⁴:

- relocation of business centers; Asia and Africa are still gaining on importance due to the regionalization tendencies associated with globalization - Eastern Europe,
- globalization and regionalization occurring in parallel as a response to the changing economic environment and turbulence in the global economy, in varying degrees in different countries,
- increase of urbanization; it is expected that by 2050 more than 70% of the world's population will live in big cities,
- the growing ecological movement, the growing importance of balanced development

⁴ Brdulak H.(2014), *Megatrendy i ich wpływ na branżę TSL, Dziennik Gazeta Prawna. Magazyn Transport, Spedycja, Logistyka*”, nr 1/2016

in business strategies,

- the aging process of societies, especially in highly industrialized countries; by 2050, the population over the age of 60 will account for 21% of the world population (in 2000 - 10%),
- dynamic development of e-commerce; network economy.

The evolution of supply chains shows how dynamically companies must reorient their existing business philosophy as a result of the various market events, the growth of customer awareness, their personalized requirements. Progressive technology and access to the information make companies increasingly cooperate. Major phenomena affecting the development and evolution of supply chains were⁵:

1. electronic commerce,
2. growing competition and globalization,
3. relationship management.

Electronic commerce means using information technology to automate business transactions with the aim of increasing the speed and quality of business communications and reducing costs⁶. It is the result of the dynamic development of technology. At the moment, no company is able to function without a computer and access to the Internet. It is even pointed out that the Internet, along with other ICTs, is one of the technologies that create the present picture of socio-economic life⁷.

Providing information to suppliers, customers, access to updated information is a standard at this moment. With the information provided in this way, which is the key to matching the offer to market needs, companies are creating their competitiveness. Accelerating the exchange of information, and what follow the availability of goods, helps to improve processes in the supply chain. Another important factor affecting the development of supply chains is globalization and the associated with it an increasing competitiveness. Globalization is "a general term for the emergence of a global community in which

⁵ Bozarth C., Handfield R.B., *Wprowadzenie do zarządzania operacjami i łańcuchami dostaw*, Wyd. Helion, Gliwice 2007, pp.37-39.

⁶ Bozarth C., Handfield R.B., *Wprowadzenie do zarządzania operacjami i łańcuchami dostaw*, Wyd. Helion, Gliwice 2007, p.38

⁷ Kisiel M., *Internet a konkurencyjność banków w Polsce*, CeDeWu Platinum, Warszawa 2011. p. 61

economic, political, technical and cultural events in one part of the world become rapidly relevant to people in another part of it. Globalization is the result of progress in communications, transport and information technology"⁸.

Due to the development of these factors, such as transport, communication and information, we are dealing with the progressive development of markets, not only on an international, but also global (global) scale. These two factors, e-commerce and globalization, are closely related and create important determinants for the e-economy. Certainly, global communication has influenced the global trade, including the use of tele-informatics techniques. The speed of changes taking place in the market is getting faster and businesses and supply chains must face these challenges. New competitors appear on the markets and induce more competitive battle. Where companies had traditionally operated, appeared the global companies. Local enterprises were forced to change their current strategy, and global ones very often adjust to the local needs and specificity of each market. Therefore, for managers, the access to as much information as possible is necessary to make decisions quickly and effectively.

In the supply chain, the essence of relationship management expands also in the other direction, in relations with suppliers. Thus, the factor that has influenced the development of supply chains is the ever-growing role of relations between its participants. These include customer relationships (CRM - Customer Relationship Management) and supplier relationships (SRM - Supplier Relationship Management). The concept of customer relationship management is based on the principle of continuous development of marketing strategy, with a view to enhancing customer loyalty⁹. The combination of these two concepts forms the basis for the development of the concept of managing relationships in the supply chain (SCRM), as an important factor in the evolution of the discussed concept.

4. VIRTUAL WORK IN THE SUPPLY CHAIN AS A RESPONSE TO E-ECONOMY CHALLENGES

Improvements in the supply chain result from the effective and rapid flow of information and access to it in real time. This can be achieved by linking the supply chain to IT systems, but this has some limitations due to the lack of trust between the partners, the risk, and the high costs involved. The second way to provide current information about the market situation are employees who penetrate this market by doing their work out of office. Examples of processes that can be improved through the use of virtual work are (see Table 2): processes of information flow along the supply chain, demand and supply planning, and forecasting, transport.

Virtual work can be used wherever there is a need to obtain information, contacts with customers and suppliers, and it does not require the physical presence of an employee at the company's headquarters. High level of virtual workers mobility, continuous access and searching for information from both areas of the supply chain indicate that virtual work in modern market conditions can be an effective and future-proof form of supply chain improvement, especially in the e-economy, because these conditions force the use of informatic solutions¹⁰. The legal basis for the development of the electronic economy is already a legal act which regulates many areas of electronic economy functioning in detail, including areas such as requirements for information obligations, commercial information, contracts concluded electronically and the liability of intermediary service providers.

⁸ Masłowski A., *Globalizacja rynku usług*, [w]; *Globalizacja usług. Outsourcing, offshoring shared services center*, red. A. Szymaniak, Wyd. Akademickie I profesjonalne, WSiP, Warszawa 2008, p.85

⁹ Harisson A., R. van Hoek, *Zarządzanie logistyką*, PWE Warszawa 2010, p.85

¹⁰ Standing G., *Work after globalization*, Edward Elgar Northampton, USA 2009, p. 53

Table 2. Improving selected supply chain processes by using virtual work.

Exemplary processes in the supply chain	Working area
Flow of information along the supply chain	Better and more transparent communication between links
Demand planning	Faster and more responsive to changes in demand, analysis of these changes and their determinants
Sales forecasting	Better availability of first-hand information, reaction to customer needs and competition policy. Better preparation for promotional activities. More efficient selection of distribution channels
Transport	Transport planning and management. Better matching of routes and loads to the needs of the company and customers. Optimizing the cost of delivering goods to the customer

Source: own study (research carried out as part of the doctoral dissertation)

Table 3. Premises for choosing the application of virtual work in the areas of the supply chain.

Premises for choosing the use of virtual work in the supply chain	Explanation
Searching for savings	It is primarily about savings in the equipment of workstations, the necessary social minimum and office space
Acquiring information at the source	Acquiring information directly from customers and contractors
The development of global networks	The necessity of constant moving of employees
The development of information technology	The ability to perform work without having to be physically present at work
Fluctuations in the intensity of work	The ability to match the intensity of tasks performed to the needs of the employee and employer

Source: own study (research carried out as part of the doctoral dissertation).

Virtual work means doing work outside the employer's premises with the help of mobile devices, on the premises, at the customer's premises or at the provider's location, which is based on the speed and transparency of information flows. To improve this information flow and convert, companies are willing to delegate their employees to work outside the company, closer to the customer, to the supplier, and to the competition. Searching for areas in the supply chain, where virtual work is possible, is determined by various factors¹¹. Table 3 presents several reasons for selecting virtual work in the supply chain.

Through the prism of changes in the economy, such as the development of the information society, the rapid development of new branches and industries in the economy, focused on the flow of information, the number of professions possible to perform in various forms of telework (including virtual work), independent of location¹ will increase¹². The new form of work, the main objective of which is to increase the effectiveness and efficiency of the supply chain, results from new market needs and the new role of an employee.

Both factors are closely related. The need to meet the requirements of customers and

¹¹ Chopra S., Meindl P., *Supply Chain Management. Strategy, Planning and Operation, Fourth Edition*, Pearson Education, Prentice Hall, New Jersey 2010, p. 248

¹² *Telepraca i usługi zdalne*, red. I. Harnik, Wyd. Małopolska Agencja Rozwoju Regionalnego SA, Kraków 2008, p. 50

competition results many re-evaluations in the current operation of supply chains. Currently, they rely on the flexibility of existing schemes and structures of action. Today's new supply chain managers face new and varied challenges. It should be noted that the functions implemented in the supply chain by virtual managers, mainly based on the flow of information. Taking care of their availability and reliability with the use of modern IT tools determines the efficiency of their work. It is about using and accessing online information systems of companies such as CRM, MRP, ERP, SCM and other related to control and current information of supervisors about the degree of achievement of goals.

5. CONCLUSION

Market conditions and the view of future business operations will determine a number of changes in the management of flows in the supply chain. It is shown that the stable supply chains are changing into dynamic, flexible and agile chains. They are characterized by efficiency and speed, response to real demand, having the right tools and information technology. It is providing to coordinating real-time operations and operations in the supply chain.

In addition, as a result of ever-increasing and tightened cooperation in the supply chains, and in particular those ones of the global range, conditioned by the dynamic development of e-economy, it is increasingly common for their participants to need teams to carry out various projects or tasks from distant countries. The catalog of works that can be remotely operated is constantly growing¹³. This means that many joint national or global projects have become real, thanks to the use of flexible forms of work. Flexible forms of employment, in addition to growing popularity, can become an effective tool for improving performance, both in terms of customer value and value for the company. It is important to remember that e-economy is a sector that is innovative and therefore needs innovative solutions. As a result, the further dynamics of its development depends mostly on the creativity of the entrepreneurs themselves analyzing the global trends in the development of supply chains and the electronic economy.

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¹³ see: www.info.pracazdalna.eu (accessed on 04.05.2017)