



## EVOLUTION OF COMPETENCIES OF LOGISTICS AND SUPPLY CHAIN MANAGERS

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**ABSTRACT.** One new concept emerging in current business reality is a virtual supply chain. This paper indicates in what way a virtual supply chain, that is subject to constant changes, influences the requirements for competencies of managerial staff in that specific business environment operating with discontinuities, temporary character, focus on customers, geographical dispersion, intensive support of IT systems, network structure and an extensive use of key competencies of their members. The paper presents the concept of virtual supply chain and results of research conducted in order to determine how current knowledge and skills of decision-makers fit into that concept. In that sense the quality of human resources, connected to logistics operations and management, has been examined from the point of view of the directions of required changes in the area of adequate qualifications and competencies for efficient management of virtual supply chains. Research was based on a survey, conducted in 2010 and aiming at identification of skills and qualifications of logistics personnel in average Polish companies. Results of the study indicated that logistics qualifications of managerial personnel in Polish companies are constantly improving. Requirements of virtualisation of logistics and supply chain business result in a modified patterns of logistics professional carriers and new challenges for education and training systems.

**Key words:** logistics skills and competencies, human resource management, virtual supply chains.

### INTRODUCTION

World business is facing new challenges in the present millennium. Actual economic reality becomes constantly more difficult for companies due to a synergy of larger complexity and growing dynamics of business processes. It results in discontinuity of development of businesses, particularly in the environment troubled by economic recessions and cycles of shrinking business opportunities. In those circumstances, a virtual organization became one of the symbols of modern economic and social development, however, it still remains one of the least understood and the most discussed concepts.

Virtual supply chains are frequently identified with e-business, computer communication and digital products. Within the framework of organization theory, a virtual supply chain is more than that; it is an organization that is subject to constant changes, demonstrating a specific potential when required, overcoming time and space barriers. Virtual supply chains could be described by such attributes like temporary character, focus on customers, geographical dispersion, intensive support of IT systems, network structure and an extensive use of key competencies of their members. Supply chain can be described as a specific form of a virtual organization with its all characteristics.

New organizational patterns definitely demand modified skills and competencies of logistics and supply chain management personnel.

## **VIRTUAL ORGANIZATION - WHAT DOES IT REALLY MEAN?**

"Virtual" has become a potent buzzword and is freely applied to many situations and has many meanings. Some authors indicate that because of that "virtual" is in danger of meaning nothing [Watson-Manheim et al. 2002]. Overuse of that term results in some serious research problems:

- It does not clearly allow to compare results from different studies, since "virtual" is used in a non-systematic way and describes many different environments,
- There are many problems connected to virtual organizations although they are not always addressed in research and literature with the explicit keyword of "virtual".

Virtual organizations are called "imaginary organizations", held together by trust, synergies of the partners, contract and information technology [Hedberg et al. 1994]. They operate without long-term relationships, can be enabled or dissolved easily on a real-time basis. Virtual corporation seems to be the strategy for structuring and improve the corporation for the coming century [Davidov and Malone 1992]. Virtual companies are characterized by a networks of internal and external relations that constantly change.

## **DISCONTINUITY AS THE MAIN FEATURE OF VIRTUAL SUPPLY CHAINS**

Virtual supply chains are "production and distribution systems utilizing a formal physical network structure, and operating through a network of separate organizations" [Chandrashekar and Schary 1999]. There are no permanent members, they are called in for particular projects and may not be visible for other members. Virtual supply chains are not serial chains but rather flexible networks with fast, real-time electronic communication.

Virtual supply chain operates in changing business environment. The virtual supply chain often focuses on the solution to concrete tasks and projects. After solving the task and completing the project, virtual supply chain is dissolved and new one is formed with new combinations of partners. The dominant organization in the chain, called often as a "broker" uses temporary partners for a specific task. The dominant firm replaces fixed connections with flexible ones, based on prior selection of alternatives that require managers to communicate tasks to members. This form of coordination has been possible only with the extensive use of advanced computer technologies and telecommunication [Townsend et al. 1998].

In that context, the use of the word "virtual" brings the notion of discontinuity, being a gap or a lack of coherence in aspects of operating business such as task, relations with other organizations or location [Watson-Manheim et al. 2002]. There are two forms of such discontinuities:

- temporal, when e.g. companies change their old suppliers to the new ones,
- cross-sectional, meaning a lack of coherence in business relations and resulting in conflicts terminating some types of business relationships.

In a virtual organization one or more discontinuities usually appear. As examples, one may indicate the following types of discontinuities: temporal business location (e.g. across different time zones), geographic business location, consortium membership (who you do business with), organizational affiliation, cultural business background (e.g. national or professional). Therefore, virtual supply chains often go against establishment of long and close relations between their partner members. However, the virtual supply chain is not quite incompatible with the model of close business partnership. Probably virtual supply chains could be established when the potential members want to make use of their existing, complementary competencies. As opposite, partnership relations would be more typical for situations, where competencies are created during the course of collaboration over longer time periods [Skjoett-Larsen 2000].

Impermanence of the virtual supply chain creates some specific positive opportunities that distinguish it from more stable arrangements. First of all, it is closely oriented towards customers or products. The temporary configuration of functional specialist members is oriented towards rapid response, offering production and distribution flexibility.

The short-term relations and transitory character of virtual supply chains creates also some problems resulting from the discontinuity of operations:

- perception of insufficient level of trust and data security,
- smaller chance for inter-organizational bonding and loyalty,
- more complicated logistics management because of flexibility due to unstable volumes and non-repeating logistics patterns.

## **HUMAN RESOURCES IN LOGISTICS AND SUPPLY CHAINS**

In 2003, a note in Harvard Business Review indicated that "...despite years of process breakthroughs and elegant technology solutions, an agile, adaptive supply chain remains an elusive goal. Maybe it's the people who are getting in the way." [Beth et al. 2003]. It is commonly believed that instead of considering the supply chain to be a 50/50 mix of infrastructure and information systems technology, rather any supply chain is more like 45/45/10 mix of human behaviour, systems technology and asset infrastructure [Gattorna 2006].

Andraski and Novack [1996] indicated that people are "... the most important element of the logistics marketing concept." Daugherty et al. [2000] noted: "To take supply chain performance to the next level, companies will have to tap into this human element more intensively. Many companies have pushed hard on technological and infrastructure improvements and investments. The next wave of improvements and investment should center on the people who manage and operate the supply chain."

One of the research reports creates a model of impact of the way of managing human resources. "Generally, the HR policies create a positive organisational social climate, creating higher levels of trust, cooperation and people engagement. Secondly, the HR policies increase human capital flexibility - the skills and behaviours needed for the organisation to change. The changes in human capital flexibility and organisational social climate have an impact on nonfinancial performance. Companies that have better non-financial performance also reported in the survey better financial performance and delivered higher returns on their assets as shown in their published annual reports." [Bourne et al. 2008]. Challenges also include managing changes associated with an aging work force that is yielding to a new generation of youth performing frontline logistics activities.

A comprehensive review of the core literature pertaining to frontline logistics personnel and their managers that has been published in the leading logistics journals, clearly indicates that research within the personnel issues in logistics does not deal at all with problems connected to virtual supply chains [Keller and Ozment 2009]. The results presented by Keller and Ozment [2009] provide a better understanding of the knowledge about logistics skills and competencies researchers have discovered up to 2007. It also identifies areas in need of further exploration. However, what is absent from the paper is research pertaining to the interaction of logistics personnel and technology, the importance of logistics personnel in securing the supply chain, and the importance of elevating frontline logistics jobs to the next level of professionalism to achieve supply chain excellence [Kisperska-Moron 2009]. That excellence is absolutely required from the very beginning of the start of operations of the virtual supply chain, as there is no time to improve its performance during its short life span (usually not more than 5-7 years). This is the most common period for operations of different type of consortia created to utilize any type of financial funding provided e.g. by the European Commission and its various agendas.

The main research problem addressed by the paper is: Are average companies prepared to function within the frameworks of such virtual supply chains? Special focus has been put on the main aspects of general logistics competencies of companies with a special concentration on different profile of managers' qualifications suiting their new patterns of virtualized companies and their associations. Hence the main research question of the paper is: what changes could be expected in the field of managers' competencies and employment patterns in order to support more and more virtualized supply chains?

## **RESEARCH METHODOLOGY**

The paper presents the concept of virtual supply chain and results of research conducted in order to determine how current knowledge and skills of decision-makers fit into that concept. In that sense the quality of human resources, connected to logistics operations and management, will be examined from the point of view of the directions of required changes in the area of adequate qualifications and competencies for efficient management of virtual supply chains. Research has been based on three research instruments:

- Two surveys conducted in 2008-2009 and aiming at identification of logistics competencies, which should suit operation of Polish companies in virtual supply chains. Questionnaires were administered in companies located in a southern region of Poland. There were 112 respondents to the first questionnaire and 121 respondents to the second questionnaire. Respondents of the survey represented various sectors and branches of economy and companies consisting of very large, large, medium size and small companies,
- A series of interviews with logistics managers (2008 - 2010) being a part of certification procedure for the European Logistics Certificate of the European Logistics Association. Interviews included 24 managers from different regions in Poland.

The firms responding to the first questionnaire were more or less evenly spread between manufacturing, distribution and service companies, however, with slightly prevailing group of manufacturing and construction companies. Respondents replying to the second questionnaire were companies operating mostly in transport, distribution and logistics. The majority of companies (around 65%) in the first sample belong to the group of small and medium enterprises. They distribute products mainly to the domestic market (72% of companies), 19% of companies sell to the EU and the remaining 9% of surveyed firms beyond the EU with only 2% of companies distributing products outside Europe. More profound analysis of surveyed companies in the sector of transport, forwarding and logistics services indicated that the majority of those companies belong to road transport sector (49%), rail transport (26%), air transport (9%) other logistics services (14%) and cross-docking and warehousing (2%).

The questionnaire tested several variables describing the major aspects of virtual supply chains. On the basis of these variables, the current status-quo presented by the survey's respondents will be discussed. The main gaps between the requirements for proper virtual supply chain and the real conditions of operating businesses will be identified. The final answer to the main research question will also provide some guidelines for the future directions of research in the art of virtual supply chain management.

Interviews were structured according to a specific pattern designed by the author for use during the certification personal meeting with the candidates for Junior and/or Senior Logistics certificate. All information acquired has been confronted with the requirements for managerial qualifications suitable for temporary and discontinued virtual business.

## RESEARCH RESULTS

### **General competencies of companies for virtual supply chain operations**

To understand the overall ability of a single company to operate in a world of virtual organizations and virtual supply chains three main aspects have been considered:

- The extent of the practical use of ICT technology,
- Potential of the logistics service providers,
- Logistics potential of firms for their operations in virtual supply chains.

#### *ICT technology*

The research clearly indicated that companies apply ICT in their relations with market partners (suppliers, customers, logistics providers) to larger extent than with their contacts with other supporting and government institutions. However, there are many limitations of using even the Internet, and even more on-line transactions. Only few companies apply EDI techniques for sales and purchases of any of their products. The scope of use of ICT technologies in supply chains to a great extent depends on companies' perception of the following barriers limiting the possibilities of implementing certain technical solutions:

- barriers for general use of ICT, such as high costs, requirement for constant learning and permanent skills acquisition suitable for operation in ICT environment, low skills of the personnel, security of computer networks,
- barriers for the use of Internet as a tool for inter-organizational communication,
- barriers for the use of e-commerce for inter-organizational transactions, such as: Lack of adequate preparation on the side of suppliers and customers, security issues connected to financial transfers, problems with physical deliveries in e-commerce systems.

#### *Potential of the logistics service providers*

Probably actual transportation systems in Poland are not supporting flows of products resulting from discontinuous flexible business processes. Road transport is the only mode of transport, which could be useful and competitive in that field. Rail transport does not provide any alternative solutions for reduction of the scope of use of road transport.

The level of integration of the Polish road and rail networks has not been adjusted to the intensity of traffic. Besides infrastructural problems of rail, road, sea ports, airports and logistics centres as well as missing infrastructure for intermodal transportation for efficient operations of virtual supply chains some special arrangements of virtual logistics are needed. They are connected to systematic organization of the flows of main cargo loads. Those processes depend on close cooperation of intermodal transport providers, logistics centres, state administration, customs and sanitary agencies, etc.

The structure of services provided by the surveyed providers indicated that their major occupation was with "pure" transport services (62%), transport and storage services (25%), "pure" storage services (7%). Mixed services such as transport and storage using standardized or individual packaging has been offered only at a very small scale.

On the basis of that data one may expect that the actual offer of the whole transportation and logistics sector does not provide many opportunities for virtual types of businesses with largely diversified requirements and demanding flexibility and accuracy from service providers.

### *Logistics potential of firms for their operations in virtual supply chains*

Respondents of the survey consistently indicated the important role of logistics (particularly from the point of view of customer service). That opinion was particularly popular among manufacturers (96% of responses). Around 67% of respondents were extremely positive about their abilities of adjusting delivery lead times to exact demand of their customers and around 57% of surveyed companies declared large possibilities of reduction of delivery time. Equally large number of respondents (65%) evaluated quite high the abilities of their companies to be flexible and accommodate changing requirements of their customers. At the same time surveyed companies were less optimistic about their systems for information about late deliveries or product modification during delivery process. These two fields probably show some practical shortcomings in the area of capacity management and its operational adjustment to changing requirements of customers.

Respondents indicated two essential elements supporting internal integration of their logistics operations:

- Strategic planning based on close cooperation of functional departments in companies (around 59% of respondents),
- Efficient information sharing between departments and employees in a company (around 54% of respondents).

SMEs suffer from specific difficulties while trying to improve their cooperation within supply chain framework, implement information systems adequate to their requirements and limited financial assets.

## **Human resource aspects**

### *Competencies*

Comparing the years 2007-2008 with previous surveys from the early 2000 one can notice a significant raise of the number of younger managers, especially in the age group of 21 - 38 years (from 1/3 of the sample in 1997 to more than half in 2008). It may indicate the trend towards recruitment focusing on better educated workforce with modern qualifications. However, in practice, when it comes to making a choice between a very well-prepared recent university graduate with a logistics specialisation and a logistics professional with a high school diploma but having a many-years' track record with leading logistics companies, reaching any kind of compromise is very difficult. At the moment, the latter candidate would, most probably, be given preference in filling the position (around 80% of respondents declared average 8 years of experience in SCM). In car industry, machine engineering, IT, electro-technical industry and distribution sector the employees of age 21 - 33 clearly prevail. The age structure of the sample had much to do with the level of logistics qualifications, as well as of general education, and with the so called "logistics awareness" of personnel who are professionally active in the field of logistics management.

Young managers seem to develop the following competencies, which certainly will enable them to operate more easily in the virtual business:

- Increased requirements for highly educated personnel even at the operational level, since dedicated virtual supply chain offers extremely high level of customer service and it has to operate in the best possible way from the start. There is no time for long-term training and education of personnel, they are recruited from "the best" ones available on the market,
- Good communication skills required for efficient coordination of day-to-day activities of collaborating firms, and in particular:
  - Convincing to reach compromise between the partners in a temporary virtual business,
  - Team work of partners who do not have large previous experiences of joint task completion,
- Extremely good skills in fully automated information systems,

- Critical analysis of problems and their not conventional solution often required in business situations not to be experienced by companies operating in companies with long-term relationships and opportunities to improve them,
- Extreme adaptability to constantly changing requirements of a temporary business,
- Open mind and innovative talents.

These competencies can be classified as indicated in Figure 1. The most suitable competencies for a manager in a virtual supply chain could be found in two upper boxes: 1) competencies of a branch expert, and 2) competencies of a polymath equalling to diversified knowledge. Thus the desired scope of competencies can be broader or more narrow but always it has to be quite profound.

The share of employees with university degree rose from 45 % in 2000 to almost 76% in 2004. The level of education significantly improved in manufacturing (e.g. car making, electro-technical and metal industry) but slightly deteriorated in distribution sector. The profile of education of logistics and supply chain managers has also changed:

- the share of employees with professional logistics education has doubled in the period 1997 - 2004 (still it is only around 50% of surveyed managers),
- the share of university graduates with economic and business profile was also higher than in the past.

As the result the technical and engineering education in SCM does not dominate any more. Considering the fact that supply chain management is a business decision making process, the numbers presented above might suggest that there is a slow tendency to employ more often personnel qualified adequately to more volatile SCM environment.

### COMPETENCIES

	<b>COMPETENCIES</b>	
Profound	<b>Competencies of a branch expert</b>	<b>Competencies of a polymath (omnibus knowledge)</b>
Shallow	Competencies of an ignorant	Encyclopedia knowledge
	Narrow	Broad

Source: Trzcielinski 2001

Fig. 1. Competencies for a virtual supply chain

Rys. 1. Kompetencje niezbędne w wirtualnym łańcuchu dostaw

The detailed requirements for future improvements of qualifications indicated by actual managers have been presented in Figure 2.

Logistics service providers require massive further development of competencies In the field of transport management. In the same group of companies managers stress the great need for good knowledge of foreign languages due to expanding global character of their operations. Logistics service providers indicate also their need to extend their knowledge on warehouse management, which becomes important due to constantly growing range of services offered to demanding customers

besides regular transport services. In trade companies the main educational requirements are connected to the problems of strategic management of product flows in supply chains, and also purchasing and general procurement issues. Inventory management skills also require further improvement in that group of companies. Managers in the group of manufacturing companies are interested mainly in improvement of production planning skills, inventory management. They would like to study also strategic management in an organization, innovations and change management.

### *Modified professional careers*

The traditional career in the early 2000 was based on the following promotion path was assumed: expert --> top expert --> section manager --> department manager --> branch manager --> vice-CEO --> CEO. There was a strong relationship between the age of respondents and their position in the hierarchical decision making structure of the company. However, nowadays new flat (horizontal) organization emerges in companies. The future will belong to "lean" organisations: based on team work, flexible, flat-structured, quality-focused, maintaining close links with their customers and suppliers, and operating globally. Alongside the "lean" concepts, in their strife for survival, businesses apply a number of other tools and techniques, such as: strategic reorientation, reengineering, downsizing, outsourcing, lobbying, and many more. Empirical observations confirm that companies are ready to abandon their vertical functional organisational structure consisting in the traditional division into procurement, production and distribution activities. Instead, they will introduce horizontal and cross-functional frameworks that are capable of supporting process management [Bowersox, D.J. and Closs, D.J. 1996].

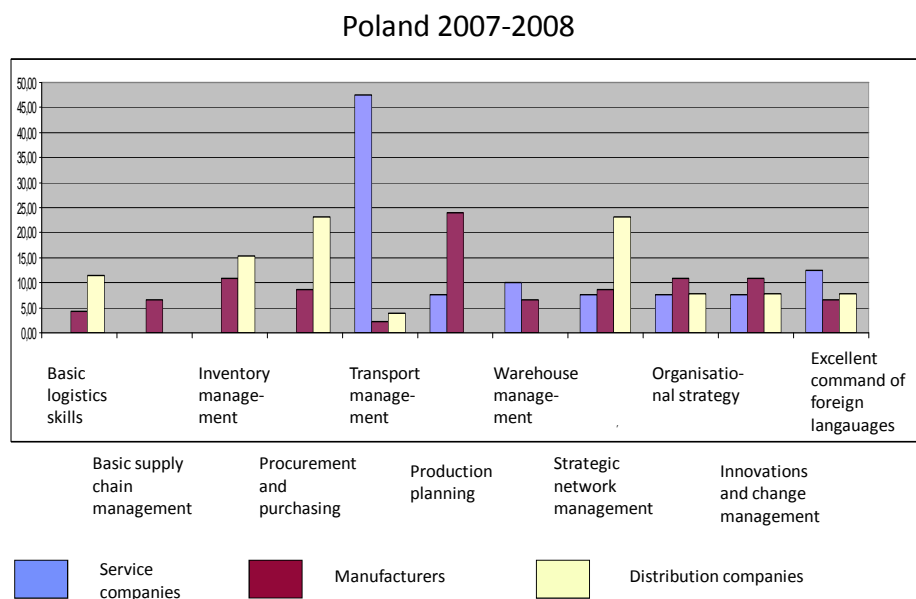


Fig. 2. What skills need improvement for effective management of virtual supply chains?

Rys. 2. Jakie umiejętności wymagają poprawy dla efektywnego zarządzania wirtualnym łańcuchem dostaw?

Therefore, the new pattern of professional career in logistics and supply chain management seems to be different and can be characterized in a following way:

- Emerging chance for personal influence on professional career, professional development and education,
- Professional career is not a vertical one since flat organizational structures do not provide adequate number of hierarchical levels,



- Professional career depends on individual intellectual assets of each potential employee,
- The value of employee does not depend on the job description but is the result of his or her acquired skills and other competencies,
- Professional career does not result directly from being employed but rather from being well prepared for potential employment and being an asset for potential employers.

The tendencies presented above resulted also in a significant change of work contracts of logistics managers:

- Full-time employment becomes just one of several options,
- Full-time employment is restricted for constantly smaller group of employees,
- People more often offer their services in the form of private business or as temporary workers:
  - People stay with a company out of their own choice, they are convinced that they can leave any time ("death of loyalty"),
  - There is no guarantee of permanent employment and no guarantee for constant high income.

A new generation of younger managers and those with higher level of skills and competencies seems to accept those new employment concepts more easily.

## **CONCLUSIONS**

The completed research brought us to a tentative conclusion that the level of logistics and supply chain qualifications has been changing constantly. Many respondents showed the growing "logistics awareness" of operational and managerial staff in supply chains and logistics. The most important issues in actual human resources management in logistics are:

- Co-existence and co-operation of different generations,
- Diversification and individualization of career types,
- A single person might be a serious force,
- Temporary co-operation and long-term collaboration,
- Virtual world of management.

However, reported research indicated also that surveyed companies are not quite ready to create efficient virtual supply chains. Information and communication technologies seem not to be responsible for that. Even if some shortcomings occur in that field they probably might be immediately eliminated either through additional investment or employees qualifications. Even specific barriers against the use of ICT were difficult to be identified.

The most important reasons limiting more frequent adoption of virtuality in supply chain operations lie in the field of traditional approaches adapted by companies in the field of logistics operations. At the same time logistics service providers do not offer diversified and complex services suitable for temporary and discontinuous business.

The results of our survey in their more detailed form may serve as a basis for further improvement of educational systems in logistics and supply chain management and they could be also helpful for companies management on their way to change the traditional perceptions of responsibility boundaries by those SC managers who concentrate their attention on systems reporting task completion and on receiving adequate compensation. Definitely, companies face many new dilemmas in human resource management in logistics and supply chain management.

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## EWOLUCJA KOMPETENCJI MANAGERÓW LOGISTYKI I ŁAŃCUCHA DOSTAW

**STRESZCZENIE.** Wirtualny łańcuch dostaw to nowe biznesowe pojęcie, które pojawiło się w ostatnim okresie. Praca przedstawia sposób, w jaki wirtualny łańcuch dostaw poddawany ciągłym zmianom, kształtuje zapotrzebowania na kompetencje kadry zarządzającej, mającej działać w specyficznym środowisku, charakteryzującym się występowaniem przerw, okresowością, skoncentrowaniem się na kliencie, rozproszeniem geograficznym, intensywnym użytkowaniu systemów informatycznych, sieciową strukturą oraz intensywnym użytkowaniu kluczowych kompetencji ich członków. Praca przedstawia koncepcję wirtualnego łańcucha dostaw oraz wyniki badań, których celem było ustalenie dopasowania aktualnej wiedzy i umiejętności osób podejmujących decyzje, do omawianej koncepcji. W takim rozumieniu, jakość zasobów ludzkich, powiązanych z operacjami logistycznymi i zarządzaniem, była poddana ocenie w celu określenia kierunków koniecznych zmian w obrębie kwalifikacji i kompetencji niezbędnych do efektywnego zarządzania wirtualnymi łańcuchami dostaw. Podstawą pracy było badanie przeprowadzone w roku 2010, które miało na celu zidentyfikowanie umiejętności i kwalifikacji kadry logistycznej w przeciętnych polskich przedsiębiorstwach. Wyniki badań wskazują, że kwalifikacje

logistyczne kadry zarządzającej w polskich firmach ulegają ciąglej poprawie. Wymagania stawiane przez proces wirtualizacji logistyki oraz działań biznesowych w obrębie łańcucha dostaw prowadzą do zmiany wzorca oczekiwanych umiejętności oraz stanowią nowe wyzwanie dla systemów edukacyjnych.

**Słowa kluczowe:** umiejętności i kompetencje logistyczne, zarządzanie kapitałem ludzkim, wirtualne łańcuchy dostaw

## **DIE EVOLUTION DER KOMPETENZEN DER MANAGER VON LOGISTIK UND LIEFERKETTEN**

**ZUSAMMENFASSUNG.** Eine virtuelle Lieferkette ist ein neues Konzept in der heutigen Geschäftsrealität. Dieser Artikel zeigt, in welcher Weise eine virtuelle Lieferkette, die ständigen Veränderungen übergegangen, die Anforderungen an die Kompetenzen der Führungskräfte, die in den Bereichen mit Diskontinuitäten, der Periodizität, der Orientierung am Kunden, der geografische Streuung, der intensive Benutzung von IT-Systemen, den Netzwerk-Strukturen und der Benutzung von Schlüsselkompetenzen ihrer Mitglieder arbeiten, beeinflusst. Der Artikel präsentiert das Konzept der virtuellen Lieferkette und die Ergebnisse der Forschung, die wie die derzeitigen Kenntnissen und Fähigkeiten der Entscheidungsträger in diesem Konzept fit, untersucht. In diesem Sinne ist die Qualität der mit der Logistik und der Verwaltung verbundenen Humanressourcen aus der Sicht der Richtungen der erforderlichen Änderungen im Bereich der angemessenen Qualifikationen und Kompetenzen für eine effiziente Verwaltung der virtuellen Lieferketten untersucht wurde. Die Forschung wurde auf einer in 2010 durchgeführten Untersuchung basiert und zielt auf die Identifikation von Fähigkeiten und Qualifikationen der Beschäftigten in der Logistik in durchschnittlichen polnischen Unternehmen. Die Ergebnisse der Studien darauf hingewiesen, dass die logistische Qualifikationen der Führungskräfte in den polnischen Unternehmen ständig verbessern. Die Anforderung der Virtualisierung von Logistik- und Lieferkette-Geschäften führen zu einem veränderten Muster der logistischen Profis und stellen die neuen Herausforderungen für die Ausbildungssysteme.

**Codewörter:** logistische Fähigkeiten und Kompetenzen, HR Management, virtuelle Lieferkette.

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