

Innovations in Application of Professional Skills Development among Supply Chain Managers

Anna Istomina^{#1}, Marina Vinogradova^{*2}, Anna Lukyanova^{‡3}, Lesya Bozhko^{§4}, Natalia Prodanova^{‡5}

^{#1} *Department of Restaurant business, Plekhanov Russian University of economics, Moscow, Russian Federation,*

^{*2} *Institute of perspective directions and technologies, -, Russian State Social University, Moscow, Russian Federation,*

^{‡3} *Department of Management, Financial University under the Government of the Russian Federation (Financial University), Moscow, Russian Federation,*

^{§4} *Department of Management and Marketing, Emperor Alexander I St. Petersburg State Transport University, Saint Petersburg, Russian Federation,*

^{‡5} *Department of Financial Control, Analysis and Audit, Basic chair of the Main control Department of Moscow, Plekhanov Russian University of Economics, Moscow, Russian Federation,*

¹Istomina-ai@mail.ru

²VinogradovaMV@rgsu.net

³avlukyanova@yandex.ru

⁴lemib@rambler.ru

⁵prodanova-00@mail.ru

Abstract— Professional competencies required in the field of logistics and supply chain management (SCM) are in the process of continuous development since the modern business environment creates a high demand for them. This study was aimed at assessing the state of training systems' development and the capabilities for their future improvement in terms of creating conditions for effective SCM by skilled labor. In order to achieve the research objective, a comparative analysis of national higher training and logistics systems was performed on the example of Russia and Germany. During the investigation, statistical information, world ratings, and various publications in the public domain were used. These data allowed examining the relationship between the academic environment and SCM practice. Thus, a conclusion was made that a low level of interaction with industrial partners slows down innovation and creates obstacles for managers' effective preparation. The gap between business and training is the main reason for insufficient qualification of SCM personnel and, as a result, poor logistic performance.

Keywords— *supply chain, innovation, training, supply chain management, professional competencies.*

1. Introduction

In the modern world, logistics and supply chain management (SCM) remain an attractive area for a professional career. The competencies required in this field are in the continuous process of developmental changes. They are mainly driven by a changing business environment, increased technological progress, globalization, internet-based systems, and enhanced requirements by upper management. Today's business creates a high demand for excellent employees' skill-set that results in the industry restructuring and evolution of supply management from an administrative function to a strategic one. Given the new SCM

role, it is of utmost importance for firms to employ purchasing professionals with the skills and abilities necessary to maximize the purchasing function's contribution to the goals of a company.

The development and growth of information and communication technologies have influenced logistics innovations and forced organizations to change their approach to SCM. These days, their competitiveness depends not only on price but also on customer service and delivery time [1]. The concept of electronic logistics has become increasingly used since it provides a methodological basis for the information exchange and transparency as part of a partnership. SCM is associated with the management of all activities in the network aimed at providing goods or services to end-users [1]. In this regard, the role of a manager in this process is becoming increasingly important [2]. E-commerce is spreading rapidly due to the development of Internet technologies. Modern trends in the SCM environment have made the procurement more strategic [3]. In order to help the procurement function move towards more planning, analytic, and strategic orientation, there is a high reliance on the use of information and Internet-based technologies.

Despite the spread of information and communication technology as well as new supply chain management paradigms, logistics remains dependent on a rather specific set of skills and competencies, whether for managerial, administrative, or blue-collar jobs, such as trucking or warehousing. Insufficient resources of a competent and adequately trained workforce in logistics adversely affect the quality of service, reduce productivity in sectors dependent on logistics, and ultimately reduce trade competitiveness. Digital transformation changes the whole process of SCM. Digital Development and Industry 4.0 have created a new business ecosystem. Since customers require more innovative, diverse, and

environmentally friendly products, numerous challenges for all supply chain participants arise. Under such conditions, the development of managers' professional skills in SCM systems should be considered a serious scientific task.

2. Literature review

In recent years, supply chain managers' competencies attract increasing attention of both practitioners and scientists. For this reason, a systematic literature review was conducted to identify, classify, and analyze current knowledge as well as offer future research recommendations. Among the reviewed studies, the following four dominant topics can be distinguished:

- 1) changes in training requirements [4, 5];
- 2) employment scenario [6, 7];
- 3) technical aspects of the work infrastructure [1, 7];
- 4) changes in job offers [8-10].

Purchasing and SCM competencies are the individual-level foundations of organizational performance [8]. In light of recent developments in the workplace and the external environment, the question of what purchasing and SCM competencies are needed now and in the future becomes one of growing importance. Analyzing qualitative data, researchers identified what current and future skills are required by purchasing and SCM professionals, classified them, and established how these competency requirements changed over the last ten years [11]. Thus, it was noted that among the essential competencies in the modern SCM are negotiation, communication and relationship management, strategy and analytics, and professional knowledge requirements. A separate niche in the research process was taken by the analysis of a supply chain manager's skills for enterprise competitiveness [12]. Given the new strategic role of SCM, the study of the key skills and knowledge needed by firms for further improvement became widespread among many researchers [13]. Numerous authors identified the main shifts in SCM that have occurred during the last decade. For instance, Campos, Lima, Silva & Fernandes analyzed the professional competencies in SCM [11]. They considered competencies in the mid-sized supermarket sector in Brazil as a way of broadening the understanding of their importance and use in business development. Their article discussed the opportunity matrix in detail and showed how managers can set priorities to fill competence gaps and improve the companies' human resources.

Cvetić et al. provided a longitudinal assessment of two studies of online ads of logistics and supply chain management jobs conducted in the Republic of Serbia [14-16]. The authors tried to consolidate these studies' results, outlining statistical similarities in the professional and fundamental competencies of logistics and supply chain managers. As for the traditional methods to train

project managers, they are becoming more and more obsolete [17]. In order to prepare graduates who possess the necessary skills in the modern world, universities must respond and adapt their curricula. For example, Mottram and Sams presented an integrated approach to building curricula that combines project management and SCM concepts. They supposed that such an approach would prepare managers with the necessary skills to work effectively in a complex and changing business environment.

In [9] conducted an explorative study to understand the dimensionality of supply chain manager competences. The authors have collected online job advertisements for supply chain managers as secondary data since they are deemed to reflect employers' real job requirements. Based on the multidimensional scaling technique to process and analyze the data, they identified five dimensions of supply chain manager competencies: generic skills, functional skills, SCM qualifications and leadership, SCM expertise, and industry-specific and senior management skills [9]. Researchers noted that SCM competencies vary in different industries and regions.

In [18] have explored the relationship between Industry 4.0, human resource management, and SCM. In view of the fact that nowadays, digital technology radically changed almost every business, the influence of digital transformation and Industry 4.0 attracts the attention of many scholars [12, 13]. The scope of issues related to SCM covers a vast range of challenges, including new competency requirements for professionals. As the literature analysis showed, many researchers noted the influence of information technologies and innovations on the acceleration of changes in the SCM field and, as a consequence, the requirements for training professionals.

2.1 Problem Statement

Supply chains are the main channels of the modern economy. Since they are involved in every single activity that enables the delivery of products to customers, they affect the company's vast majority of functions. SCM is closely connected with suppliers. It plays a leading role in finding the product's value to the customer and improving business performance. These days, companies in all sectors face the challenges of a new digital economy era that offers extensive business opportunities. However, since supply chains involve relationships between multiple participants, comprehensive initiatives at this level remain very complex.

Training and science can benefit from a better understanding of how practice defines a profession in terms of job type. Typically, blue-collar logistics jobs have lower status and pay than blue-collar jobs in other industries and are thus less attractive for skilled workers. In developing countries with a potentially available workforce, lack of vocational preparation for careers in logistics means that less skilled workers are not easily re-skilled.

The present study aims to assess the capabilities and level of training systems' development in terms of

creating the conditions for ensuring proper SCM by skilled labor. Thus, to evaluate the potential and effectiveness of managers' training, it is proposed to build relative assessments of the logistics efficiency level and higher training, determining the main drivers for professional skills development.

3. Methods and materials

The study was based on statistical information, world ratings, and publications in the public domain. As the objects of comparison, national higher training and the logistics systems of Russia and Germany were chosen, for which a high level of training and, as a consequence, the introduction of innovations and effective SCM mechanisms were assumed. The analysis was based on ratings retrieved from The World Bank [14] and Universities 21 [15] official websites for 2017–2019, while a set of indicators that characterize the selected countries was chosen according to a logical heuristic algorithm. All the obtained statistical data was processed through the Microsoft Excel spreadsheet processor.

The basis for assessing the logistics infrastructure's effectiveness of the country was the Logistics Performance Index (LPI) [14] – a benchmarking tool created to identify the challenges and opportunities of trade logistics and what they can do to improve their performance [14]. The indicator U21 (Ranking of National Higher Training Systems) was used to assess the country's level of higher training [15]. It was assumed that such characteristics as competitiveness and economic development of a country depend directly on the level of competence and training of its specialists as well as the availability of technologies that can enhance labor productivity. The U21 ranking involved evaluation of 24 measures of performance combined into four modules [15]:

1. Resources;
2. Output;
3. Connectivity;
4. Environment.

The main distinguishing feature of the U21 ranking is the presentation of comparative estimates of a large number of countries at different stages of economic and social development, while most higher training ratings use indicators of specific universities. U21 also presents a separate report on estimates of a country's performance relative to its level of GDP per capita [19].

Innovations in training continue to be the primary sign of the interaction between the academic environment and business. As long as they contribute to the provision of high-quality training programs for supply chain managers, the correlation of the comparative analysis results will allow characterizing the country's ability to prepare competent personnel that meets the high requirements of modern business.

4. Results

The set of issues that are usually addressed in connection with SCM includes various concepts and challenges concerning the increase of the company's efficiency and a number of entirely new concerns resulting from the development of electronic methods of communication and doing business. A special place among them is occupied by the provision of the business sector with skilled labor and the ability of training systems to meet students' requirements related to the training quality.

Before considering the level of higher training and the conditions for preparing logistics and SCM managers, the analysis of logistics systems' effectiveness in Russia and Germany was conducted using the LPI data [14]. The LPI allows for comparisons across 160 countries and provides feedback on the logistics "friendliness" of the countries in which they operate and those with which they trade. Following this, according to The World Bank, Russia occupies the 75th position, while Germany is ranked the best-performing country in the field of trade logistics [20]. Figure 1 presents the LPI sub-indicators for the selected countries.

As can be seen from the diagram, Russia is significantly lagging behind the rating leader. The LPI indicators are interconnected and reflect challenges associated with an insufficient level of infrastructure and inadequate use of modern technologies, which affects the timeliness and ability to track loads in the system.

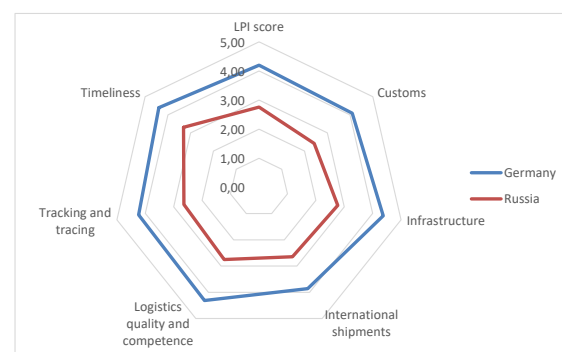


Figure 1. Logistics Performance Index: Germany and Russia (retrieved from [14])

To improve the logistics system efficiency at the national level, an effective training system for managers is necessary. For this reason, the next step was the analysis of the level and quality of higher training systems in reviewed countries. The national ranking U21 reflects the aims of higher training, including training of a nation's people, contributing to innovation through research, and facilitating interconnections between tertiary institutions and external stakeholders, both domestic and foreign. U21 uses 24 measures of performance grouped into four modules: Resources, Environment, Connectivity, and Output. According to U21 ranking for 2019, the top three countries, in order, are the United States, Switzerland, and the United Kingdom. Figure 2 presents comparative data on changes in the rating for Russia's and Germany's

national higher training systems over the past three years.

Russia is ranked 35th overall, which combines ranks of 44th for Resources, 28th for Environment, 44th for Connectivity, and 26th for Output. In the Connectivity module, Russian universities are relatively weak on interactions with industry: ranked 44th for joint publications with industry and 42nd for knowledge transfer with firms. Russia ranks 44th for joint publications with international researchers, which indicates an insufficient use of innovations both in training and industry. In Output, Russia is ranked second for the training qualifications of its workforce and ninth for the employment rates of those with a tertiary qualification compared with school leavers. These rates are considered relatively high. Russia's total research publications rank 15th, publications per head 42nd, and their average impact 34th [15].

Germany is ranked 16th overall, which combines ranks of 18th for Resources, 28th for Environment, 14th for Connectivity, and 13th for Output. In the Resources category, it ranks 37th on total expenditure (public plus private) as a share of GDP but 16th on expenditure per student. The difference is explained by the lower rank for the participation rate in higher training. In Connectivity, Germany performs well on links with industry: ranked eighth for joint publications and ninth for knowledge transfer. It ranks 23rd for the share of publications that have international co-authors. This indicates the high innovative potential of the training system, which is reflected in the high results of the logistics evaluation. In Output, German universities are ranked fourth for total publications. Besides, Germany ranks seventh for the standing of its best three universities [15].

As Figure 2 explicates, the values of Russia's and Germany's indicators did not significantly change over a three-year period, even though their positions in the rating varied slightly. A comparative analysis revealed that Russia lags starkly behind the leaders in the higher training system's estimates. Despite the rather good ranking for scientific publications, the low level of interaction with industry is the main reason for its considerable backlog in the field of SCM.

Modern managers' training and training programs help drive innovation. A well-designed and implemented study plan cannot be successful if the economic, social, and political contexts do not meet its objectives. Low level of interaction with industrial partners slows down the implementation of innovation and creates obstacles for effective management skills training. The gap between the academic environment and business is the main reason for the low personnel qualification in SCM and, as a consequence, poor efficiency of national and global logistics systems.

5. Discussion

In the current circumstances, SCM is becoming increasingly relevant in view of globalization, digital transformation, and the transition to new technological paradigms. This topic has been qualitatively examined by a growing body of literature. Fernandes et al. [2] highlighted the need for organizations to develop competitive advantages in a supply chain context. The powers of the manager of this chain are considered fundamental attributes to the company's competitiveness in meeting customers' requests. The authors [2] indicated that to be competitive, the organization should be integrated into a supply chain, and the same manager profile should cover technical skills, behavioral skills, knowledge of competition, and the core supply chain processes [2]. Giunipero et al. denoted that supply managers of the future need to acquire strategic skills that add value and enable effective alignment with fundamental business functions at a senior decision-making level [3]. Thus, additional research is needed in the area to determine how best to recruit and train managers in these skills to move forward [3].

Mottram and Sams noted that such skills as procurement, quality, and risk management are common to SCM and project management, being extremely important for both employers and graduates themselves. Therefore, there is a need to train these two related professions in an integrated manner [21]. The authors emphasized that the traditional approach to training provides a technically competent workforce but without the knowledge or expertise to work within cross-functional teams. As this is a fundamental part of the project manager role, Mottram and Sams presented the rationale and developments on integrating two large modules in the managers' training programs to form competencies in future graduates both in the field of SCM and project management. This innovative approach allows students to work on a real project and introduces the fundamental concepts of project management and logistics [5].

The current SCM is in the process of accelerated development due to the influence of globalization, innovation, sustainability, and technology. These changes raise challenges not only to higher training institutions, but also to students, employing organizations, and third parties like SCM-related professional bodies. To understand this challenge, [16] investigated the gaps between demand and supply of SCM-related knowledge in the United States, answered related design questions, and made recommendations to close the gaps.

Simulation-based training products continue to be an excellent set of illustrative tools. Such products are highly effective in training and are known to be one of the first-rate student-centered learning methodologies since they allow students to improve critical thinking and decision-making skills. In light of this, Siddiqui, Khan, & Akhtar presented a case where a scenario-based e-learning product, namely "supply chain simulator," was developed for an introductory technology course. This product is believed to simulate

a supply chain that carries out the task of procurement and converting materials from a manufacturer to a customer [17]. Within their research, the authors tested the developed product during four semesters and conducted a survey among the involved research participants to investigate its effectiveness. The obtained results clearly suggested the benefits of using the “supply chain simulator” for improving the students’ learning process [17]. This confirms the reasonability of information technology application in training and the effectiveness of such approaches.

In Russia, the matter of training supply chain managers also attracts considerable interest among researchers. In [18] investigated the influence of the regional structure of the supply chain and noted a sharp gap in innovation and the production of social benefits. The authors believed that if these elements of the regional supply chain structure are brought into line with the norm, then, taking into account the specific Russian infrastructure and the capital intensity factor, it will lead to a significant increase in investments.

Information forms the basis that provides all management decisions in supply chain logistics, contributing to its sustainable development and goal achievement. For this reason, a vast number of scholars consider it crucial to determine the impact of digitalization on new capabilities in logistics supply chains and assess the market evolution for business analytics in Russia [13].

Many interventions affecting the efficiency of logistics, such as international infrastructures, trade corridors, regulations, and services, have already been extensively reviewed. Nevertheless, the report “Logistics Competencies, Skills, and Training: A Global Overview” prepared by McKinnon, Floethmann, Hoberg, and Busch [10] is the first to cover the contributions of human resources and how to develop skills and improve competences, especially in developing countries. This work proposed a framework for the skills needed according to the logistics activity. Based on several sources, including recent surveys carried out by the World Bank, the report uncovered the skills constraints according to the type of job or the country [10, 19]. In such a manner, the authors provided a conclusion that logistics is the industry focused on hiring skilled workers, although with differences between rich countries and developing economies.

Thus, the grounded study of logistics operations and SCM remains a matter of primary concern for a further professional career. Today’s related courses are often limited to basic concepts and methodologies. They rarely include practically oriented elements regarding the use of systems for planning enterprise resources and modeling real business processes. As a result, it often leads to an incomplete description of business processes and, therefore, reduces decisions’ effectiveness. It is multiply confirmed that the main reason for the gap between the training process and industry

requirements is that academic communities do not provide sustainable training at all levels [20, 21] and are inert with the advent of new technologies.

6. Conclusions

Considering that SCM plays a leading role in finding the product’s value to the customer, additional value entails its creation for all interested parties from an economic, environmental, and social point of view. In the production context, additional value creation requires innovation at the level of products, processes, and systems, as well as an understanding of the complex interaction of socio-technical systems with the natural environment. The existing training programs with traditional disciplines are fragmented and do not reflect the current market’s multidisciplinary or integration demands. The modern requirements are associated with the need to work at the interface of various disciplines to solve complex tasks. Consequently, transformational and innovative reforms in training with a general paradigm shift are crucial for providing the next generation of engineers, scientists, and managers with proper technical knowledge, skills, and capabilities.

Logistics tasks at the top level of the professional hierarchy often require additional staff development to be in pace with the latest technologies. The performed comparative analysis shows that the poor staff qualifications may result from limited resources, money, and time allocated for training, especially in developing countries. High-quality training systems provide opportunities for the formation of innovative approaches to training managers in SCM systems.

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