

Agile Supply Chain Management in Multinational Corporations: Opportunities and Barriers

Pavel V. Zhukov^{1*}, Alexander A. Silvanskiy², Kirill Y. Mukhin³, Olga L. Domnina⁴

¹*Don State Technical University, Rostov-on-Don, Russia*

²*Federal State Budget Educational Institution of Higher Education «Industrial University of Tyumen», Tyumen, Russia*

³*The Federal State-Funded Educational Institution of Higher Education 'Financial University under the Government of the Russian Federation', Moscow, Russia*

⁴*Volga State University of Water Transport, Nizhny Novgorod, Russia*

*Corresponding author: zhukovpv66@mail.ru

Abstract- The purpose of our research is to study new opportunities in agile supply chain management, identify barriers to agile supply chain management, develop a methodology to overcome these barriers and make proposals for agile supply chain management in multinational corporations. The study and analysis of supply chain management of multinational corporations allowed us to define the specifics of the industry using the following research methods: the choice of logistics intermediaries, forecasting (indicators, flows, etc.), nomenclature groups, risk optimization, statistical data analysis. The methods of grouping and systematizing statistical data into registries were applied to assess the business agility of supply chain management and obtain results. In addition, the expert assessment method was used to assess the agility indicators of the following companies METRO Cash & Carry, Gloria Jeans and Gazprom. Procurement (timeliness and prices), supply management, product management, finished-product output and shipment management were assessed. The calculations showed that the multinational corporations METRO Cash & Carry, Gloria Jeans and Gazprom should continue to increase the agility of supply chain management and implement the SCM strategy, which will quickly address and mitigate supply chain disruptions. We also believe that the companies should adapt SCM in the organizational structure optimization in order to eliminate bottlenecks.

Key words- supply chain management; Agile, multinational corporations; SCM concept; cold chain management; business agility.

1. Introduction

Multinational corporations face many challenges when trying to achieve business agility of management in their supply chains. The factors

which prevent them from this are the desire for short-term profitability and long-term integrity, economic efficiency and sustainability, as well as the desire to achieve competing interests of the parties concerned. Despite this, research on agile and sustainable supply chain management (SSCM) [1,2] primarily follows an instrumental approach that takes for granted the dominant role of economic issues in relation to social and economic goals and focuses on the relationship between environmental, social and economic objectives in terms of mutually beneficial or compromise decisions. Many researchers have been studying the concept of agile supply chain management [3, 4]. Based on the literature studied, we have defined the business agility of a company's supply chain as the ability of multinational corporations to reconfigure their supply chain to respond to external changes [5]. Business agility is crucial for the efficient supply chain management to take its opportunities and respond to environment changes. Recently, researchers have made an effort to provide alternative views on the agility of supply chain management through the conceptualization of sustainability and other business objectives as equally important [6]. Some advocates [7] of this new perspective regard agility and supply chain management as contradictory but interrelated elements that exist simultaneously. The researchers of the paradox encourage managers to accept contradictions, rather than try to resolve them [8]. Agile supply chain management is differently interpreted by scientists. We studied and systematized the characteristics of this concept in Table 1.

Table1. Systematization of the “Agile supply chain management”concept

Agile supply chain management	Source
Quick response to uncertainty in order to mitigate risks, decrease in prices and stock	[9]
Establishment of additional capacity as a buffer	[10]
The existence of inventory/raw material/spare parts/finished products stock	[11]
The use of analog processes and technologies for emergency supply chain conversion	[8]
Response to internal and external supply chain risks	[12]
Quick response to the requests in new supply chains	[13]
Effective operation of supply chains under the conditions of risk and uncertainty	[7]
Quick response to the fluctuations in demand, output, range, requests and warehouse	[5]
Quick adaptability to serious and unpredictable business environment changes	[14]

Source – own development

Over the years, supply chain management in industrial companies has become a cross-functional consolidation and MNCs managed to change and adapt structural elements [12]. Scientists say that it is more difficult to manage global supply chains than internal supply chains [6]. The geographical distance in these global situations does not only increase transportation costs, but also complicates decision making due to the increased inventory cost and delivery time in the supply chain. These factors affect the agility of the supply chains of multinational companies. In addition, global supply chains have risks that affect results. They are volatility and uncertainty in exchange rates, economic and political instability and the changes in the company's internal and external environment. It is not easy to manage international activities. To do this, it is necessary to create a logistics system that will provide agile supply chain management

system, timely supply and efficient operation of the entire enterprise. Some scientists [13,6, 15] use the SCOR methodology and special information systems to refer to supply chain management. Many studies [7, 13] are based on determining the agility of supply chain management using the information systems of the enterprise, such as ERP SAP or Oracle, supply chain management systems (i2 or Manugistics), as well as special customer relationship management systems (CRM) and warehouse management system (WMS) . Some scientists [7,16] suggest the implementation of IBS or Business Objects, which partially correspond to the SCOR model, in order to introduce the agility of supply chain management. To ensure these processes, it is necessary to analyze the activities of MNCs and draw up strategies for achieving the goals. To do this, we have built a model of agile supply chain management for MNCs (Fig. 1).



Figure 1. Agile supply chain management model for multinational corporations

Source – own development

In this model supply chain management is provided not only at the production stage, but also at the stage of procurement of raw materials. It includes such a structural element as a distribution center. After the introduction of this model at the enterprise, the structure of the supply chain management department should be developed. There are a lot of industrial multinational companies in Russia. Each of them has a supply chain management, namely: supply management – supply chain design; product distribution; import; export; certification; warehousing and storage. In addition, they have demand planning, operational planning, distribution and logistics management (customer service and distribution center). The issues of supply chain agility have recently been discussed and this was the main topic of the MIT forum “Agility and efficient management of supply chain costs in the new economic conditions” [17]. A lot of heads of multinational corporations took part in this meeting. There were also some representatives from METRO Cash & Carry and Gazprom. The object of the analysis to study the possibilities and barriers to agile supply chain management were such multinational companies as METRO Cash & Carry, Gloria Jeans and Gazprom. Gazprom applies the supply chain management (SCM) system, which allows analyzing production output and the oil refinery basket, as well as managing the distribution of fuel. At this stage, production, transportation and sales processes are controlled and managed. The SCM systems of the company help to determine the range and volume of products to be manufactured, taking into account its capacities and raw materials. It was established that the supply chain management system of Gazprom is based on the AspenTech solutions (a supplier of software for the oil and gas industry) (Gazprom Neft). Until 2007, the company used the RPMS system. But it was not perfect. There were no unified approaches to planning models and integration with information systems. The distribution and production of petroleum products should be improved in order to improve supply chain management of the company. It is important to calculate the material flows and marginal products of the company. Thus, a resource planning and a sales plan are required. The supply chain management of “Gloria Jeans” is characterized by distribution centers, whose mission is to provide all outlets with products. Recently, the company has significantly improved its supply chain

management system: the Manhattan SCALE warehouse management system has been launched; a communications system has been created; warehouse processes of acceptance, selection, shipment, placement, integration with technological equipment have been automated (Gloria Jeans - Implemented projects). The supply chain management system of METRO Cash & Carry is more complicated and functional, as logistics should include the factor of technological requirements for storage and transportation of food. The company uses ERP systems to build supply chains (METRO Cash and Carry). This system includes: inventory planning, supply management, conclusion of agreements with suppliers, order placement, acceptance and storage of goods, purchase of goods, distribution of goods and timely delivery to shopping centers. There are distribution centers in the METRO supply chain management structure as the company imports goods directly from foreign suppliers. After the goods are cleared, they are sent to the central warehouse of the Noginsk distribution center, where they are distributed to shopping centers (METRO Cash and Carry). The company uses the PAXD platform. It is a scheme for the supply of non-food and food products without special storage and transportation conditions. In distribution centers the goods are checked and sent to the METRO shopping center. The distribution center has an important function in building agile supply chain management for METRO Cash & Carry. It optimizes delivery routes and transportation costs. It also reduces the number of vehicles to be used (METRO Cash and Carry). The study of scientific literature helped us to determine that METRO Cash & Carry, Gloria Jeans and Gazprom have strong and efficient logistics for supply chain management. But they are not focused on agile management that will ensure coordination at all strategic levels. For the effective operation of all industrial multinational corporations, agile supply chain management is required. In this case, the company will have a logistics system in foreign markets that will meet the requirements of all markets. Gazprom and METRO Cash & Carry introduced an information system with agile supply chain management based on analytical units and decision support. This is SCOR, namely e-SCOR and ADOLo system. The main functions of the system are as follows:

- evaluation of the planned supply chains;

- modeling and forecasting of performance indicators;
- designing and planning of alternative supply chains;
- efficient management at all levels of supply chain.

The system also helps the companies to evaluate the effectiveness and timeliness of deliveries, as well as to monitor the arrival and availability of goods. In order to provide a better understanding of how organizational practices are cultivated in a multinational corporation to make its supply chains agile, we considered the organizational structure of supply chain management and configurations as internally consistent and interdependent elements. It was concluded that configurations can be located at several analysis levels, depicting templates that are common to individuals, groups, departments, organizations or a network of organizations. This configuration corresponds to the SCM organization in a multinational company. It is a unique multi-level structure. We found out that previously SCM was controlled by various departments of the company (for example, procurement, production, marketing and logistics), whose activities were rarely coordinated. This fragmentation made it possible to distribute responsibilities.

2. Materials and Methods

Our research is an empirical study, in which the barriers to agile supply chain management have been studied and systematized. The methods of agile supply chain management in multinational companies have also been studied. For the studied companies, the business agility of supply chain management was measured with the help of expert assessment methods. These methods were the basis for studying agile supply chain management. A large number of studies devoted to this issue do not solve the problem of building and implementing agile supply chain management in multinational corporations. We offer an integrative model of the organizational structure that supports the agility of supply chain management in multinational corporations. This model describes the relationship between the choice of SCM, simplification of supply and the development of supply chain agility. We offer the following structural solutions: a high hierarchical position of the top supply chain manager in the supply department, a wide range of operations of the supply department, a high hierarchical position of the top supply chain manager at the main office and the coordination of the SCM performance by the main office. The studies were based on mechanical samples,

statistical data and the data from the companies under study. The research was based on the practices of METRO Cash & Carry, Gloria Jeans and Gazprom. We have developed a model of agile supply chain management for multinational corporations to make their logistics system an efficient element of supply chain management. The proposed model includes the following criteria for agile supply chain management: management of import and domestic procurement, supply and product management, management of the output of finished products and by-products, management of shipments / deliveries and customer relationships. The agility of supply chain management in METRO Cash & Carry, Gloria Jeans and Gazprom was assessed with the help of grouping, systematization and expert assessment methods. The expert assessment was based on ranking and rating. A database for the selected criteria was created. The data were grouped according to procurement (timeliness and prices), supply management, product management, finished product output and shipment management. It was established that the agility of the supply chain of METRO Cash & Carry, Gloria Jeans, Gazprom is 6.5, 6 and 5.7, respectively. The hierarchy between the top manager of the supply chain and the CEO of the corporation was also measured: METRO Cash & Carry - 4.1, Gloria Jeans - 3.8, Gazprom - 5.2. With the help of mathematical statistics methods, we obtained a generalized expert assessment and defined the degrees of barriers to agile supply chain management in Gazprom. Each barrier was regarded separately. First, we calculated the proportion of S_j according to the formula:

$$S_j = \frac{\sum_{i=1}^{m_j} a_y}{m_{kj}} \quad (1)$$

where m_{kj} is the number of experts evaluating the j th barrier; i is the number of the expert; j is the number of the barrier. The greater the value of S_j , the greater the importance and degree of the barrier is. To determine the relative or global weight of barriers, the coefficients were calculated according to the formula:

$$\bar{S} = \frac{\sum_{j=1}^n S_j}{n} \quad (2)$$

3. Results

We evaluated the agility of supply chain management in the above mentioned companies using the expert assessment methods based on the supply chain agility development: the possibility of changing routes, replacing materials for production; agile pricing, timeliness of supply and supply management by shortening the procurement / delivery cycle, product management, finished product output, shipment management by shortening the order cycle, etc. The expert assessment method is based on ranking analysis

criteria and determining the degree to which one factor is more important than the other. The range of changes in the characteristics of the object was divided into separate intervals, each of which was assessed by an expert. The companies under consideration received our questionnaires to assess the criteria of agile management. The questionnaires were filled in by the top managers and the analytical department. Having collected and analyzed the questionnaires, we derived the average expert value. The higher the score, the better and more efficient the indicator is. Table 2 shows the assessment results.

Table 2. The assessment of supply chain management agility of multinational companies

Indicator	Gazprom	METRO Cash & Carry	Gloria Jeans
Agile development in supply chains	15,2	10,5	11,4
Improved procurement	10,0	8,5	9,9
Increased globalization	7,8	8,1	7,4
Reduced supply cycle	9,2	10,8	7,1
Increased number of shipments	7,2	8,5	6,4
Reduced order cycle	12	8	11

Source: own development

According to the expert assessment, Gazprom has more agile supply chain management than METRO Cash & Carry and Gloria Jeans. Having conducted a survey and evaluated the indicators, we came to the following conclusion: multinational companies should reduce the life cycle of their supply chain to increase the indicator from 8, 11 or 12 to 17 (the minimum set by the experts) in order to improve supply chain management agility. It is also necessary to build a global distribution network to increase globalization, as well as to map specific customer demands in order to increase shipment. Having evaluated the organizational structure of the companies under study and examined their management levels, we concluded that in order to improve management agility, it is necessary to ensure supply chain dynamics by changing the hierarchical position of the top supply chain manager. The volume of operations of the supply chain department should be reduced in order to introduce an effective SCM model to increase management agility. In addition, the hierarchical position of the top supply chain manager in the main office will contribute to the supply chain agility; the coordination of SCM activities by the main office will positively affect supply chain agility. Based on the analysis of these criteria, we believe that the four structural elements are the constituent elements of the ideal structural configuration, which is focused on achieving

supply chain agility. The structural configuration data were collected during several stages of surveys with the information provided by METRO Cash & Carry, Gloria Jeans and Gazprom. We used a successive comparison method to analyze the agility of supply chain management of the studied companies. We arranged all the criteria in order of decreasing their importance: $A_1 > A_2 > \dots > A_n$. The value of one was also assigned and the rest of the criteria were given weights. Next, we compared the value of the first criterion with the sum of all the subsequent ones. It can be expressed mathematically:

$$A_1 > A_2 + A_3 + \dots + A_n \quad ;$$

$$A_1 = A_2 + A_3 + \dots + A_n \quad ;$$

$$A_1 < A_2 + A_3 + \dots + A_n$$

In the end, we calculated the overall assessment of each criterion according to the selected inequality option:

$$A_1 > A_2 + A_3 + \dots + A_n - 1 \quad ;$$

$$A_1 = A_2 + A_3 + \dots + A_n - 1 \quad ;$$

$$A_1 < A_2 + A_3 + \dots + A_n - 1$$

The following indicators were developed based on the structural elements and variable factors, such as supply chain agility, hierarchical position, volume of operations, etc.:

To measure supply chain agility, the assessments from Table 2 were used. The experts assessed the criteria on a 7-point scale (1 = not agile at all, 7 =

extremely agile). METRO Cash & Carry, Gloria Jeans and Gazprom received 6.5, 6 and 6.8 points, respectively (Table 3).

Table 3. Comparison of the supply chain agility based on the structural elements of the multinational company

Structural elements	Scale	METRO Cash & Carry	Gloria Jeans	Gazprom
Supply chain agility	low	4,5	5,05	5,10
	high	6,5	6	6,8
Hierarchical position of the top management in the supply chain	low	4	3	4,80
	high	4,5	3,8	5
Volume of operations performed in the supply chain	low	3,10	3,10	3,4
	high	3,7	3,9	4,2
Hierarchical position of the top supply chain manager in the main office	low	0,9	1,85	1,90
	high	1,10	3,53	2,40

3.1. The hierarchical position of the top supply chain management

We calculated the number of hierarchical positions between the top supply chain manager and the CEO of the company. This indicator varied from 2 to 10 points, where low values were represented by a higher hierarchical position. The indicator of METRO Cash & Carry was 4.5, Gloria Jeans - 3.8, Gazprom - 5.

3.2. The volume of supply chain operations

was assessed by the number of functional areas included into the supply chain management. The scale ranged from 3 (low) to 6 (high). The indicator of METRO Cash & Carry was 3.7, Gloria Jeans - 3.9 and Gazprom - 4.2, where high values represent high SCM.

3.3. The hierarchical position of the top supply chain manager in the main office

We calculated the number of hierarchical levels between the top supply chain manager in the main office the CEO of the company. The indicator ranged from 1 to 6, where low values represented a higher hierarchical position. The indicator of METRO Cash & Carry was 1.10, Gloria Jeans - 3.53 and Gazprom - 2.40.

3.4. The coordination of SCM by the main office

The degree of SCM coordination by the main office was measured by the number of SCM processes coordinated according to the activity of the main office department. This number ranged from 1 to 6, where high values represented a large SCM coordination area. The indicator of METRO Cash & Carry was 1.7, Gloria Jeans - 2.5 and Gazprom - 3.2. Based on the concept of dynamic capabilities, when the supply chain agility includes

a set of interrelated supply chain processes that give an appropriate response to changes, we compared the agility of supply chain management of the companies under consideration in Table 3. Having performed the calculations and assessment, we found out that the companies should develop supply chain agility, since none of them received the highest assessment. Thus, our research shows that various structural characteristics of a business, departments and main offices of SCM are simultaneously built and used through the general structural configuration of multinational companies. Having analyzed the barriers to the agile management in METRO Cash & Carry, Gloria Jeans, Gazprom, we identified the key obstacles: the difficulty of measuring the quality of cooperation with suppliers and monitoring them, lack of practice and agility to switch to a new supply chain management system, lack of awareness of logistics agility, etc. Based on the analysis of scientific sources and the barriers to agile management, we made a classification and rating. It was revealed that the technological barrier is the most important barrier to agile management. Technological change is an expensive and decisive barrier to SCM implementation. The weight of financial barriers is less than half the weight of technological barriers, taking into account the fact that industrial multinational companies usually need more funds to expand their management system. The barriers of science and knowledge rank the fourth among the barriers to agility. It was concluded that there is not enough knowledge in measuring agility indicators of supply chain management.

We have compiled a barrier rating for the implementation of agile SCM methodology in the multinational companies under study. Table 4 shows the ranking of specific barriers. The overall

rating is based on the global relative weight. It is calculated by multiplying the relative weight of the barrier category by the relative weight of each

specific barrier. The result is based on the barrier category.

Table 4. The relative weight of barrier to agile supply chain management in Gazprom

Barrier	Relative weight Sj	Relative weight of the barrier	Global weight of the barrier	Ranking
Outsourcing in logistics	0,2698	0,2618	0,0615	3
Technology	0,3659	0,1256	0,4099	1
Science and knowledge	0,1589	0,1056	0,0447	5
Finances	0,1569	0,2659	0,1562	2
Participation and support	0,0598	0,1563	0,0113	4

Source – own development

The table shows that the most serious barrier to agile supply chain management is the technological one. The companies should develop and use new trends and technologies when implementing SCM. The lack of new technologies, material and processes are on the first place in the category of technological barriers. Multinational companies usually slowly respond to the problem of improving supply chain agility because they do not have enough resources. In the given categories the barriers are difficult to be measured and controlled. The relative weight shows that Gazprom can't properly monitor and measure agility due to the lack of scientific substantiation in the field of agile supply chain management. The calculations helped us to conclude that the multinational companies METRO Cash & Carry, Gloria Jeans and Gazprom should continue to increase the agility of supply chain management and implement the SCM strategy, which will be able to quickly respond and restore the balance in the supply chain. We also believe that these companies should adapt SCM in optimizing their organizational structure in order to eliminate bottlenecks. The structure of supply chains and the processes that must be interconnected with each of the key counterparties of the chain should be defined when building agile supply chains. Management agility will allow multinational companies to achieve maximum competitiveness and profitability of business activities, as well as an agile supply chain structure.

4. Discussion

The supply chain structure of each company under consideration includes the following elements: production, engineering, quality assurance,

procurement, customer service, logistics and planning. It was concluded that for the effective implementation of agile supply chain management in the main office of a multinational company, a global supply chain manager, who will report directly to the CEO, is required. The management team should consist of at least 15 managers of global processes. The reports should be sent directly to the global supply chain manager. Each global supply chain manager should perform horizontal work: demand planning, integrated planning, supply planning, distribution, requirements planning, supply of raw materials, physical distribution between warehouses, setting up processes for performing supply chain management functions, initiative planning, customer logistics, retail supplies, supply chain design, strategic distributor design. The organization of many multinational companies is based on independent departments. Since the multidisciplinary model is one of the most widely used management models, agile supply chain management is becoming a strategic tool for creating competitive advantages. There are always many problems and obstacles towards achieving management system agility. It is very important to understand the barriers of building agile supply chain management. There are many scientific discussions on the classification and characterization of the barriers to agile supply chain management. Having studied the scientific literature, we systematized the main and most common barriers to agile supply chain management in multinational companies. The results are presented in Table 5.

Table 5. Barriers to agile supply chain management in multinational companies

Barrier	Characteristics	Source
Problems with suppliers of raw materials and other materials /services	Due to traditional thinking the interests of suppliers are different from the interests of other supply chain participants	[7]
Difficulty of measuring the quality of cooperation with supplier and monitoring them	Metrics displacement affects the efficiency of supply chain interaction	[18]
Lack of ethical partnership with competitors	It is difficult to maintain partnership relations in competitive environment	[5]
Lack of state support for environmental policy of industrial multinational companies	Governmental regulation can't make industrial companies accept the environmental policy	[14]
Fear of failure	Fear of failure in adopting supply chain agility, fear of possible financial losses, fear of losing a competitive advantage	[16]
Lack of human resources	There are not enough workers and/or they are not competent enough	[16]
Difficulties associated with positive external changes	Multinational companies have a good external policy, but they do not always apply it	[19]
Lack of practice and agility to switch to a new supply chain management system	Current production practices do not allow switching to new systems	[16]
Lack of new technologies, material and processes	There is no appropriate technology for adopting agile supply chain management	[16]
lack of awareness of logistics agility	Industrial companies are not aware of agile logistics	[16]
Difficulties in obtaining the information on the potential of improved supply chain management	There is not enough information related to the potential of improved supply chain management	[7]
Financial constraints	Financial component is important in changing and improving of supply chains	[20]
Lack of inter-department cooperation and links	Limited information on the hierarchical structure of the company does not allow the implementation of GSCM	[21]
Insufficient involvement of the top management into the introduction of supply chain management	The top management does not want to change current investment, information systems and habits	[22]

Source: [own development]

The study and analysis of supply chain management models and the assessment of supply chain management agility helped us to conclude that the SCOR and DCOR models are the most popular models. The SCOR model has its own language to characterize the relationship between the supply chain participants. The model uses a system to evaluate the performance of the chain and

a library of typical business processes. The SCOR-model makes it possible to create unified, comparable and adapted for evaluation processes in the supply chain [5]. Business processes, relations and rules that operate in various areas are identified in this model. The introduction of the SCOR-model will allow multinational companies to analyze the material flow process in an integrated way. An

important point of this model is graphical representation of the supply chain that visually shows the company's structure [19]. It was concluded that the Gazprom SCOR model will allow it to manage supply chains, standardize the relations between business processes and in standard metrics, which will make it possible to measure and compare the performance (productivity) of the processes. This practice will help to achieve "best-in-class" results. In turn, the introduction of this model will also ensure the implementation of agile supply chain management through the reduction of costs for the entire supply cycle, increased speed of supply and reduced number of operations. Some researchers [19] recommend the implementation of the Design Chain Operations Reference model (DCOR) to improve the agility of supply chain management. It will cover such processes as product creation, raw material procurement, market research, logistics, delivery, etc. The DCOR model can be implemented in multinational companies both separately and together with the SCOR model. Both models perform the following basic business processes:

- planning;
- execution;
- provision;
- launch of new products / goods;
- organization and implementation of new technologies [8].

All levels of these models are focused on the agility of supply chain management. DCOR model functions correspond to the SCOR model functions and include: supply chain reliability, reactivity, agility, costs and assets. Supply-Chain Council also suggests the development of the third model – the CCOR (Customer Chain Operations Reference model), which together with the two existing model will form the so-called Integrated Business Reference Framework (IBRF) [16]. IBRF is a model that will allow METRO Cash & Carry, [23] to combine all the supply chains to ensure agility. This means that it will be possible to combine the management of product creation, customer requirements, life cycle and the cost of the whole supply cycle. Thus, multinational companies will be able to achieve effective supply chain management and competitive advantage, as well as supply chain agility and changes in accordance with the projected processes and objectives. It was found out that the application of the above mentioned models in [24], Gloria Jeans and Gazprom will allow developing their own agile supply chain

management models based on personal-corporate business processes, tasks and goals. We believe that it will combine the existing proposals and conclusions, studied and recommended concepts of business processes and best practices [25, 26].

5. Conclusion

In our research we have analyzed the barriers to agile supply chain management in multinational companies. We have identified and formulated the key characteristics of the barriers to agile supply chain management. We have also studied the opportunities of supply chain management and proposed a methodology for overcoming the barriers to agile supply chain management. The proposals for agile supply chain management in multinational companies have been developed. Agile supply chain management model based on procurement (timeliness and prices), supply management, product management, output of finished products and shipment management has been developed. We have assessed the agility of supply chain management of the companies under study and found out that the agility of the supply chain of METRO Cash & Carry, Gloria Jeans and Gazprom Neft is 6.5, 6, and 5.7, respectively. The number of hierarchical positions between the top supply chain manager and the CEO of the company has also been calculated. This indicator ranged from 1 to 6, where low values represented a higher hierarchical position: METRO Cash & Carry – 4.1, Gloria Jeans – 3.8, Gazprom – 5.2. It has been concluded that the multinational companies METRO Cash & Carry, Gloria Jeans and Gazprom should continue to increase the agility of supply chain management and implement the SCM strategy, which will be able to quickly respond and restore the balance in the supply chain. We also believe that these companies should adapt SCM in optimizing their organizational structure in order to eliminate bottlenecks.

References

- [1] Gloria Jeans - Implemented projects. <https://korusconsulting.ru/clients/avtomatizaci-a-biznes-processov-gloria-jeans/>, 2005.
- [2] Stock, J.R., & Lambert, D.M. *Strategic logistics management*. M.: INFRA-M, pp. 520, 2005.
- [3] Mukhin, Yu. Yu., & Mukhin, K. Yu. Reengineering of public health system, based on a person-centered model, hybrid project management approaches and methods of

- artificial intelligence. *Information technologies for the Physician*, 3, 23-38, 2017.
- [4] Lopatin, V.A., Seryshev, R.V., Trifonov, P.V., Mukhin, K.Yu., & Smirnov, V.V. *Increasing the level of STP in information processing*. International Journal of Innovative Technology and Exploring Engineering, 8(8), 2019.
- [5] Zhu, Q., Sarkis, J., & Lai, K.H. *Green supply chain management innovation diffusion and its relationship to organizational improvement: An ecological modernization perspective*. Journal of Engineering and Technology Management, 29 (1), 168–185, 2012.
- [6] Li, X., Holsapple, C. W., & Goldsby, T. J. *The structural impact of supply chain management teams: Supply chain agility development in multidivisional firms*. Management Research Review, 42(2), 290-310, 2019.
- [7] Faisal, M.N., Banwet, D.K., & Shankar, R. *Supply chain risk management in SMEs: analyzing the barriers*. International Journal of Management and Enterprises development, 4 (5), 588–607, 2000.
- [8] Chung, S. *Explaining compliance: A multi-actor framework for understanding labor law compliance in China*. Human Relations, 68, 237–260, 2015.
- [9] Andriopoulos, C., & Lewis, M. W. *Exploitation-exploration tensions and organizational ambidexterity: Managing paradoxes of innovation*. Organization science, 20(4), 696-717, 2009.
- [10] Angus-Leppan, T., Benn, S., & Young, L. *A sense making approach to trade-offs and synergies between human and ecological elements of corporate sustainability*. Business Strategy and the Environment, 19(4), 230-244, 2010.
- [11] Bush, S. R., Oosterveer, P., Bailey, M., & Mol, A. P. *Sustainability governance of chains and networks: A review and future outlook*. Journal of Cleaner Production, 107, 8–19, 2015.
- [12] Deegan, C., & Shelly, M. *Corporate social responsibilities: Alternative perspectives about the need to legislate*. Journal of Business Ethics, 121, 499–526, 2014.
- [13] Sarkar, A., & Mohapatra, P.K.J. *Evaluation of supplier capability and performance: a method for supply base reduction*. Journal of Purchasing and Supply Management, 12 (3), 148–163, 2006.
- [14] Lee, S.Y. *Drivers for the participation of small and medium sized suppliers in green supply chain initiatives*. Supply Chain Management International Journal, 13 (3), 185–198, 2008.
- [15] Management International Journal, 13 (3), 185–198, 2008.
- [16] Latif, A.Z., Malkh, H.N., AL-Khalidi, A. *Impact of Supply Chain Governance on Financial Reporting: Evidence from Iraq*. International Journal of Supply Chain Management, 8(1), 2019.
- [17] Porter, M., & Kramer, M. *The link between competitive advantage and corporate social responsibility*. Harvard Business Review, 84 (12), 78–92, 2006.
- [18] Gattorna, J., Ogulin, R., & Reynolds, M. *Supply Chain Management: Gower Handbook (the 5th ed.)*. M.: INFRA-M, pp. 670, 2010.
- [19] Hamner, B. *Effects of green purchasing strategies on supplier behaviour*. Greening the Supply Chain. Springer, Berlin, pp. 25–38, 2006.
- [20] Revell, A., & Rutherford, R. *UK environmental policy and the small firm: broadening the focus*. Business Strategy and the Environment, 12 (1), 26–35, 2003.
- [21] Zhu, Q., & Geng, Y. *Drivers and barriers of extended supply chain practices for energy saving and emission reduction among Chinese manufacturer*. Journal of Cleaner Production, 1–7, 2010.
- [22] Khan, K.A., Bakappa, B., Metri, B. A., & Sahay, B. S. *Impact of agile supply chains' delivery practices on firms' performance: cluster analysis and validation*. Supply Chain Management: An International Journal, 14(1), 41-48, 2009.
- [23] Luthra, S., Kumar, V., Kumar, S., & Haleem, A. *Barriers to implement green supply chain management in automobile industry using interpretive structural modeling technique-an Indian perspective*. Journal of Industrial Engineering and Management, 4 (2), 231–257, 2011.
- [24] Gazprom Neft. <https://www.gazprom-neft.ru>.
- [25] METRO Cash and Carry. <https://www.metro-cc.ru/>
- [26] Ali, Alavi Shoushtari, Meysam, Sharafi, Sina, Sekhavat. *Effect of Solution Annealing Heat Treatment on the Corrosion Resistance and Mechanical Properties of an Austenitic Stainless Steel*, UCT Journal of Research in Science, Engineering and Technology, Issue 4, pp.14-16, 2013.
- [27] Muhammad K. *The Effects of Electronic Human Resource Management on Financial Institutes*. Journal of Humanities Insights. 02(01):01-5, 2018.