Zorica Lazic¹ Milica Grujic Vladimir Skoric

Article info: Received 15.07.2024. Accepted 03.02.2025.

DOI - 10.24874/IJQR19.02-18



QUALITY IN SUPPLY CHAIN MANAGEMENT IN TIMES OF GLOBAL CRISES

Abstract: Once the pandemic was brought under control in February 2022, the ongoing conflict between Russia and Ukraine started, which has additionally affected the operations of a number of companies and a number of countries as well. The supply chain interruption poses a risk for companies with the long-term impact, particularly in a highly globalized era in which companies tend to have long and complex chains. The poor preparedness of companies, with no alternative solutions has brought changes in business processes and supply chains worldwide. The ways the global crisis caused by COVID and the war in Ukraine impacted the supply chains and the business process modifications in domestic companies, will be demonstrated by two case studies: Defining the criteria for supplier selection on the national market and Comparative analysis of exporting the same product by a manufacturer in the automotive industry before and during the global crisis

Keywords: supply change management, suppliers, production companies

1. Introduction

The global pandemic caused by COVID 19, declared at the beginning of 2020, initiated significant changes in both society and business. In a very short period, market conditions and business models, as well as many other factors, with digitalization being the one that stood out the most and the one that has become increasingly important in modern business, drastically changed. Business organizations had to adjust rapidly to the newly emerging circumstances, so that they could adapt to the radical changes that were taking place. Once the pandemic was brought under control in February 2022, the ongoing conflicts between Russia and Ukraine began, which has additionally affected the operations of a number of companies and a number of countries. The

increased uncertainty on a global level forced both large and smaller companies to find alternative solutions in terms of trading partners and become even more aware of the significancy regarding the source of raw material, component and other production and service material stocks. It is evident that today's companies, through successful cooperations with suppliers and other actors in supply chains, can achieve certain benefits that often result in significant savings, which on the other hand is one of the goals every company strives to achieve. Supply chain interruption poses the risk that can have a long-term effect, particularly in a highly globalized era in which most companies have long and complex chains. The poor preparedness of companies, with no alternative solutions, has brought changes in business processes and supply chains

¹ Corresponding author: Zorica Lazic Email: <u>zorica.lazic@metropolitan.ac.rs</u>

worldwide. Closing borders led to the disruption in the structure of multinational companies, due to the fact that there were a number of problems during not only the production process, but also the supply chain and logistics. All these factors led to the collapse of the global economy and the establishment of predominantly national companies. Therefore, the supply chain in which the goods, processes and structures can easily be replaced needs to be foreseen as a response to changing condition (Zekhnini et al., 2020). These changing conditions and disruptions bear significant negative consequences on sales return, profit, share yield, brand image, recruitment in companies, customer safety and the total supply chain impact (Chowdhury et al., 2019; Silva et al., 2024; Elliott et al., 2019; Paul & Chowdhury, 2021).

This paper aims at reviewing the impacts of the global crisis caused by COVID 19 and the war in Ukraine on supply chains and business process modifications in domestic companies providing two case studies as examples: Defining the critiria for supplier selection on the national market and Comparative analysis of exporting the same product by a manufacturer in automotive industry before and during the global crisis.

The first study deals with the analysis of the delayed raw material delivery caused by the closure of borders due to the COVID 19 pandemic, which resulted in the failure to comply with the production deadlines and therefore with the deadlines for the delivery of a final product to its customer. All the above forced companies to seek raw material suppliers on the domestic market.

The second study deals with the analysis of the observed period from 2020 to 2022, in which the total business interruption occurred, followed by the reduced scope of business in the analyzed manufacturing company. For research purposes, the comparison of the reference unit export in 2022 and the export carried out in 2018 has been demonstrated.

2. Supply Chains

Supply chain management (SCM) has broadly been defined as the "systematic, strategic coordination of the traditional business functions and tactics across these business functions within a particular company and across businesses within the supply chain, for the purposes of improving the long-term performance of the individual companies and the supply chain as a whole" (Payán-Sánchez et al., 2021). Supply chain is an integrated system that starts from raw material or semi-finished goods, continues with the production, packaging, storing goods and their distribution, and finishes with the delivery of the final product to the end customer (Toygar & Yildirim, 2023). The relations within the chain are not limited only to manufacturers and suppliers. There are a number of various parties across the supply chain such as service and logistics providers, retails, insurance companies, customs brokers and customers (Toygar & Yildirim, 2023.).

Supply chains are the processes you use to deliver your product to customers. The chain encompasses everything, from obtaining the raw material necessary for your product manufacturing to its delivery to the customer (Ray, 2009.). A supply chain is the network of all the individuals, organizations, resources, activities and technology involved in the creation and sale of a product. A supply chain encompasses everything from the delivery of source materials from the supplier to the manufacturer to its eventual delivery to the end user.

The supply chain activities imply the transformation of natural resources, raw material and components into a final product and its delivery to the end user. Supply chain management is the essence of business since it is one of the important added values of trading companies, in which a product is transferred from its place of origin (Manufacturer) or other source (Supplier) to its place of consumption (Buyer).

2.1 Production Company Supply Chains

Supply chain is characterized by the flow of material and information within and between the business subjects including suppliers, manufacturers and buyers. The ultimate goal of supply chain management is to satisfy customer requirements in a more efficient manner. For a production company, the goal is to create the right product, for the right customer, in the right amount and at the right time (Wang et al., 2005). This requires carefully devised supply chains.

A manufacturer obtains raw material and components for final goods production from its suppliers. The material may be delivered directly to the factory or they may be handed to an external warehouse where they are consolidated and only then delivered to the factory. The material is processed in the factory, converted into a final product, and then packaged and eventually delivered to warehouses and distribution centers from which the goods are delivered to end users.

The supply chain concept refers to the flaw of material (Figure 1):

- from the source (supplier) to the warehouse, from the warehouse to the company (manufacturer); within the company, to the place it is needed; from the company-manufacturer (factory) to the distributor-trader; to the end user (customer);
- from the source (supplier) to the company (manufacturer); within the company to the place where it is needed; form the company-manufacturer (factory) to the end user (customer);
- from the source to the company (manufacturer); within the company to the place where it is needed; from the company-manufacturer (factory) to the end user (customer).



Figure 1. Possible material flow in supply chains

A typical production supply chain includes the following processes:

The inbound supply chain that includes: sources, incoming quality control, inbound transportation from the supplier to the production unit, import documentation / customs processes in case the material is imported, receipt of goods and their storage, the management of production raw material stocks; The production and internal processes that include: production planning, timetable and production, quality control process, inventory management during the work process, plant maintenance;

The outbound supply chain/distribution that includes: outbound transportation, final goods quality control, final goods storage in the company factory, external storages and distribution centers, packaging, problems with goods, final product inventory

management;

Customer service that includes: defining the level of services for customers, order management, return management, packaging, defining the distribution channels, product development;

Other supply management functions that include: backup logistics, supply chain exception management, outsourcing logistics (which is usually conducted at the company headquarters).

2.2. Supply Chain Participants – Suppliers

A supply chain additionally encompasses production and supply. Therefore, it has a significantly wider focus since it includes a number of businesses (including suppliers, manufacturers and traders) that work together in order to satisfy the user requirements for a product or a service.

According to (Hugos, 2018), there are four types of participants in every supply chain. They perform the activities that make the supply chain work and give the reason for its existence. These participants are: 1) producers; 2) distributors or wholesalers; 3) retailers; and 4) customers or consumers.

If we observe supply chains through their simplest form, we may say that it consists of a company, its suppliers and customers. By combining these actors (supplier, company, customer) we obtain a simple supply chain.

Companies today have become aware that successful cooperation with suppliers can lead to certain benefits that often result in significant savings, which is one of the goals that every company strives to achieve.

According to the definition (Akamp & Müller, 2013) supply relationship management (SRM) is the practice of planning, implementing, developing and monitoring the relationship of a company with both current and potential suppliers. The key supplier management activities are the selection and evaluation of suppliers, their monitoring, development and

integration.

According to Ray (2009.), supplier relationship management is the key factor that includes all the processes that refer to supply management such as supply planning and execution, source analytics, the selection of suppliers, monitoring their performance, the cooperation with suppliers and all other processes that enable analyzing, controlling and optimizing a source.

Suppliers are an integral part of every business, production in particular. The selection of suppliers is the process of finding the right supplier for business, which includes the steps taken for a supplier discovery, selection and cooperation with them. If we talk about a product quality or its success, the supplier selection is an essential part, since the process of selecting the right supplier is the crucial one.

There are many different types of criteria used for supplier selection. They include price, quality, service, delivery, reputation **etc.** Certain companies will use all these criteria, whereas some may focus only on one or two of them.

3. Case study

3.1. Defining the criteria for supplier selection on the national market

This part of the paper will demonstrate a case study that analyzes a company which, like most companies in Serbia, was not ready for the challenges in supply chain caused by the global pandemic. The analysis deals with the delay in the raw material delivery caused by the closure of borders due to the COVID 19 pandemic and the consequent inability to import the raw material, which led to a non-compliance with the deadlines to the final product delivery to its customers. All the above forced the company to seek a raw material supplier on the domestic market.

The case study analyzes the company that produces rubber technical goods, including

the production of semi-pneumatic wheels, rubber rollers, metal rims, plastic mass and silicon products, compression pressure, injection and die-cutting technologies. The accent is on the semi-pneumatic wheels for agricultural machinery. The company had imported the raw material from Slovenia and Austria until 2020, when the COVID 19 pandemic began, causing the closure of borders, which led to the production decline and the drop in the final product export to the foreign market in the following months, since the company exports more than 90% of the wheels to the foreign market (Germany, Russia, Austria, etc.).

The company values and selects its suppliers based on their ability to meet the requirements from the agreement/specification, including the requirements that refer to the quality management system, as well as any other specific quality requirement.

The Procurement Officer along with his or her team defines the criteria and the method of the evaluation and selection of suppliers that include the suppliers of raw material, material and components, as well as service providers – external providers, in order to create the "List of Verified Suppliers", with the goal to ensure adequate reliability with respect to harmonizing the procurement of material and goods or the contracted service with the agreement/specification requirements, including the requirements that refer to quality management system. The basic criteria for supplier rating are: quality control, certificate of analysis, supplier reliability, complaints and meeting the standard requirements. Each of these criteria is broken down into sub-criteria, i.e. levels, and each level is evaluated by the correspondent number of points. The company defines various evaluation criteria for:

- the suppliers of raw material and services that directly affect the product quality;
- the suppliers of hazardous material and other services (consulting, legal work, safety and health at work, laboratory tests, etc.);
- the suppliers of consumables.

At the end of the financial year, the Procurement – Sales Officer reviews individual deliveries according to suppliers and type of goods/services. Every supplier is awarded the appropriate number of points, according to all 5 evaluation criteria. The average annual rating for each supplier is obtained by adding up the number of points according to the defined criteria. The Procurement – Sales Officer defines the supplier status based on the determined criteria that can be (Figure 2):

A – approved supplier (> 70 points)

 $B-\mbox{temporarily}$ approved supplier (from 50 to 70 points)

C – unreliable supplier (below 50 points)



Figure 2. Supplier-Provider Rating Scheme

The team formed to find a solution to the circumstances that affected the company had to make a decision on which raw rubber supplier on the domestic market may provide the raw material of approximately the same quality as the one the company had imported until the moment when the level of raw rubber stocks fell below the permitted level. The team concluded that the method they had been using to evaluate the suppliers was not sufficient and, as a solution to the problem, they defined the checklist

(Table 1) with the criteria and sub-criteria for the selection of the domestic market suppliers. Then they also added the new procedure Defining procurement conditions and requirements to the Quality Regulations. Depending on the type of a product, service, raw material that is ordered as a new or a standard product, as well as on whether they are verified or unverified suppliers, in order to make the best decision, the Procurement Officer checks the supplier through the checklist presented below (Table 1).

Table 1.	Supplier	checklist
----------	----------	-----------

Criteria	Description of criteria	Check
1. Basic data about supplier company	Basic information about the supplier company through the chosen portal(http://www.infopoint.rs/usluga-checkpoint which monitors operations of buyers and suppliers in the country, provides insight into their credit rating and business rating and information on	
	blockages accounts, court cases, etc.)	
2. Certificates	1. Certificate ISO 9001:2015	
	2. Other certificates (ISO 14001:2015, ISO 45001:2018, etc.)	
3. Material quality	1. Possession of a certificate on the origin and quality of the material	
	2. Compliance with a query	
	3. Delivery of samples for control and testing quality	
4.Fulfillment of	In order to ensure the fulfillment of the contract obligations, from our suppliers or customers we may require several instruments:	
obligations defined	1. Authorized Promissory note	
through contract	2. Bank guarantee [*]	
	3. Other	
5 Price	Price quality ratio	
	Lowest price/quality on request	
5.11100	Market price/quality on request	
	High price/quality offered on request	
	1. Type and quantity	
	2. Applicable specifications, drawings, process requirements and other important technical characteristics	
6. Fulfillment of	3. Statement on the purpose of the goods and other necessary data	
company's	4. Flexibility and delivery deadlines	
requirements	5. Method of packaging and labeling	
	6. Method and place of delivery	
	7. Method of payment	
	8. Offer validity period	
7. Communication	1. Good service	
	2. Poor service	
8. References of the supplier	1. Business cooperation, clients	
Note:		

In order to maintain the quality level of its products, the company had the choose among three domestic raw rubber suppliers by means of the defined checklist and the conditions determined by the new procedure, as an additional method and with the aim of satisfying the raw material quality requirements, as well as the product quality, so as to satisfy the needs of very demanding customers.

Part of the procedure Defining the conditions and procurement requirements is given below:

Defining the conditions and procurement requirements

1.0 SUBJECT

1.1 The procedure defines the activities to be carried out when contracting the procurement of a product through the requirements concerning the procurement general conditions, product specification and its quality.

2.0 APPLICATION SCOPE

2.1 The procedure is to be applied with the goal to regulate the relationship between the Company and the equipment, material, product, or service supplier as well as with the companies providing external services from the aspect of procurement and quality general conditions.

3.0 LINK TO DOCUMENTS

3.1 ISO 9001:2015: article 8.4 – The control of externally provided processes, products, and services

ISO 14001:2015: article 8.1- Operational planning and control

3.2 Rules of quality management system procedure

3.3. Procedure: evaluation and supplier selection

3.4. Procedure: Procurement

4.0 PROCEDURE

4.1 Defining the Company general procurement terms and conditions

General procurement terms and conditions define and consolidate all mutual rights and

obligations of both the supplier and the company in terms of quality, procurement, logistics and all other relevant processes necessary for the general procurement conditions fulfilment.

The general procurement terms and conditions specified in the document (General Terms and Conditions for Purchase of Products, Services and Raw Material) include:

- Introductory provisions (Ethical norms)
- Product or service procurement
- Offers
- Delivery responsibilities
- Insurance
- Pricing and payment

• Delivery, delivery deadlines and contractual penalty

- Guarantees
- Statements
 - Commitment
- Confidentiality

• Quality (product quality requirements, certification, sample delivery, quality control)

- Specific provisions for suppliers performing processing operations
- Logistics requirements
- Contract duration and the breach
- Force majeure
- Laws and jurisdiction

4.2 Defining Company requirements

Depending on the type of a product, service or raw material being ordered as a new or a standard product, as well as on whether it is a verified or an unverified supplier, Procurement Officer sends an inquiry to the supplier which includes the following requirement:

• name, type, catalogue number or other product identification,

• product characteristics when purchasing a product upon request,

• product label when purchasing a product according to its catalogue label for an approved supplier,

• regulations and standard that a product must fulfil,

• product quantity,

• necessary permits, required certificates and product declarations,

• required warranties and service (if applicable),

• deadlines, dynamics, and place of delivery,

• *method and place of product verification and validation,*

• *method of use, operation, and storage conditions,*

• SDS (safety data sheet), when purchasing hazardous substances within a product,

• *REACH* (the EU regulation on the registration, evaluation, authorisation, and restriction of chemicals),

• *RoHS* (hazardous substances restriction certificate),

• Price and payment method, etc.

4.3 Defining Quality requirements

Depending on the type of a product and raw material that is being ordered by means of inquiry, the requirements regarding quality are also defined and they include the following:

• product safety certificate,

• product quality typical certificate,

• confirmation that the products are a well-known brand,

• conducting product testing:

-quality requirements according to the standard

-quality control description (e.g. pretreatment, surface protection quality requirements)

-technologies

-package

• confirmed references and recommendations with/from reputable companies.

• process performance evaluation that may include, depending on the product type and process:

-evaluation of equipment being used in supplier's processes,

-evaluation of personnel structure for key roles important for realization of products being ordered,

-evaluation of method used for the process management – appointing the owners of process, procedure, technology, planning, monitoring, etc,

• evaluation of supplier reliability that may include, depending on a product:

-certificate of possessing an effective QMS, -proof of organization solvency (liquidity)

4.3.1 Quality

Supplier guarantees the quality of ordered goods. Supplier also guarantees that all delivered goods and their parts are authentic and is obliged to deliver the ordered goods in accordance with the contract and all accompanying documentation (especially with drawings and the goods technical description), but also in harmony with the international, national, and technical standards.

The goods must possess typical characteristics as well as the characteristics that the parties have agreed upon, and must comply with the standard product characteristics of a supplier. In case the supplier is familiar with the purpose for which the customer will use the goods, the goods must also possess the characteristics for the appropriate application.

The supplier is not allowed to make any changes to the goods, i.e. product without a prior written consent by the customer. The supplier must possess an established system that recognizes a non-compliant product, i.e. goods which implies that the products or goods that do not fulfil the quality requirements set by the customer, shall not be delivered to the customer. The supplier must also possess an established system for document management that implies enabling the usage of the latest valid technical specification of the customer.

The supplier must ensure that its employees are aware of their responsibility for the quality and compliance of goods, i.e. services.

The company may, with the prior notice, carry out an inspection and evaluation, in order to confirm whether all technical documentation conditions have been provided. In case certain irregularities have been detected which ultimately, after the customer's warning, have not been resolved, the customer is entitled to withdraw from the contract.

For the purpose of quality assurance, the supplier must maintain the raw material to product traceability system.

4.3.2 Certification

The company does not require but does recommend possessing ISO 9001 certificate. The exceptions are allowed for packaging material (palettes, boxes, bags, and other material that are not included in the final product). The raw material suppliers that do not possess ISO 9001 standards may possibly be subject to an audit by a technical person of the Company.

The Procurement Officer and Quality System Manager are responsible for the decision on the audit. The suppliers are obliged to deliver valid certificates to the Quality System Manager, who is obliged to keep the record of certificates and confirm their validity.

4.3.3 Sample delivery

For the purpose of sample verification, the supplier is obliged to itself carry out the delivery of samples at its own expense. Based on the delivered samples reviewed by the Quality Controller, the Procurement Officer informs the suppliers about the decision whether the samples have been approved or not, and, if approved, to treat them as reference samples for quality control purposes.

The supplier, with the samples, also delivers all necessary technical sheets, safety sheets and other documentation required by either legal regulations or the Company, in a reasonable number of copies, as well as the product quality evidence, its origin, attests or other necessary documentation in accordance with the nature of the procurement subject and specific procurement conditions.

For all the samples ordered by the Company, the supplier is obliged to deliver ahead of time the customs tariff numbers for the purpose of the raw material customs status check.

Regardless of all other provisions, the supplier guarantees the quality of the product.

3.2. Comparative analysis of exporting the same product by a manufacturer in automotive industry before and during the global crisis

The case study relates to a micro-enterprise in the automotive industry field, or more precisely to a manufacturer of special purpose trailers and semi-trailers. The company is a micro-enterprise with up to 10 employees and an annual turnover lower than 2 million euros. It manufactures two types of special units intended for on-road and off-road driving. The company carries out the production operations outside the EU zone not taking the advantage of the possibilities, i.e. benefits of an exporting (VAT refund). company nor the opportunities of working in a duty-free zone (the opportunity of temporary import and refinement).

The observed period relates to the period from 2020 to 2022. Within that period, there was even a total interruption of the company operations in a certain number of months, followed by the reduced scope of business operations. For research purposes, the comparison of the reference unit export in 2022 and the export carried out in 2018 has been demonstrated. The comparison significance lies in the following:

- It is the same product type/variation/version;
- In both cases the destination EU country was the same, with the same central place of unloading;
- In both cases the buyer, i.e. end user was the same;
- In both cases the services of the same transport company were used for the transportation to the country/destination.

The importance of the study lies in the fact that the homologation requirements (ECE regulations) do not allow the replacement of one component with another unless it has priorly been defined in homologation documentation (the so-called alternative components). Or in other words, only the goods that have been pre-defined or approved can be purchased or acquired. Otherwise, additional tests, which require both time and costs, need tot be carried out.

The company defined the following four categories: chassis, superstructure (extension), light and signalization and functional equipment. The following elements were defined as the critcal purchase elements: brake axle, traction control device, wheels, led light signalization.

However, the observed comparison has certain limitations:

• In the supply chain, only the road transportation was observed as the only form of transportation the company carries out within EU;

- The critical elements like the brake axle was on stock and for the comparison purposes the first offer by the supplier was included;
- For the comparison financial aspect purposes, the cut-off was made after the critical elements had been received and customs-cleared (control device, wheels) and it did not include the subsequent leveling of element or service prices by a manufacturer or a supplier.

The company could not avoid the supply chain disruptions as the consequence of the global crises caused by COVID 19 and the military conflict in Ukraine. The observed product unit that was taken as a reference due to the relativity of the comparison with the period prior to 2020 contains 32% of the components that were obtained from abroad either by direct import or by import through other suppliers. For the purpose of exporting to the EU countries, all components were obtained from 8 EU countries.



Figure 3. Comparison of the supply chain under normal conditions and during a crisis

The comparison (Figure 3) of the two abovementioned export cases emphasizes the following facts:

• At the moment when the cut-off was made, the total increase in the product element purchase prices

was 36% as compared to the prices before the global crises, i.e. before February 2020;

• The global crisis caused the crucial element delivery time upon purchase to be extended by 4 weeks

on average. In the case of the control device, the manufacturer was not able to define the delivery date;

- The unavailability of the elements at the manufacturer caused the creation of alternative supply channels, focusing on sales agents or more precisely dealers. However, the total transport of product elements and key elements from EU did not increase by more than 10%, counting the price per km or square meter;
- When the purchase was made on the domestic market, the deferred payment terms were either canceled or reduced due to the new circumstances;
- Given the workshop good positioning in terms of transport conditions and the allocation of human and material resource, the workshop level of equipment in the domain of tools and micro-climatic conditions, as well as the proximity of the service providers, there were no significant increases in labor and service costs, nor the disruption in production and service the realization;
- The increase in the fuel prices caused by the leveling of prices at a global level led to the increase in operating costs;
- There was an increase in the bulk transport price (including the transport insurance) by 212%.

4. Conclusion

The global crisis caused by COVID 19 and the war in Ukraine has transformed the whole world. All over the world, companies faced huge business losses. The change in market conditions caused by the global crisis forced many companies to transform their operations. Production companies encounter a number of challenges due to supply chain disruption on a global level, therefore many companies had to modify their operations on the domestic market and seek suppliers in their own countries. This paper and the conducted case studies aim at answering the question of how domestic manufacturing companies have responded to the current global crisis and the disruptions in supply chains they came across.

The significance of the first case study lies in the discovery that companies similar to the analyzed one need to have alternative solutions regarding the raw material procurement, and they should not be limited only to their global suppliers, but should instead foster the cooperation with the local market suppliers as well, thus avoiding the challenges arising from unpredictable circumstances, the import suspension caused by the global pandemic being one of them.

The second study leads us to the conclusion that following business strategy changes need to be carried out: to replace "delivered at place" (DAP) by "ex-works" strategy so that the production could meet the given deadlines, to reorganize the assembly process in accordance with new conditions, i.e. new procurement period, to reduce the number of elements within functional equipment with the aim to harmonize new retail price with the market demands, to improve the superstructure modularity in order to increase the sales offer, to carry out the additional selection of alternative components, principally in the critical element domain, with the goal to absorb the potential negative trends and changes in supply chains.

The analyzed studies make us conclude that the companies succeeded in adjusting their supply chains to the modified operation conditions caused by the global crisis. There were no significant differences among companies in terms of the supply chain disruptions, and the experience forced them to redisign their supply chains, which even resulted in the modifications regarding the supplier selection processes, procurement and production processes, and company strategies.

Based on the experience of the analyzed companies, the research findings may be practically used and implemented by managers, procurement and logistics officers to identify and develop efficient supply chain management measures during unpredictable circumstances. Further studies may aim at identifying efficient solutions for supply chain risk management.

References:

- Akamp, M., & Müller, M. (2013). Supplier management in developing countries. Journal of Cleaner Production, 56, 54-62. https://doi.org/10.1016/j.jclepro.2011.11.069
- Chowdhury, P., Lau, K. H., & Pittayachawan, S. (2019). Operational supply risk mitigation of SME and its impact on operational performance: A social capital perspective. *International Journal of Operations & Production Management*, 39(4), 478-502.
- Elliott, R., Thomas, C., & Muhammad, K. (2019). *BCI Supply Chain Resilience Report*. Business Continuity Institute, London.
- Hugos, M. H. (2018). Essentials of supply chain management. John Wiley & Sons. ISBN 9781119461104
- Paul, S. K., & Chowdhury, P. (2021). A production recovery plan in manufacturing supply chains for a high-demand item during COVID-19. *International Journal of Physical Distribution & Logistics Management*, 51(2), 104-125.
- Payán-Sánchez, B., Labella-Fernández, A., & Serrano-Arcos, M. M. (2021). Modern age of sustainability: Supply chain resource management. In *Sustainable Resource Management* (pp. 75-98). Elsevier.
- Ray, R. (2009). Supply chain management for retailing. Tata McGraw Hill Education.
- Silva, K. O. A. N., Lima, R. S., & Alves, R. (2024). The Impacts of the Pandemic on Urban Freight Deliveries: a Case Study in a Brazilian Carrier. *International Journal of Simulation Modelling (IJSIMM)*, 23(1), 65-76.
- Toygar, A., & Yildirim, U. (2023). Examining the effects of the Russia-Ukraine conflict on global supply chains. In *Handbook of Research on War Policies, Strategies, and Cyber Wars* (pp. 184-199). IGI Global.
- Wang, G., Huang, S. H., & Dismukes, J. P. (2005). Manufacturing supply chain design and evaluation. *The International Journal of Advanced Manufacturing Technology*, 25, 93-100.
- Zekhnini, K., Cherrafi, A., Bouhaddou, I., Benghabrit, Y., & Garza-Reyes, J. A. (2020). Supply chain management 4.0: A literature review and research framework. *Benchmarking: An International Journal*, 28(2), 465-501.

Zorica Lazic	Milica Grujic	Vladimir Skoric
Metropolitan University,	Faculty of Organizational	Metropolitan University,
Belgrade,	Sciences,	Belgrade,
Serbia	Belgrade,	Serbia
zorica.lazic@metropolitan.ac.rs	Serbia	vladimir.skoric@metropolitan.ac.rs
ORCID 0000-0002-5366-0227	milicagrujic991@gmail.com	ORCID 0009-0000-8162-1340
	ORCID 0009-0003-3045-1275	