UNION OF ENGINEERS AND TEXTILE TECHNICIANS OF SERBIA

VII INTERNATIONAL SCIENTIFIC CONFERENCE

CONTEMPORARY TRENDS AND INNOVATIONS IN THE TEXTILE INDUSTRY

VII MEĐUNARODNA NAUČNA KONFERENCIJA

SAVREMENI TRENDOVI I INOVACIJE U TEKSTILNOJ INDUSTRIJI

PROCEEDINGS

EDITOR:
Prof. dr SNEŽANA UROŠEVIĆ

Belgrade, 19-20th September, 2024
Union of Engineers and Technicians of Serbia
Dom inženjera „Nikola Tesla“

SNEŽANA UROŠEVIĆ
IN THE TEXTILE INDUSTRY

UNION OF ENGINEERS AND TEXTILE TECHNICIANS OF SERBIA

AND

UNION OF ENGINEERS AND TECHNICIANS OF SERBIA
FACULTY OF TECHNOLOGY AND METALLURGY IN BELGRADE
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PREFACE

The 7 th International conference "Contemporary Trends and Innovations in the Textile Industry" CT&ITI 2024, is co-organized by:

- Union of Engineers and Textile Technicians of Serbia,
- Union of Engineers and Technicians of Serbia,
- Faculty of Technology and Metallurgy in Belgrade, University of Belgrade, Serbia,
- Faculty of Technology, "Goce Delchev" University, Shtip, North Macedonia,
- Faculty of Mechaical Engineering, Polytechnic University of Tirana, Albania,
- Society for Robotics of Bosnia and Herzegovina and
- Balkan Society of Textile Engineering-BASTE of Greece.

The Ministry of Science, Technological Development and Innovation of the Republic of Serbia recognized the importance of this Conference, and thus, supported it.

The aim of this Conference is to consider current technical, technological, economic, ecological, R&D, legal and other issues related to the textile industry, then the application of contemporary achievements and the introduction of technical and technological innovations in the production process of fiber, textile, clothing and technical textile by applying scientific solutions in order to improve the business and increase the competitive advantages of the textile industry on the domestic and global market.

Leading scientists and experts from the Balkans and other countries, working at faculties, textile colleges and institutes, but also individuals who professionally deal with the issues at hand are taking part in this Conference.

The Conference program involves papers dedicated to the scientific and practical aspects of the following topics: Textile and Textile Technology, Textile Design, Management and Marketing in the Textile Industry and Ecology and Sustainable Development in the Textile Industry. The Conference program includes 66 papers, and a total of 158 participants from 17 countries: Albania, Australia, Bosnia and Herzegovina, Bulgaria, Croatia, Germany, Greece, India, North of Macedonia, Montenegro, Portugal, Romania, Serbia, Slovenia, Spain, Turkey and Ukraine.

Therefore, this Conference is an opportunity for establishing scientific, educational and economic cooperation of our country with other countries. Certain number of papers by domestic authors present the project results dealing with fundamental research and technological development, financed by the Ministry of Ministry of Science, Technological Development and Innovation of the Republic of Serbia.

I would like to thank all those who have made it possible to organize the conference Contemporary Trends and Innovations in the Textile Industry and make it a success. First, I would like to thank the Scientific and Organizing Committee for working hard, spending countless hours and finding the best solutions for numerous organizational aspects of our Conference. I also thank all the other institutions that supported the Conference in various ways, because without their support, the Conference could not have been organized. Last but not least, I would like to thank plenary lecturers, all authors and co-authors and guests for their participation in the Conference.

On behalf of the Organizing Committee

Prof. dr Snežana Urošević, president

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SUPPLY CHAINS AND LOGISTICS OF TRANSPORT IN SME TEXTILE AND CLOTHING INDUSTRY

Review scientific paper
DOI: 10.5937/CT_ITI24051D

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ABSTRACT: *Today, in times of general globalization of business, efficient business optimization measures are necessary, as well as innovative ways of organizing supply chains and transport systems, which are based on the exploitation of invariant and adaptable possibilities, i.e. on the efficient exploitation of information system flexibile modules, with a high degree of automation of all activities and comprehensive implementation of ICT. By the way, one of the most important links in the process of business or production supply chains for companies in the textile and clothing industry is the transport of materials and goods, which with its adequate technological or organizational solutions enables cost reduction and increase in productivity and business efficiency, thereby strengthening the competitiveness of the company. These are precisely the elements of innovative logistics of transport systems that, as key components in the supply chain organize, regulate and monitor the process of transport (goods and materials) and adequate storage, but also optimize the control of process stocks, finished products and raw materials, with minimal costs and acceptable impact on the environment, which enables an increase in the effectiveness and economic efficiency of all technical and organizational systems. Based on the current global state of the clothing industry, as well as trends in business, the future development of supply chains and logistics of transport (of all kinds) can be anticipated as a diffusion spillover in the field of artificial intelligence and virtual show or quantum computing, with self-regulation and taking appropriate actions, with a direct prediction of anomalies in logistics costs and performance, as well as in the needs of artificial intelligence and automation of some parts or complete areas of business processes, whereby as a result, the obvious need for quantitative-qualitative strengthening and increasing the capabilities of human resources will be imposed.*

Keywords: *supply chains, logistic of transport, digitization logistics of transport.*

LANCI SNABDEVANJA I LOGISTIKA TRANSPORTA U MSP TEKSTILNE I ODEVNE INDUSTRIJE

APSTRAKT: *Danas su, u vremenima opšte globalizacije poslovanja, neophodne efikasne mere optimizacije poslovanja, kao i inovativni načini organizacije lanaca snabdevanja i sistema transporta, koji se baziraju na eksploataciji invarijantnih i adaptibilnih mogućnosti, odnosno na efikasnoj eksploataciji modula informacionih sistema, sa visokim stepenom automatizacije svih aktivnosti i sveobuhvatnom implementacijom IKT. Inače, jedna od najvažnijih karika u procesu poslovnih ili proizvodnih lanaca snabdevanja preduzeća tekstilne i odevne industrije predstavlja transport materijala i roba, koji svojim adekvatnim tehnološkim ili organizacionim rešenjima omogućava smanjenje troškova i povećanje produktivnosti i efikasnosti poslovanja, čime jača konkurentnost preduzeća. Upravo to su elementi inovativnih sistema logistike transporta koji, kao ključne komponente u lancu snabdevanja, organizuju, regulišu i nadziru proces prevoza (robe i materijala) i adekvatnog skladištenja, ali i optimizuju kontrolu procesnih zaliha, gotovih proizvoda i sirovina, uz minimalne troškove i prihvatljiv uticaj na okruženje, čime se omogućuje povećanje efektivnosti i ekonomske efikasnosti svih tehničkih i organizacijskih sistema. Na osnovu trenutnog globalng stanja industrije odeće, kao i trendova u poslovanju, budući razvoj lanaca snabdevanja i logistike transporta (svih vrsta), može se anticipirati kao difuziono rasipanje u oblasti veštačke inteligencije i virtuelnih prikaza ili kvantnog računarstva, uz samoregulisanje i preduzimanje odgovarajućih radnji, sa direktnim predviđanjem anomalija u logističkim troškovima i performansama, kao i u potrebama veštačke inteligencije i automatizacije nekih delova ili kompletnih oblasti poslovnih procesa, pri čemu će se kao rezultat nametati očigledna potreba kvantitativno-kvalitativnog jačanja i povećanja sposobnosti ljudskih resursa.*

Ključne reči: *lanci snabdevanja, logistika transporta, digitaliyacija logistike transporta*.

1. INTRODUCTION

Globalization processes are radically changing the position of companies on the market, by imposing accelerated work and continuous reduction of costs, i.e. requirements to create conditions for sustainable competitiveness by increasing productivity and business efficiency, whereby the way out of such a situation is sought in various innovative content and adequate technological solutions, of course with reengineering and optimization of business processes, through mass implementation of ICT and adequate information systems. It is obvious that new ways of doing business impose a need for business systems that have a high degree of automation of all activities, starting from planning and design to production and sales, which requires innovative solutions and the implementation of new technologies in such processes, which are otherwise based on flexible automation and efficient implementation of adequate information systems – IS [1].

As each functional unit of the organization has its own IS, the IS of companies can be divided according to functional areas. Business systems, which otherwise represent a special group of information systems with an original organizational structure and the task of collecting and processing data and connecting management and executive functions, as well as the goal of generating and transforming information - data into IT products for end users, consist of several subsystems, i.e. from several so-called of separate systems with the possibility of different functioning (internal logistics management, material management, planning of production and business operations, etc.), complement each other and represent a whole, in which integration into one multi-level system is possible, useful and necessary. On the other hand, it is known that business processes represent a series of logically connected activities in a certain time and space, which are necessary in order to complete a business transaction, achieve a business result or realize value for the customer, whereby each business process (production, technological, processing) has its own information system with information about users within the business system or other subjects in its environment, as well as the so-called service or support systems, which should contribute to harmonious and optimal functioning (Enterprise Resource Planning - ERP, Supply Chain Management - SCM, Marketing Systems, Decision Support Systems - DSS, etc.) [4].

Today, as one of the most common problems of inefficient work of SMEs in the textile and clothing industry, the elements of business organization are highlighted, which are otherwise explicitly connected with constant demands for continuous changes in production programs, as well as with changes and improvements in process tools and implemented IS, which can be divided on several relatively independent, but interconnected subsystems of certain functions of business processes (planning, supply, production, sales, finance, investments, human resources, research and development), and they are different due to the specificity of each company, they are included in innovative models of electronic business (which enables the connection of internal and external processes of the company, but also the implementation of processes with suppliers and business partners in a more efficient way, while reducing total costs and achieving a significant competitive advantage) [2]. It should be pointed out that, in contrast to previous criticisms addressed to the management or owners of SMEs in the textile and clothing industry, due to the slow, inadequate and insufficient implementation of information systems in production processes (CAD-CAM), which to the greatest extent depended precisely on them themselves (of course not forgetting the bad and inadequate marketing of such systems, as well as high prices, insufficient supply and lack of experts), in cases of implementation of the so-called business and service information systems, criticism is absent for the reason that the whole process depends primarily on the state and its involvement in the creation of the so-called favorable economic environment and business milieu, i.e. directly from the level of generating the basis for such a way of doing business by creating infrastructure through the parameters of a strong and high-quality Internet, internal and external networking, harmonization with global systems, etc., or harmonizing the functioning of the state administration with such a way of doing business. The needs of expert knowledge of new ways of organizing business, with various innovative ways of working of certain necessary parts of the overall system, are the cause of research and

explanation of one of the most important constituent elements of the modern way of doing business - of explanation the elements of new ways of organizing supply chains, with special reference to the elements of transport and transport logistics , with efficient exploitation of the invariant possibilities of ICT technologies and systems and compatible Just In Time and Quick Respone System ways of doing business.

2. SUPPLY CHAIN MANAGEMENT

Considering the current situation and the possibilities of economic development, it can be said that in times of global economic and especially energy crisis, with a decrease in production and a drastic increase in the prices of energy sources, otherwise universally necessary elements of efficient and successful economic growth and development , and especially in the transportation phase (goods and materials), it is obvious that the policy of optimal and sustainable business must insist on cost reduction, and then on reengineering and optimization of business, with special reference to efficient optimization of the supply phase. Therefore, it is clearly necessary to specifically investigate the possibilities of modern, adequate, adaptable and efficient information systems for the organization and management of the supply phase in production, or in general in business processes [2]. Effective optimization of the supply phase is closely related to the effective implementation of ICT technologies, observed through the software support of supply chains and class of systems such as: ERP - enterprise resource planning systems, CRM - customer relationship management systems, WMS - warehouse management systems, TMS - transport management systems, APS - applications used to forecast future production and required supplies, SRM - supplier relationship management systems [12]. For example, by uniting a large number of adequate applications under one interface, modern ERP information systems automate and integrate the information systems of individual parts of the so-called integrated business - production, procurement, distribution, planning, marketing, etc., while the company by introducing an ERP system, which constantly adapts and changes in accordance with changes in the market and in accordance with changes in the needs of consumers and suppliers, as well as its customization, standardization and by implementing additional modules (CRM, SCM, etc.), they generate a good business environment for their business [3].

As the success of business systems is generally based on the ability to manage the flow of materials, information and money, solving and overcoming this problem is possible with a high-quality and efficient organization of supply chain management, from where it originates, that is, it can be said that with ERP and CRM, as well as marketing information systems, one of the most important business information systems for quality and efficient business - Supply Chain Management system - a system that through its activities essentially represents integrated planning and management of the flow of goods, services, information and money, and aims to achieve efficient and effective coordination of participants in the procurement, production and sales processes. SCM systems rely heavily on the application of innovative electronic business technologies in order to achieve efficient and successful optimization of production, logistics, distribution, as well as the reduction of costs related to these activities, because traditional approaches cannot respond

to the requirements of modern business and enable complex management of e-supply chains [5, 11]. It can be said that thanks to the Internet and other achievements of information technology, the concept of supply chain management has changed, so today modern, so-called the e-procurement system is based on the concept of information, that is, on the idea of sharing and exchanging information between the most important participants (customers, suppliers, contractors, consultants, etc.) in the production-business chain, along with logistics and payment systems (Figure No. 1), while it should be emphasized that the supply information system - SCM must include the flow of materials, products, services and information from the initial - supplier to the final exponent - user - customer in the business chain, which requires precise and timely coordination between different participants (manufacturers, suppliers, distributors , carriers and sellers), with the ultimate goal of delivering the right product, to the right place, at the right time, under the right conditions and at the right price. That's why such chains, as basic processes within themselves, must contain customer and supplier relations management processes, procurement processes and production management processes, as well as physical product distribution processes - transport and warehouse management processes, and therefore, as the most developed concepts of SCM, they can highlight: quick response - QR, inventory management by seller -VMI and supplier -SMI, continuous replenishment of inventory - CRP, efficient response to the consumer - ECR, etc. [8].

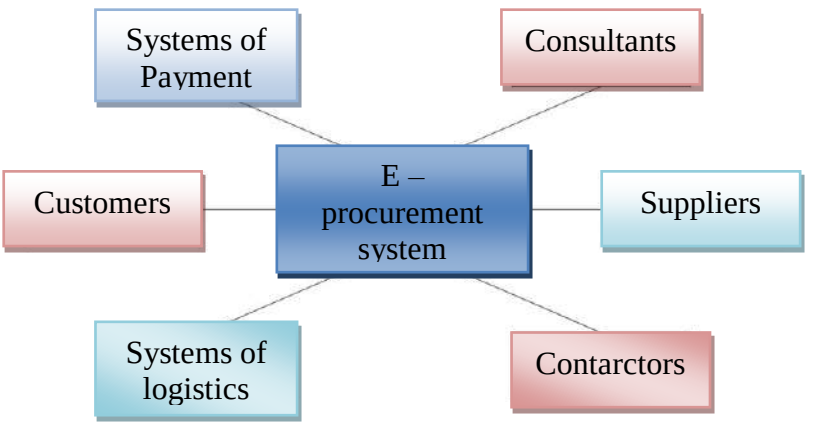

Figure 1: Structure of the e-procurement system [6]

As supply chain management can be interpreted as the handling of the entire production process of goods or services - starting from raw components to the delivery of the final product, it follows that companies should create networks of suppliers that drive the entire process of product movement, from suppliers of raw materials and information systems of the organization to marketing and sales, which would specifically deal with leads or end consumers, whereby the E-supply chain must ensure: integration and connection of partners on a strategic and operational level, a framework for well-defined chain strategy, visibility of information along the chain, higher speed, lower price and better quality of

services for end users. Therefore, it is necessary to correctly select and generate the most important components of the supply chain management system, such as: planning (the total resources necessary to satisfy customer demand for the company's product or service), sourcing (selection of suppliers who will provide the goods and services needed to create the product), manufacturing (as an organizer of activities required for acceptance of raw materials, direct production of products, quality testing, packaging for shipment and delivery schedule); shipping and logistics (for coordinating customer orders, scheduling deliveries, dispatching loads, etc.), etc. [7]. In addition to the above, it is necessary to highlight the connectivity component, as one of the key features of efficient supply chain management, i.e. the ability to access unstructured data from social media, structured data from the Internet and more traditional data sets available through traditional tools for ERP and B2B (busines to business) integration. Finally, as some of the key characteristics, the factor of cooperation with suppliers, using digitalization and commercial networks based on the cloud, as well as cognitive self-improvement through automation, unification, coordination and implementation of decisions and actions, but also the necessary protection, i.e. the necessity of existence cyber protection, as well as analytical comprehensiveness.

Otherwise, practice data directly show that the supply chain is the best indicator of the quality of business and the company in general, because good and efficient management of the supply chain, as well as analytical skills, indicate minimized business costs (time, material and quantitative and qualitative aspects of human resources), so therefore, on long-term sustainability and business reputation. The evolution of supply chain management is evident in the basic elements of business, because the previous focuses were on the availability, movement and price of physical assets, while today's focuses relate to the management of data, products or services, thus affecting the quality of products and services, delivery, costs, user experience, and even the profitability of the business itself. As modern supply chains take advantage of the vast amount of data generated by the processes of the chains themselves, analysts or future leaders in supply chains, as well as ERP systems, are likely to focus on their optimization and real-time analysis.

As a special segment in the supply chain, the so-called order management, which starts when the customer orders and ends when he receives the ordered product, thus enabling the company to actively participate and coordinate the entire process, from sending and confirming the order, through generating invoices, packaging and shipping, to inventory management, with a special with reference to transport processes and transport logistics systems. Digital order lifecycle management or Order Management System - OMS tracks all information and processes, including order entry, inventory management and fulfillment and after-sales service, thus providing transparent visibility (both to the company and the customer) in near real time. It is obvious that order management is closely and directly correlated with every part of the system and process in the supply chain, so modern global companies increasingly do not have an order management sector within their organization, but include other partners (parts and components suppliers, implementation of assembly services and packaging, distribution centers, etc.).

In each, and especially in digital ways of managing supply chains, as one of the most important components of the efficiency of the system of such chains, supply chain analytics should be singled out, which otherwise represents a real possibility of making data-based decisions based on a summary of relevant and reliable data, with the frequent use of visualization in in the form of charts, diagrams and other means, which can be descriptive, predictive, prescriptive or cogitive. Supply chain analytics can help businesses reduce costs, better understand risks, increase planning accuracy, etc., and based on that, make smarter, faster and more efficient decisions, which are important for business success, as well as minimize risks, demonstrate competitiveness and strengthen sustainability. It should be noted that supply chain analytics, with its characteristics such as connectivity, collaboration, comprehensiveness, speed and automation, while strengthening defense systems against cyber intrusions and hacks, represents a good basis for the application of cognitive technologies, such as artificial intelligence, which represents introduction to the new era of supply chain optimization [8, 9]. Significant changes and evolution of analytics can be seen in data previously limited mainly to statistical analysis and measurable performance indicators for planning and forecasting demand, whereby data obtained from various participants in the supply chain were stored in tables, in order to adopt systems in a later period electronic data exchange - EDI or enterprise resource planning systems - ERP, which enabled easier access to data and more precise and high-quality analysis. Successful global as well as local business, with new demands on manufacturers and customers, leads to a situation where supply chain analytics is becoming more and more complicated, which requires the development of various types of performance optimization software, where further development and deeper knowledge of supply chain networks directs towards the implementation of business intelligence and predictive analytical software solutions, all with the aim of better and more efficient analyzes of structured and unstructured data in real time, as well as proactive event predictions [8, 9, 11].

It should be pointed out that one of the major problems of digitization and global e-business is the various technologies that these companies implement internally, which can be solved by optimization and adequate B2B tools, which otherwise represent the automation of business processes and communications between two or more organization and enable companies to be more agile and capable of efficient business. The concept of adaptable B2B networks, which connect: supply, planning, production, distribution, retail and logistics, provides the possibility to ensure the visibility and availability of information in real time with the help of information technologies, and the operations of several connected companies can quickly and efficiently adapt to environmental conditions, without jeopardizing operational and financial efficiency. That is why the optimization of supply chains, and for the purpose of improving efficiency and performance in the supply network, implies the effective implementation and exploitation of adequate technologies and resources, such as Artificial Intelligence - AI, sensor technology - Internet of Things - IoT, or decentralized databases - blockchain.

By the way, the optimization of supply chains had to evolve and change its identity in a very short period of time, because today the principles of global manufacturers, trade and networks, with maximum time requirements, so from the phase of focusing on investments in the design phase, moved to supply phase with real-time responses [9, 11]. In addition, it

is an obvious fact that today are the times of major global crises and uncertainty in business, which directs the flow of efficient optimization of supply chains towards the efficient exploitation of modern technologies and innovations and the business of superior exception management, and for the sake of better visibility in supply chains and decision-making in real time, which of course ultimately enables survival and sustainable competitiveness. Observing and analyzing all information systems in the chain of efficient operations of a company, where information flows and money flows are constantly intertwined, it can be observed that procurement information systems - SCM, with all its accompanying elements (strategic, logistic, planning, ...) and connections, occupy a central position (Figure 2).

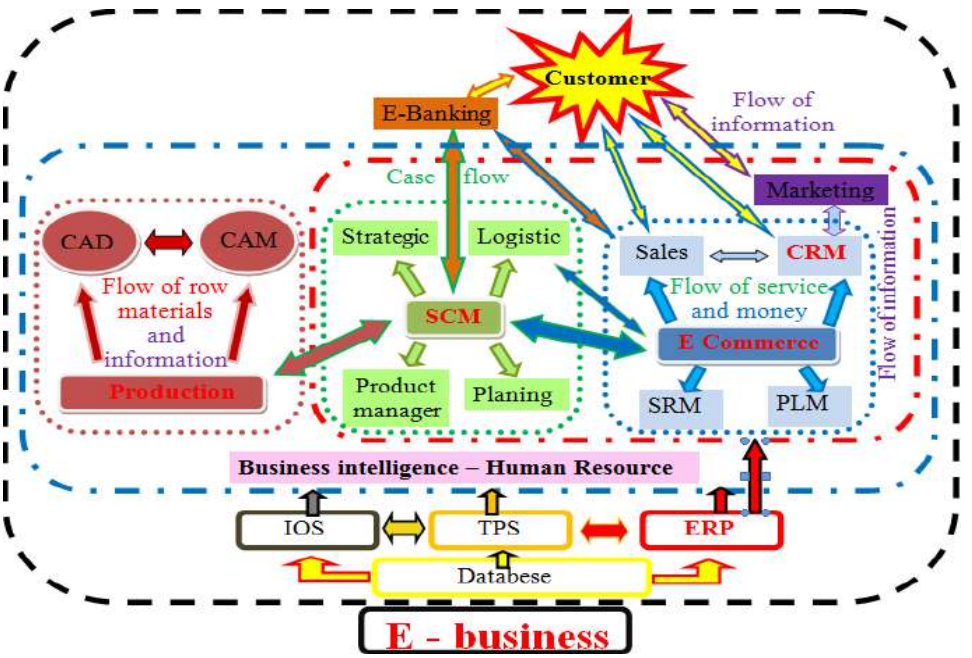

Figure 2:Information systems of e-business [1]

The central position of the procurement system also indicates the necessary coherent role, as well as the necessary compatibility of all business, production or service information systems in the processes of the so-called. e-business. Of course, the cohesion of procurement information systems with the production part (CAD and CAM systems), on the one hand, indicates the necessity of the practical realization of separate procurement and transport systems, known in practice as internal procurement and transport, while on the other hand, it indicates the connection with the elements of sales and trade (CRM, PLM, marketing and other systems), which shows the existence of the so-called external procurement and transport, where it should be emphasized that the effective

implementation of such systems in companies is a prerequisite for modern, efficient and successful business (Figure 2).

3. LOGISTICS OF TRANSPORT - AN IMPORTANT ELEMENT OF THE SUPPLY CHAIN IN SME TEXTILE AND APPAREL INDUSTRY

Just as in the part of information business systems, necessary for successful and efficient operations, procurement and marketing systems are singled out, so in the analysis of procurement systems, as the most important elements, i.e. the most important sub-processes and systems, logistics systems are singled out and as subsystems - logistics of transport. Logistics, because it represents a system that ensures the smooth functioning of the supply chain, and logistics of transport, because it monitors and optimizes the organization of the transportation process and adequate storage, but also regulates the routes by which goods are transported and ultimately represents the backbone, that is, the most important component of the supply chain [10]. The needs of modern society, as well as the drastic increase in the demand for goods of all kinds on the global market today, lead to the position of continuous logistical demands for a continuous increase in efficiency, effectiveness and speed of implementation, but also to continuous demands for a continuous reduction of business costs, which at the same time implies a continuous, adequate and efficient automation and digitization of all business segments. All this stems from the basic position of the mission of logistics, which is defined as the right thing in the right place in the right condition and with minimal costs and an acceptable impact on the environment, that is, from the main goal of logistics, which can be defined as the delivery or transportation of goods and materials in the most efficient possible way, whereby the purpose of carrying out logistics activities can be stated as increasing the effectiveness and economic efficiency of technical and organizational systems in order to plan, implement and control the efficiency of the costs of raw materials, process supplies and finished goods. Complex production and business processes and systems of the clothing industry indicate that the clothing industry has several types of transport, and therefore there are several types of adequate logistics of transport, i.e. two types of transport of clothes, parts of clothes and materials require two types of logistics, where the transport of materials from the warehouse, the transport of workpieces - parts of clothing and the transport of finished products to the warehouse (which means during the entire production process), known as internal or interphase transport (and, accordingly, interphase transport logistics systems exist), while the delivery of raw materials to the warehouse and the transportation of finished goods to the customer or to stores is the so-called external transport (external logistics of transport systems are adequate) [10].

3.1. Internal transport

The names themselves, as well as the roles they have or the jobs they deal with, indicate two quite different types of transport, because the internal subjects of such processes and systems are also different, i.e. it is obvious that in the cases of external and internal transport, the same process actions are indicated, but with different subjects. In fact, from the point of view of information systems, external transport clearly requires the

coordination of businesses to business - B2B subjects, or companies supplying repro-materials and manufacturing companies, as well as business to consumer - B2C subjects, i.e. coordination of producer-seller and consumer-buyer companies, while on the other hand, internal transport can be treated through production information systems, because it obviously represents an integral part of the organization of the production process. In the clothing industry, repro-materials are transported from the warehouse of raw materials to direct production, as well as articles or parts of clothing items and finished products, within the production process itself, where certain production phases are connected, which is why it is known as interphase transport. By the way, today, SMEs in the textile and clothing industries most often use two methods of internal transport:

- Manual transport - mainly used in small and medium-sized enterprises, and is carried out with carts of solid and durable construction, made of bars, with two, three or four wheels and light weight, adapted for heavy loads and weights (up to 100 kg). In order to increase the carrying capacity of such carts, battery-powered engines are used, or less often with internal combustion, which have a carrying capacity of about 2000 kg, with a speed of 5 km/h to 10 km/h, with and without load.
- Mechanical transport - means transport with automatic, and today most often with computer control of specially designed means of transport, such as: running conveyor belts, which are endless rubber, plastic or textile impregnated belts, which are transferred over rollers with electric drive, while in recently more and more often they install belts between two rows of production places on two floors, one above the other, and which move in opposite directions, with the upper ones supplying the workplaces and the lower ones taking away the products; and the so-called hanging conveyor belts, which are mounted on poles, wall or ceiling supports, which is their main advantage, because they leave a free working surface in the work rooms, while another positive feature is that the products do not wrinkle, because they are in a hanging position.

By the way, many researches and analyzes show that internal transport in the clothing industry directly affects the increase in productivity, even up to 30%, which is a sufficient indicator and reason for special research of this type of logistics of transport in the processes of clothing production. Of course, it should be noted that both types of logistics of transport require superior knowledge of the production process, where the direct influence, as well as the finesse of the implementation of internal logistics of transport, indicate and require a much greater reliance on expert knowledge of the production process, as well as on information, data and documents of the design process workplaces and work studies, so that the repro-material or parts of clothing - workpieces, are in the right place, at the right time and in adequate quantities, i.e. with a precise and adequate frequency or flow of goods and materials, and for the purpose of quality and efficient functioning of the production process, without delays and distractions [10, 11].

3.2. External transport

Of course, the process of globalization, as well as the economic and political crisis, directly affect all elements of business, but as the world energy crisis is especially pronounced today, which directly and strongly affects the organization, i.e. the logistics of external transport, as well as the price of products, obviously, radical changes and innovative ways of looking at and solving this problem are necessary. External transport involves the organization and coordination of all necessary elements of business, from delivery - transport of raw materials from suppliers to production plants, and to the delivery of finished products from the manufacturer to the consumer - the customer. In fact, external transport can be defined as a necessary activity for the efficient and safe transportation of goods from point to point, where in order to carry out this process in the most economical and optimal way, it is necessary to know the elements of exploitation of logistics of transport, where as elementary and unavoidable functions include: transportation planning, creation of optimal routes for transportation, realization and organization of transportation, regulation of movement of goods and organization of storage of goods. It should be noted that today, due to the complexity process of the logistics of transport, external transport operations, as well as storage, packaging, consulting, etc., are increasingly carried out according to the principle of third-party logistics - 3PL, i.e. they are assigned to specialized companies for the transport of goods and materials, the so-called logistics providers.

3.3. Modern technologies in logistics of transport - digitization logistics of transport

While traditional logistics of transport is based on analog tools - spreadsheets, paper documentation, PDF documents, etc., digital **logistics of transport** uses modern technologies, which makes common tasks simpler, shorter and, ultimately, cheaper. The first visible results of savings by using modern technologies in **logistics of transport** are reflected in saving the time of delivery of products or materials, as well as in reducing delays in transport, which has proven to be effective, with an average saving of as much as 35% [5]. However, a much more important or key difference between traditional and modern logistics is in the connection of participants in the supply chain, whereby in the traditional way of doing business and logistics, employees are not provided with data visibility of all sectors of the supply chain, which affects the flexibility and agility of the entire process, while in digital logistics, data is entered into the system and is always available to all participants of the supply chain [10]. The modern market especially requires certain changes in the logistics of external transport, in order to be able to fulfill all the needs of both producers and consumers-buyers, so specialized logistics companies are required to constantly improve, upgrade and follow trends, where digitization participates and helps in many ways, because they are internet and innovative technologies have become imperative in all spheres of business, especially in logistics (for reasons of faster and more efficient communication, easier exchange of necessary information, as well as better compliance of all participants). It is a fact that with the digitalization of logistics of transport, the situation is significantly improved on established manual operations subject to errors, that processes of logistics have been improved, as well as that the compliance of participants in the supply chain has been raised to a new-higher level, but it should be emphasized that the implementation of new technologies in logistics of transport, is by no

means a substitute for the human factor in the supply chain, but only a tool that achieves better coordination between principals, customers, warehouses and carriers in the best possible way.

Today, some of the modern technologies, which are applied in logistics of transport, reduce business costs by 10% (eg Digital Twins technology, which is based on the method of creating a virtual copy of the supply chain in real space and time, thereby achieving easier control of transport and protection goods, as well as more accurate forecasting and more successful prevention and removal of traffic jams), some others by 15% (e.g. Artificial Intelligence, as a leading technology among modern technologies, whose contributions are reflected in the precise management of goods stocks and fast delivery, better insight into customer needs and efficient warehouse management), the third for 20% (e.g. *IoT sensor* technology, which helps systems to track goods and warehouse stocks, enabling real-time monitoring of transportation, with continuous data loading into the electronic system), and some even for a 30% reduction (e.g. *Blockchain* technology, which is a decentralized database with information storage in electronic blocks, thus reducing errors to a minimum, and achieving a more coordinated supply chain network and a safer and faster exchange of information, where it should be emphasized that the strength of blockchain technology dynamically improves in combination with AI and IoT, migrating from the traditional business network and pooling good quality data among partners) [10, 11].

It can be said that the digitalization logistics of transport, with benefits such as: faster delivery time - by reducing the number of intermediaries in the chain, improving the user experience - thanks to digital platforms, improving efficiency - by monitoring events in real time and precisely planning routes for transporters, sustainability - by reducing delays in transport and fuel consumption, and according to green logistics models with the aim of reducing negative impacts on the environment, enabled a greater dedication to the needs of clients and a quantitative-qualitative increase in business. On the other hand, it is known that for the successful implementation of modern technologies in logistics of transport, high-quality computers are needed, with high software requirements for the smooth digitalization logistics of transport, which requires high initial investments and high-quality and well-trained professional staff, thus representing one of the disadvantage of digitization logistics of transport [8]. Data security can also be mentioned as a disadvantage, given that technologies of logistics are started and will be with the help of the Internet, and given the fact that all data is networked in such a way of doing business, there is a risk of hacker attacks and compromise of user data. Finally, as a drawback, it should be mentioned that the very process of modernization and transition to digital procedures logistics of transport is difficult and complex, with the addition of also complicated requalification of the workforce [8].

In the end, it should be pointed out that the implementation of information systems in small and medium enterprises of the textile and clothing industry is a problem, because the existing SCM models fail to solve the needs and problems of the supply chain of small enterprises, that is, it is a problem because at the very beginning of the idea of implementation for many reasons, from which are the most important for supply and transport information systems: quantitative aspect of production - small batches, large

initial investments, qualitative aspect of human resources, supplier selection, supply chain coordination, dynamic management of customer orders, etc. [8, 11], so a small number of such companies work in such a way and, of course, are not involved in the processes of global market competition.

4. CONCLUSION

The policy of optimal and sustainable business today must insist on the accelerated implementation of innovative technologies and modular flexible ways of business organization, but also on reducing costs through processes of reengineering and optimization of business, with special reference to efficient optimization of the supply phase. For the efficient optimization of supply chains, precisely defined elements of network design and quality design, elements of plan generation, as well as the implementation process itself, are necessary, implemented through applications and systems that incorporate the most important elements of such processes, such as visibility, (artificial) intelligence, adaptation and management, analytics, control, etc.
An indispensable element of efficient business today is the implementation of the so-called business logistics, which represents the integration of two or more activities in order to plan, implement and control the efficiency of the costs of raw materials, process supplies and finished goods from the starting point to the point of consumption, with the purpose of increasing the effectiveness and economic efficiency of technical and organizational systems, noting that the constituent part business logistics and optimization of supply chains is represented by logistics of transport, which through internal and external logistics of transport monitors and optimizes the organization of transport and adequate storage. While the internal logistics of transport implies being based on expert knowledge of the production process, as well as on information, data and documents of the process of designing workplaces and work studies, and for the purpose of quality and efficient functioning of the production process, external logistics of transport jobs are, due to the complexity of the process, increasingly assigned specialized transport companies, so-called logistics providers, who provide transportation, storage, packaging, consulting, etc.. Regardless of the fact that digitization has made the process of organization and planning of supply chains and logistics of transport easier, more precise and cost-effective, it should be emphasized that it is by no means a substitute for the human factor, but only a means for a better connection of all participants, i.e. a means of better coordination between principals, customers and carriers in external, or principals and executors - employed in internal transport, as well as regardless of the disadvantages, such as high initial investments or complexity and security of data, digitalized logistics of transport still shows better results in all the most important elements of efficient business (time , human resources and material).

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