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Strategies of minimization of supply costs and optimization of production logistics potential in a global business (On the example of the Autonomous Republic of Adjara)

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Introduction

Actuality of the theme. Reducing of the expenses in the process of delivering goods and services to the consumers has an important role in economic development. Accelerated competition and economic integration has put into agenda optimization of the logistics potential. The economic growth is the priority for every country, precondition of which is well-functioning market, where logistics has a decisive role.

The importance of the logistics, as a separate science field, was increased in terms of globalization. The world's economic globalization has created the necessity for integration of modern methods of logistics, which is revealed in the consolidation of the parties in the product movement system to ensure constant and continuous delivery processes. Nowadays, logistics is the backbone of the supply chain which safeguards effective, profitable and reliable exchange of the information and goods/services.

Actuality of the topic is highlighted by the fact, that in the globalization processes development of the country's economy is directly related to the logistics systems thus proper functioning of the supply chain processes. In the modern economy, one of the main tools used by the companies for the profit maximization and maintenance of the competitiveness is establishing the effective logistics system and minimization of the expenses in the supply chain.

The operational system of any organization requires various raw materials and industrial purpose services received from the other companies. In 2013, a research conducted by the largest audit company PricewaterhouseCoopers (PwC) on the international supply chains of 503 companies from North America, Asia and Europe, revealed significant difference between the management approaches of the supply chain in the developed and developing countries. According to the research, the companies with properly arranged supply chains have higher financial index and they are using supply chain as a tool of strategic management.

Poor experience and lack of modern infrastructure of the Georgian companies in the logistics field, restrains large international companies from being involved in the retail trade and service sector on the local market despite their interest to establish large distribution centers in Georgia and to cooperate with businesses from the Caucasus and Central Asia countries. This also limits export opportunities.

It should be noted, that strategic geographical location of Georgia creates precondition for integration of the country in the global logistics network and transforming it into logistics hub (regional center) for effective connection with world markets.

One of the indications of the topic actuality is that development of the market economy makes obvious requirements that customers are confronting to suppliers and producers. In case of Georgia, this gained more importance after signing the Association Agreement with the European Union (EU). One of the main requirements is bringing Georgia's logistics system close to the European standards that implies reduction of supply chain expenses. Thus it is important to plan supply chain in such a way, so the products are delivered on the right time and right place in order to ensure security and success of the businesses.

In the conditions of the globalization, optimization of the logistics system is significant. It is estimated that in low income countries improvement of the production logistics may increase trade by 15%, out of which the companies and consumers will benefit with 10%, as they will receive better quality service/goods in the favorable price. Furthermore, increase in efficiency of the supply chain will ensure sustainability, competitiveness and profitability of the company, as well as improvement of economic indicators of a country.

In order to survive in the competitive struggle and strengthen position on the market, the enterprises strive to maximize operational effectiveness to increase profitability. Globalization and technological advancements have also made the marketplace increasingly competitive and the role of logistics in the success of the company more crucial.

Therefore, we decided to research and analyze the production logistics system and organization-economic models and approaches of the companies based in the Autonomous Republic of Adjara. This paper is the modest attempt to study the characteristics of the supply chain and logistics management on the example of the Autonomous Republic of Adjara, it aims to set up the strategies for minimization of supply costs and improving logistics potential, that has a huge role not only for businesses, but for development of the country's economy.

The aim and objectives of the research. The aim of the dissertation is to study production logistics system and identify the problems of the businesses (on the example of the Autonomous Republic of Adjara), to set up the strategies for their formation and development, to analyze the affecting factors and elaborate

tools for minimization of the supply costs, which is one of the main alternatives of the economic and financial strength. So, the main objectives of the research are:

- Analyzing existing attitudes and foreign experience on the essence of logistics system;
- Determining influence of the globalization processes on the supply technologies and defining specificities of the supply chain management in the global business;
- Studying Georgian logistics system on the example of the Autonomous Repub-lic of Adjara and develop comparative analysis to the logistics system of the EU member country (based on the case of France);
- Analyzing production logistics system through Supply Chain Operations Reference model;
- Identifying the problems existing in production logistics system and defining the factors affecting supply chain costs;
- Developing the strategies for improvement of the production logistics system and minimization of the supply costs.

The subject of the study. The theoretical issues and methodological approaches for improvement and projection of the production logistics system.

The objective of the study. Production logistics system of Adjara based enterprises.

Assessment of the problem. The Georgian researchers have not studied the supply chain as an important aspect of the companies engaged in market economy and the field of logistics remains unexplored. The logistics potential is insufficiently studied at the national level, the statistical data is poor and inaccurate, there is a lack of publications that would create clear picture on the logistics of the country and provide comprehensive information. There is no any particular method for revealing and studying the factors that facilitate formation of the field and elaboration of the development strategies.

The theoretical and practical problems of the development of the logistics system are being studied by the foreign researchers. It is worth to mention Blecker T., Blauwens J., Bowersox D.J., Coyle J.J., Cohen S., Roussel J., Harrison A. and other authors.

After studying the processes and issues of the supply chain, above mentioned authors have come to the conclusion that “management of the supply

chain has a decisive role in competitiveness and is a backbone of the companies"[3]. Foreign experts use theoretical and practical examples in order to assist companies in choosing optimal strategy of the supply chain.

As for Georgia, despite the fact that supply chain is a complex and important issue in terms of country's geographical location, the field remains unstudied at the national level. There are only few publications about the logistics in Georgian language. Botsvadze L., Eradze K., Veshapadze M., Zubiashvili M., Tkeshelashvili G., Gelashvili O., Osadze L., Devadze A., Goletiani K., Mamuladze R., Gabaidze M. are the Georgian researchers who have contributed to the development of the logistics field. Although, the Georgian authors mainly examine theoretical aspects of logistics discipline and do not provide comprehensive information on each link of the supply chain.

Interpreting the problematic issues of the supply chain and elaborating optimal strategies for its development have determined purpose and objectives of this research.

Methodological and theoretical basis of the research. The research has been developed using empirical and theoretical methods. Based on the different researches, surveys, Georgian and foreign publications, scientific and applied papers allowed us to study the concept of the supply chain and provide in-depth analysis of existing problems. Analyzing of the data presented by the Statistics offices of different countries, the logistics associations and governmental bodies helped us to see the growth of importance of the supply chain in recent years; using practical and scientific researches and recommendations (regarding the inventory management, transport expenses, customs and supply time) developed according to these studies gave us an opportunity to analyze all possible and already established practical approaches for developing optimal supply chain systems and strategies in terms of market economics.

Scientific Novelty. The novelty of the research is to introduce methods and elaborate optimization strategies of the supply chain and production logistics. Among them it is worth mentioning:

- The research presents characteristics of the interconnected patterns of production and logistics evolution and their principal specificities;

[3] Cohen S. ; Roussel J., " Strategic Supply Chain Management: The Five Core Disciplines for Top Performance, 2nd editon, New York

- On the basis of the two different explanation of logistics concept, our own, modern vision of the logistics is formulated;
- The traditional concepts of logistics are examined and a new direction – virtual logistics, as a part of the modern logistics system is introduced;
- The evolution phases and specificities of the logistics system in Georgia are determined;
- The mechanisms ensuring efficient functioning of the supply chain in terms of globalization and growing competition are justified;
- The hindering factors for developing the logistics potential in Georgia are identified and the role and importance of the government in improvement of the field and accomplishing its potential are determined;
- The management methods of material and informational flow are studied, the challenges of production logistics system are identified and existing system is assessed;
- The research presents analysis of the production logistics system based on the Supply Chain Operations Reference (SCOR) model and assessment of companies' logistics operations according to the key performance indicators (KPI);
- On the basis of the comparative analysis of Georgian and foreign experience, specific recommendations and strategies for the improvement of the production logistics system are drown out;
- The specific directions for reducing supply chain costs and optimization of the production logistics system are worked out which includes determining priority product, establishing safety stock, developing production plan and introducing information technologies;
- The principles of production planning in conditions of unstable demand are drawn out;
- Based on the comparative analysis of four different strategies of stock replenishment advantages of order point replenishment model in Georgian companies are alluded;
- Awareness rising of business operators on logistics issues is defined as one of the priorities toward optimizing production logistics system and minimizing supply costs and the importance of state involvement in this regard is justified.

The theoretical and practical importance of the study. This research has

a theoretical and practical importance. Its inclusion in the bachelor and master programmes will improve teaching quality while giving the students an opportunity to get acknowledged with the local and foreign experience, existing potential and its effective usage.

The analysis, assessment and conclusions provided in the research will be significant information for the related state institutions and supervisory bodies of the field on the regional level, as well as for the business companies and entrepreneurs willing to set up the strategies for optimization of their logistics potential.

The structure and content of the research. The dissertation work consists of 195 pages and includes introduction, three chapters, nine sub-chapters, conclusions and recommendations, 5 drawings, 5 diagrams and 19 tables, bibliography and annexes.

Structure of the work

Introduction

Chapter I. Economic essence, structure and theoretical aspects of supply costs

1.1 Driving factors of production and service and their economic features
1.2 Logistics concepts and evolution tendencies
1.3 Economic features determining supply chain efficiency

Chapter II. Specificity of managing supply chain techniques and logistics potential

2.1 Specificity of managing supply chain techniques in a global business
2.2 Foreign experience of managing logistics system
2.3 Economical and organizational opportunities of fulfilling logistics potential and supply chain processes

Chapter III. Strategies of improving production logistics system and optimizing supply chain costs in a global business

3.1 Principal directions of improving production logistics system based on SCOR model
3.2 Strategies of minimizing supply costs and improving production logistics system
3.3 The role of information technologies and automated systems in improving production logistics

Conclusions and Suggestions
References
Annexes

Summary of the work

The first chapter of the work “Economic essence, structure and theoretical aspects of supply costs” comprises three sub-chapters. In the first sub-chapter - “Driving factors of production and service and their economic features” - the definitions compiled over the years by foreign and Georgian authors, international organizations and experts upon the essence of production and service and their characteristics are represented.

The same sub-chapter is devoted to trace the history of manufacturing and to single out its evolution phases. Based on the review of concepts of production and service, traditional and modern concepts of production are distinguished. We consider that the modern concept of production was relevant in “seller’s market” conditions, when the market power is in hands of sellers. While the modern concept of production is acceptable in “buyer’s market” conditions, where more attention is paid to service factors in order to affect buyer’s power and behavior.

On the basis of review of evolution phases of production and service, we have concluded that development of production contributed to the formation of logistics as an independent science and sphere, while increased importance of quality service factor played a vital role in a further development of logistics.

Before the 2^{nd} half of 18^{th} century, manufacturing was regarded as a functional area, it was associated with trade and was characterized by a direct contact between the producer and consumer, low level of mechanization, production by order and personalized products. From the 2^{nd} half of 20^{th} century, the problems related to supply of the material resources, distribution of resources and necessity of decreasing of inventory and transportation costs stimulated the transition of manufacturing to the new phase of development that created the incentive for new means of designing, planning, and controlling of manufacturing processes, and thus resulting in mass production, minimum inventory level and improved service. All the above mentioned factors led to emphasizing the role of logistics as a tool of improving production efficiency.

The second sub-chapter of the first chapter “logistics concepts and evolution tendencies” outlines fundamental preconditions that prompted formation of logistics as a modern discipline. Based on the analysis of foreign and Georgian literature, we illustrate the evolution stages of logistics system through a scheme and declare that the development of logistics was affected by the industrial

revolution, changes in customers' demand, development of information technologies, globalization and abolishment of the trade barriers.

Based on the different views and attitudes toward logistics issues, we have provided our own, modern vision of the essence of logistics, according to which:

- Logistics is an integral component of supply chain. It is a complex term encompassing planning, controlling and managing transportation, supply of material, human, financial and information flow, warehousing, marketing and other material and non-material operations;
- Supply chain management is referred to as logistics, but taken to a higher level of sophistication.

We define the general objective of the logistics, which consists in meeting customers' requirements through providing right products in the right place at the right time with right cost and in the right condition; and we mention those principal rules that ensure achievement of this objective and that act as a determinant of logistics system's efficiency.

Recognizing the fact that implementation of logistics functions depends on performance of the components of the logistics system, we consider that it would be valuable to provide a brief description of each component that we called sub-systems of the logistics. We have graphically represented the traditional logistics system and concluded that creation of multi-corporations, integrated information systems, common databases and widespread use of internet induced the formation of a new sub-system of logistics – virtual logistics. According to our own definition of virtual logistics provided in the thesis, it is the management of the logistics resources and information through virtually based logistics system that coordinates electronic material and informational flows and experience gathered in the online environment.

We agree with the opinion that logistics discipline was developed following the development of manufacturing and used this argument while analyzing the evolution of logistics system in Georgia. In the beginning of this sub-chapter three phases of logistics evolution cycle were singled out: fragmentation, partial integration (consolidation) and functional integration. We consider that Georgia's logistics system is on its early stage of development, as logistics related functions (purchasing, inventory management, warehousing and etc.) are fragmented, caused by the Soviet regime dominating in Georgia in the 20th century. In Georgia, development of logistics system started from 1991 and it was affected by the

changes in property and organizational and legal status of logistics actors, introduction of new technologies in businesses and etc.

By review of different literature dedicated to the logistics issues, objectives and tendencies, it is revealed that logistics have a key role in every sphere of economics. Its evolution nature is appeared in changes occurring on each stage of social-economic development. Hereof, we concluded that level of logistics' usage is an indirect criterion of society development.

The third sub-chapter – "Economic features determining supply chain efficiency" discusses the factors affecting the quality of product/service supply and determines efficiency of the supply chain. There is a difference between opinions provided by Georgian and foreign authors regarding this issue. The Georgian works outline that efficiency of the supply chain is determined by the reliability, required time as from order reception to its delivery, as well as for order fulfillment, volume of stock and availability of credit (later payment). The foreign researches use metrics that include measurements for procurement, production, transportation, inventory, warehousing, material handling, packaging and customer service. The most common metrics highlighted are perfect order measurement (i.e. order quality); customer order cycle (measures how long it takes to deliver a customer order after the purchase order is received); Supply Chain Cycle Time (i.e. the time it would take to fill a customer order if inventory levels were zero); Freight bill accuracy (i.e. the percentage of freight bills that are error-free); Freight cost per unit and On Time shipping rate. We assume that the metrics mentioned in foreign literature will give more precise index of supply chain efficiency in practice.

Taking into account the fact that customers expect receiving right product in the right place at the right time at the right cost, review of Georgian and foreign literature allowed us to cite flexibility, minimal costs, high quality and rationality as the principal determinants of supply chain efficiency. All these indicators are discussed in details from the perspective of logistics sub-systems. Although, we believe that these indicators are four principal characteristics of supply chain efficiency level, we consider that against the background of the technological advances, intensified competition, increased globalization, they are outdated. Its underlying factors are hidden and regarded as secondary, but in fact they are modern economic characteristics of supply chain efficiency. In view of this, it is important to work out a new advanced approach to measure supply chain efficiency.

Efficiency of supply chain depends on country's economic features. While defining modern approach of estimating efficiency level of the supply chain, it is worth to mention the criteria of logistics performance index (LPI) developed by the World Bank. Considering that the index scorecards demonstrate comparative performance of different countries in terms of global supply and logistics operations it can be said that the scores obtained in LPI's six criteria are modern determinants of supply chain efficiency.

In condition of globalization and strong competition, the companies are facing increasing levels of competitive pressure and difficulties in maintaining and improving profitability, self-consciousness and strengthening market positions entirely depends on customer satisfaction. Various literature and information sources let us to admit that organizations are not only obliged but forced to seek flexible solutions and implement innovative strategies to attract new customers and increase loyalty of existing clients that is inconceivable without improving manufacturing process and whole supply chain. Thus as businesses continue to globalize, their attention has increasingly turned to the logistics operations.

Globalization is a complex and labor-intensive phenomenon. The specialists recognize that long-term competitiveness of large corporations is based on their ability to unify dispersed businesses in the integrated system with the common goals and objectives and set up integrated supply chain strategy. While the efficient logistics system has a key importance in forming intra-state supply chain, it is extremely important in a global supply, manufacturing and marketing. In view if this, the second chapter of the dissertation **"Specificity of managing supply chain techniques and logistics potential"** examines the influence of the globalization processes on supply chain structure and strategies; discusses in details the supply chain development tendencies, experience and approaches applied to EU member States on the example of France, as of the country fully integrated in the global logistics market; analyses Georgia's logistics system on example of the Autonomous Republic of Adjara and represents a comparative analysis of France's and Georgia's logistics systems; assesses Georgia's logistics potential and discusses the factors hampering its realization.

The first sub-chapter of this chapter – "Specificity of managing supply chain techniques in a global business" provides concepts and definitions of supply chain; differentiates the supply chain structures in the transnational corporations and businesses operating at the national level; illustrates the difference by a generalized scheme and discusses the factors to be considered while developing

supply chain strategy.

Supply chain is a complex system and its specificity lies within the fact that the competitiveness of the system is defined by overall results of the whole system, in majority cases supply time, cost and delivery reliability. It is worth mentioning that the consignor evaluates the quality of the supply system by the final outcome, not by judging on which link of the supply chain was taken the decision that caused quality worsening or improvement. This outlines the specificity and complexity of the supply system.

Experience shows that businesses operating at the national level are focusing on intra distribution, warehousing and supporting the formation of integrated supply chain in economically and politically sustainable environment, while the businesses breaking the national boundaries are obliged to cope with obstacles and take into account various risks, such as distance, different nationality, religion, culture, style, politics, trade regulations and etc. Based on this, four supply strategies are singled out: no international strategy, multi-domestic, global and transnational strategies. Abovementioned strategies are synthesized in a table from the perspective of service, marketing, delivery, management and human resources strategies. It was revealed that while there are increased synergies in service, marketing and operations with evolvement of the company from a no international strategy to a transnational strategy, there are also increased challenges related to the management and human resources. The complexity of the business strategy and organizational structure rises with expansion of the operational area.

Following the review of different supply strategies, the research discusses major differences between domestic and international supply operations and determines five factors that globalized enterprises have to recognize for maintaining the competitiveness. These factors are defined as performance cycle structure, transportation, operational considerations, information systems integration and strategic alliances. Although these factors are essential while managing global supply chain, it has to be bear in mind that businesses in a global economy face more complex operating aspects of the supply chain.

Globalization imposes challenges to the companies to get benefits from the development of integrated supply strategies. On its turn, development of the supply strategies is based on the countries logistics potential and logistics system. Examples of the developed countries and successful enterprises demonstrate that the logistics plays a strategic role in a modern business. The European countries

are taking leading positions in this regard. For this purpose, subsequent chapters represent the analysis of France's and Georgia's logistics systems, in order to distinguish the difference of logistics approaches of the developed country, fully integrated in the global supply chain and developing country, striving for globalization.

The overall objective of the second sub-chapter of this chapter – "Foreign experience of managing logistics system" is to provide understanding of the scope, functioning and performance of the European logistics system on the example of France, to identify best practices and approaches used that can be adopted in Georgia's logistics system.

Logistics sector significantly contributes to the France's economy. It functions as a key driver in the effective and efficient functioning of other services and economic activities of France. The value added and jobs generated by the sector are significant as well. According to the Ministry of Ecological and Solidarity Transition of France, the logistics sector contributed to French GDP with 10% in 2015. Moreover, 9% of the total employed population of France, that counts 1.8 million people, works in this sector. In modern market economy, logistics is the 3rd most important sector in France that is stimulated by geographical location of the country and thus development of all types of transportation.

Development of logistics sector in France retraced accelerated processes of globalization and introduction of information systems. The main changes that have taken place in logistics sector for the last 20 years are:

- Flexible production logistics system has been formed that was driven by complication of market relations system and increased requirements on supply chain quality;
- Outsourcing of logistics services has been widespread. Increased number of enterprises hire third/fourth party logistics system providers to receive different logistics services;
- Usage of the information systems, especially of Enterprise Resource Planning (EPR) system has been intensified;
- Demand on qualified workforce has been increased. The number of employers making preference to the candidates with a background in logistics has stimulated integration of the logistics courses by the educational institutions.

Based on the information provided by various sources, the research analyzes the tendencies of logistics evolution in France and outlines practical

approaches applied by the country for optimization of the logistics system. To summarize logistics experience of France, it can be concluded that:

1. Improvement of logistics infrastructure in France plays a key role in perfection of the logistics system. It has a systematic character as in private, as well as in a public sector;
2. Diversification of logistics services is important to increase logistics potential of the country. The ports, airports offer various logistics services to the customers that is facilitated by modern logistics platforms throughout the country;
3. Industrial companies pay increased attention to proper planning of the production processes, for this reason the companies apply different logistics methods, out of which the most widespread is ABC analysis;
4. Importance of information logistics has increased in the country. Number of the enterprises utilizing information logistics programs increase annually. Against the background of globalization and introduction of technologies, logistics sector has become automated in France;
5. Inventory management is considered as a tool of minimizing logistics cost. For the last 6 years demand on information logistics programs simplifying inventory management has been increased;
6. On the one hand, outsourcing of logistics services has increased. In transnational enterprises logistics alliances are used in order to optimize supply chain. On the other hand, more companies tend to become the self-providers of logistics services and decrease logistics costs in this way;
7. Geographic dispersion of logistics services has increased. The monocentric approach has been widely replaced by polycentric approach that results in transformation of industrial zones into logistics centers;
8. The entreprises have recognized importance of timely delivery. Therefore, there is a considerable rise in number of logistics warehouses located nearby to the customers' markets;
9. Education institutions has launched a new direction – logistics, in order to increase logistics skills and competences in a new generation;
10. The Government is actively engaged in development of logistics sector, as by attracting new investments in the field, as well as by implementing concrete approaches devoted to the evolution of logistics system in France. Its obvious example is a new logistics strategy "France logistics 2025".

Logistics potential of France, logistics approaches already implemented by the enterprises, and their continuous strive to optimize the supply chain, actions planned by the Government and many other factors create a precondition for the logistics field to remain as one of the most attractive sphere of new investments in France in the upcoming years. On its turn, investments flown into the field will promote the development of logistics system, growth of logistics market volume and introduction of new logistics concepts. The analysis of French logistics system represented in the sub-chapter gives us a thorough picture about the European logistics system, European standards and provides an opportunity to Georgia to adopt and adjust experience of France to Georgian reality.

The third sub-chapter of the second chapter – "Economical and organizational opportunities of fulfilling logistics potential and supply chain processes" is devoted to provide an in-depth analysis of Georgia's logistics system on the example of the Autonomous Republic of Adjara; to draw a parallel with experience of neighbor countries, such as Turkey and Azerbaijan; to examine importance of effective usage of the logistics potential for development of Georgia's economy; to discuss the reforms implemented by the Government of Georgia and factors existing that hamper the use of logistics potential and perfection of logistics system in Georgia.

Development of a global logistics systems (trade, transportation and information systems) is a vital for Georgia, as it provides an opportunity to accelerate integration of our country into world economic and information space. The Autonomous Republic of Adjara with its favorable geographical location, possibilities of growth in transit freight turnover, plays a significant role in development of the country's logistics system.

The analysis of logistics potential of the Autonomous Republic of Adjara reveals that geographical location grants big logistics opportunities to the region, especially to be transformed into a regional transit center. However, dynamics of the railway, road and sea freight turnover has made evident that above-mentioned potential is currently untapped Existing conditions of Georgia's logistics system, uncompetitive transportation rates, undeveloped logistics infrastructure and ineffective reforms undertaken by the Government in the field are cited as the main reasons.

It should be noted that the Autonomous Republic of Adjara has a particularly important role in transporting of oil. The Batumi port, as well as the railway knot passing through the Autonomous Republic of Adjara plays signi-

ficant role in transporting raw oil and oil products through Georgia. According to the forecast of Energy Information Administration (EIA), it is expected that the volume of oil will grow till 2040 and will reach 4.66 million barrels. Existing pipelines could not ensure transportation of increased volume of oil and it is assumed that it will be transferred to railway and maritime transports. However, if Georgian port and railway infrastructure is not ready for these processes (competitive rates, simplicity of service, high level of reliability, and rapidity of transportation) the freight will be moved to alternative itineraries. Accordingly, coordinated work of the rail, road and maritime transports is essential that can be ensured by forming logistics cluster. The advantages of this approach is broadly discussed in this paper and declared that clusters represent an effective tool for optimizing supply costs and increasing competitiveness. It ensures improvement of information flow, optimization of business proceses, stimulation of innovation, decrease of logistics costs and increase of service quality. All these on its turn will enhance investment attractivess of the Autonomous republic of Adjara and support perfection of its logistics systems and its integration in the global logistics network.

In the same chapter, various ongoing projects are described that will affect usage of logistics potential of the Autonoumous Republic of Adjara, out of which it is outlined “Silk Road”, “TRACECA”, “Istambul Canal”, “Modernization of Georgian Railway” and “Baku-Tbilisi-Karsi” railway projects.

For the last 15 years, transition of economy to market relations and implementation of radical economic reforms instigated transformation of investment policy in the country and thus initiation of long-term state programs. Also, according to the liabilities undertaken against world trade organizations, the series of reforms were executed in Georgia that aimed at reorganization, liberalization and simplification of trade regulations. As a result of institutional changes, the trade borders of Georgia has been opened, import-export procedures have been simplified, tax rates has been decreased and tax types has been reduced, tariff and non-tariff regulations have been simplified, trade relations have been diversified through concluding free trade agreements with regional partners, investment environment has been improved, barriers to free trade has been minimized through simplifying customs clearance, license, permits issuance and property registration processes. The above-mentioned activities, aimed at improving the country’s political and economic environment. Moreover, one of the reasons for taking such measures were to support production sector and increase investment attractiveness, in

addition to this we should mention that the reforms had to have indirect impact on development of other sectors of economy as well, including logistics.

The same sub-chapter provides detailed overview of the outcomes of different researches published by the international organisations. Position of Georgia in various international ratings is compared to the positions of France and Turkey, which enable us to conclude that in Georgia customs procedures, rate politics, infrastructure quality and service competence remain to be problematic. It can be admitted that during the recent years, worsening the indicators in these components are explained by malfunctions in different issues such as optimization of transportation system and network, coordinated work between different types of transport, marketing effectiveness, productivity of operations, strategic planning of human resources and management efficiency. Despite drawing out some approaches by the Government and undertaking measures to improve the logistics sphere, the impact is meaningless and in reality the development of logistics system is stuck on the same level.

The analysis presented in this sub-chapter reveals that there is still no competitive environment in Georgia that would stimulate growth of innovations and productivity of the private sector and in turn contribute to logistics development. The logistics system of developed and developing countries considerably differs from each other. The difference is noticeable between logistics system of neighboring countries as well. Georgia and Azerbaijan are on the same level in terms of logistics development; while Turkey's logistic system is almost alike to France's. In Georgia, development of logistics sector is slowly ongoing, that is stipulated on the one hand by implying inappropriate policy in the sector and on the other hand by low level of production, as production industry creates demand on logistics services and thus contributes to the sector development. Consequently, it can be concluded that logistics is a set of issues that requires constant fundamental researches and systemic approach for improvement.

The third chapter of the work **"Strategies of improving production logistics systems and optimizing supply chain costs in a global business"** presents main findings of the production logistics system research conducted in entreprises based in the Autonomous Repiblic of Adjara, discusses in detail inventory and information flow and evaluates organizational and economic models of management of the surveyed companies. The data collected is processed according to the Supply Chain Operations Reference (SCOR) model and based on

it suggestions on minimization of the supply costs and perfection of the production logistics system are provided.

The aim of the first sub-chapter of the third chapter "Principal directions of improving production logistics system based on SCOR model" is to identify the main characteristics of the current production logistics processes of the firms based on the 5 main components of the SCOR model: Plan, Source, Make, Deliver and Return; and evaluate the efficiency of the system based on the Key Performance Indicators (KPI). The respondents were asked to rate their degree of agreement to some statements related to production logistics practices. The mean and standard deviation were calculated and then used as a standard to compare the relative importance of the variables in different companies.

First of all, it is important to note, that the SCOR model is the world's most widely accepted framework that enables a company to evaluate the performance of its supply chain activities as a set of operational objectives that defines its performance in the market and financial stability. The method includes strategic metrics, called Key Performance Indicators (KPI), which evaluates the efficiency of the business processes, achievement of goals and performance quality of enterprises, its subdivision and each employee.

The research methodology was based on empirical data collected through semi-structured questionnaires used during face-to-face interviews. The experience of 32 companies from different sectors, with different size and financial indicators were collected, tabulated and analyzed.

The research has revealed that planning process preceding production was more or less present in all companies; however, the investigated companies have shown a lack of the coordinated planning process between marketing and procurement operations compared to the world best practice. The main reasons for this gap are their poor forecasting standard and models used in their planning operations. 85% of the respondent companies follow traditional forecasting procedure based on previous two-three years of sales historical data. They did not use any feedback data from the direct customers or users and did not define the performance indicators to check their planning process level. 'Team based cross functional planning activities' was also at the lowest level of practices due to low level of collaboration activities between different departments.

Conjunction of the planning process with the SCOR model and KPI indicators in interviewed companies can be achieved if only the planning process is a process driven by customers' requirements and is coordinated among different

departments of the company. As for planning accuracy, it will be achieved through introducing information technology in the process.

The sourcing process is the second indicator of the SCOR model. It is one of the important strategic areas for company's success and further improvement activities. Compared to the standard deviation scores of planning process the scores for sourcing process is low that imply consistencies in the respondents' answers and thus similar approaches used while sourcing. One of the important points here is supplier selection. It is found out that the majority of the companies do not have a pre-defined strategy and criteria for selecting a supplier. All respondent companies have practiced raw material sourcing from local and foreign suppliers. In case of import, interviewed enterprises complained on getting a reliable and cheap supplier; therefore, they keep high stock level in their warehouses. Furthermore, the experience speaks that supplier-buyer relations are based on trust acquired over years.

According to the SCOR model and KPI indicators, logistics system optimization cannot be achieved without setting rules for effective negotiation, supplier selection and evaluation procedures. In our case, it can be price, quality and delivery time. Also, it is vital that supplier-buyer relationships are defined by a contract in order to avoid unforeseen costs and risks.

Manufacturing is the third indicator of SCOR model. Research findings allow us to mention, that in 78% of respondent companies decision regarding what to manufacture and when is made by the managers. 90% of the respondents use push-type production strategy for organizing production process. So, they are using Make-to-Stoke (MTS) strategies in their operations that imply that supply of raw materials during production is organized according to pre-defined schedule. The approach once again confirms that the companies are using traditional concepts of production and the development level of logistics is still low.

In the work, our attention is paid to one of the important issues discovered during the research that is capacity of machinery and workload of the labor force. Generally, there are internal factors affecting the manufacturing process, such as exploitation time of machinery, quality and specification of the machinery, taking into account technological instructions, effectiveness of maintenance works and etc. It is noticeable that among surveyed enterprises only large companies are investing in infrastructure. In small companies, all workload is put on the labor force and such companies own 25-30 and more years old machinery, that in most

cases are outdated, need renovation and their exploitation is related to additional maintenance costs that in turn increase production costs.

The fourth indicator of the SCOR model is delivery. Nowadays, product delivery time and customer service are one of the areas of a company's competitiveness. The research observation is about the company's distribution activities. 60% of respondent enterprises use third party logistics (3PL) service providers for organizing sea or road freight shipment. Moreover, 7% of the companies stated that a buyer bears all the risks and liabilities on shipment, as well as shipping cost; the supply is organized based on EXW (Ex Works) term. Indicated approach is mainly noticed in the companies that export their products to Russia, Kazakhstan, Armenia, Belorussia and Turkey. Other enterprises use DAP (Delivered At Place) term for road and CIF (Cost Insurance Freight) term for sea freight.

The fifth indicator of the SCOR model – Return (known as Reverse Logistics) – describes the activities associated with the reverse flow of goods back from the customer. Almost one third of the respondent companies have shown lack of experience about the return process. 88% of the respondents have no any planning for the return process. Accordingly, we have recognized that the new reverse logistics principles are new for them.

Taking into account suggestions of the SCOR model and the KPI indicators, development of logistics system lays within introducing reverse logistics principles in the company, as it contributes to calculating logistics costs properly, forecasting reverse logistics indicator in advance and having a defined strategy for undertaking appropriate activities in case of return of the product.

In general, applying the SCOR model and the KPI indicators in the company ensures optimization of each sub-system of logistics. In spite the fact, that the first three indicators of the SCOR model are already sub-systems of logistics system, it should be mentioned that performance level of each indicator effects performance of another. The company cannot achieve production level foreseen by the SCOR model if it does not perfect all indicators.

Based on all abovementioned, it can be summarized that optimization of production logistics system depends on the various factors, including quantitative and qualitative flexibility of manufacturing. Qualitative flexibility is reached in terms of flexible production conditions and qualified human resources, while maximum quantitative flexibility can be obtained through different approaches used, such as creating labor reserves, machinery reserves and etc.

We tried to synthesize the constraints revealed during the research and provide it as a cause and effect analysis that is represented in the table below (see table №1, p.69).

Table 1: Directions of improving production logistics system

#	Problems revealed	Cause	Effect	Directions for improvement
1	Planning process is not driven by customers' requirements	Production plan is based on sales of previous years	Hign inventory driven costs; Ineffective use of warehousing space	Defining the most demanding products through using various logistics methods
2	Purchase of raw materials is organized in large quantity and in advance	The companies try to avoid cost caused by currency fluctuation and delivery delays		Determining optimal size of the order and creating stock reserves based on stock level
3	Technical specification of machinery is quite low	Investing in infrastructure is associated with high expenses	Out-dated and amortized machinery leading to manufacturing process protracted in time	Developing production plan and planning the production process according to bulk lot of the prioritized produces
4	Low levels of information technology applied in logistical operations	Introduction of information technologies is associated with high expenses; The companies do not recognize importance and benefits of it	Logistics system is not optimized, frequent errors are occurring while entering the information manually that generates additional costs	Introducing information technologies in order to automotize logistics system
5	Irrational management of time of the personnel engaged in manufacturing	The employees are working overtime	Labor force is not motivated and result oriented	Building motivation system for the staff
6	Logistics system is fragmented	Employ qualification is very low	The employees are not acknowledged with modern logistics concepts	Developing qualification raising training modules for employees

Source: Developed by the author based on research findings

The problems presented in the table №1 leads to non-optimized logistics system. Since the production process is not driven by the customers' demand and the companies keep high stock level, they experience irrational use of the warehouse area and increased inventory management costs. Outdated and fully amortized machinery results in increased production time, while manual entrance of information leads to high index of error occurring and provokes additional expenses. Low level of competence, as well as ineffective planning of working time, decreases the productivity of the company. All these will lead to rising logistics costs, putting the negative environmental footprint on the sector and an increasing shortage of qualified staff. These problems will persist in the future and might possible even worsen without taking appropriate actions. To address all above-mentioned problems appropriate measures are outlined:

- It is important to apply modern concepts of production logistics, that implies identification of priority product in terms of revenue;
- Production plan should be developed based on the series of priority product;
- Safety (reserve) stock should be established that will ensure optimization of sourcing process and inventory volume;
- It is notable to improve the information logistics system in the companies which means introduction of new technologies that will minimize the time spent on implementing logistics processes and costs related to it;
- The above mentioned measures will not succeed if qualified staff is not engaged in business processes and the company does not keep them motivated. Therefore, it is recommended that the enterprises build an effective personnel motivation system and put emphasis on constant improvement of the employees' qualification.

The actions presented above are broadly discussed in the next sub-chapters of the work.

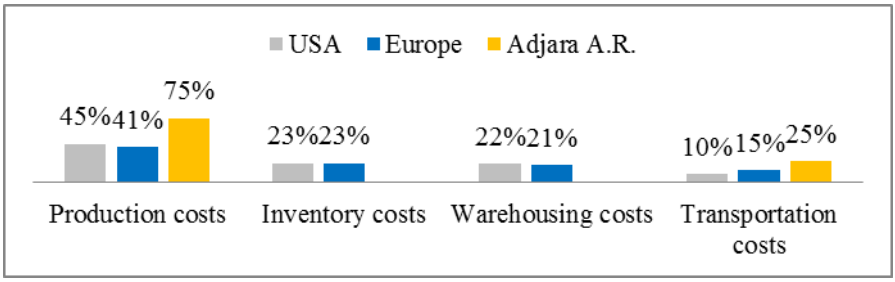
The SCOR model offers a number of benefits that the firms can tap into, such as measuring their supply chains, determining where weak links exist in their processes and identifying how to make improvement and as a result reducing production time and costs; and integrating to global supply chains. Consequently, through systemic approach toward above listed suggestions companies can fulfill business processes, minimize supply costs, increase productivity, generate additional revenue and achieve and sustain competitive advantage.

The second sub-chapter of the third chapter “Strategies of minimizing supply costs and improving production logistics system” deals with analyzing of main tendencies used by surveyed enterprises in managing their logistics costs, underlining the importance of minimizing supply costs and proposing relevant strategies.

In general, logistics system is a complex system where it is difficult to predict exact expenditures, since total logistics expenses combine obvious and hidden costs. To increase the competitiveness, the companies should calculate total logistics expenses and determine a margin that should not been exceeded by the expenditure.

The research has revealed that surveyed enterprises have different approaches regarding logistics cost management compared to the experience of the companies based in the developed countries. Furthermore, there is an absence of a control mechanism for managing logistics costs in respondent enterprises. For a better understanding, experience of repartition of logistics expenses in respondent companies are compared to the experience of companies based in USA and Europe and results are illustrated in a diagram below (see diagram № 1, p.71).

Diagram 2: Classification of logistics expenses



Source: Developed by the author based on the research findings

As it is demonstrated on the diagram № 1, in US and European companies, logistics costs are divided into four directions, while in our cases only two types of costs are figured out, that are production costs and transportation costs. It is a significant problem, as the costs related to inventory management and warehouse management is equated with production costs in Georgian enterprises. Management of logistics costs has to be conducted continuously by a logistics manager, however in the majority of surveyed enterprise, such position does not exist and thus, logistics costs are not properly accounted. Only 20% of the interviewed

enterprises control it. Consequently, Georgian companies cannot recognize on which link of the supply chain comes bigger expense and thus, cannot make rational decisions aimed at cost minimization.

We consider that high share of logistic costs in the total production cost indicates existence of large reserves in terms of improving economic indicators in managing material flows. Generally, volume of produced goods influence economic indicators of the production, therefore on the one hand, it is not advised to produce such quantity of the product that exceeds demand generated for that period and retain the supplement to meet the demand of the next periods. Maintaining inventory is expensive and requires scarce capital. It is considered that this capital is frozen and over the time it loses the value. Furthermore, keeping a stock, especially of perishable goods, requires special warehousing conditions. At least it needs allocation of the space, hiring of the additional personnel that already generates additional costs. On the other hand, as low the stock level is as high the risks of the deficit are, that can result in losing a customer, delaying production process, decreasing revenue and etc. In case of setting up a low inventory strategy, the company will be obliged to start production when the customer demand arises, so in this case costs associated with technical preparation of the production process will be higher. Well-managed firms should be able to reduce the costs through more efficient production practices and at the same time they might achieve higher productivity through more effective utilization of inventory. Accordingly, the goal of the enterprises should lie within establishing a balance between cost and demand through developing such a production plan that will ensure minimal costs of production, warehousing and other logistics activities while satisfying the customers demand on-time.

Optimization of production systems and minimization of supply costs can be achieved through applying different methods. Among these methods can be listed Pareto analyses, Poke-Yoke, Ishikava diagram (so called fishbone), ABC (Activity Based Costing) analysis and others. In the work, our attention is focused on the ABC analysis as a proposed approach designed for inventory optimization and cost minimization. The ABC analysis or a method of classification is one of the easiest but the most efficient method that is particularly useful for determining which of the company's inventory items impacts its inventory cost the most and has a vital importance in financial stability of the company. It also provides a framework for determining the best ways to manage and control your inventory.

In the paper, the ABC analysis is tailored to one of the respondent compa-

nies. The following steps were undertaken: classification of the items (Find out the unit cost and the usage of each material over a given period); calculation of the revenue for each item (Multiply the unit cost by the estimated annual usage to obtain the net value); determining the effectiveness of each item (List out all the items and arrange them in the descending value); ranking the items according the priority. The analysis was developed for one product group comprising of 12 different sorts of products. After calculating the quantity of the products sold and the revenue generated from it, we were able to define the share of each item in the company's sales through calculating cumulative sales and cumulative revenue. As a result, 3 groups of product (please see the table № 2, p. 73) were identified:

1. Category A ‑ under this category fall the goods with the highest annual consumption value. 70-80% of the revenue of the company typically accounts for only 10-20% of total inventory items.
2. Category B ‑ products with medium consumption value fall under this category. 15-25% of their annual revenue accounts for 30% of total inventory items.
3. Category C – items, falling under this category have the lowest consumption value. 5% of the revenue typically accounts for 50 % of total inventory items.

Table 2: ABC Analysis

Item	Number of sold items	Revenue	Cumulative of sales (%)	Cumulative of Revenue (%)	class
X_8	47 129	565 548	21,7	21,7	
X_3	27 000	453 600	17,4	39,1	
X_7	31 879	255 032	9,8	49,9	
X_1	15 746	188 952	7,3	56,2	**A**
X_6	9 298	167 364	6,4	62,6	
X_2	7 344	161 568	6,2	68,8	
X_4	15 552	155 520	6	74,8	
X_{12}	12 669	152 028	5,8	80,6	
X_{10}	9 024	151 603	5,8	86,4	**B**
X_{11}	14 988	149 880	5,8	92,2	
X_5	5 748	114 960	4,5	96,7	**C**
X_9	12 277	85 939	3,3	100	

Source: Developed by the author

As the table №2 shows, the first seven products (X_8, X_3, X_7, X_1, X_6, X_2, X_4) are ranged in the category A, which means that these items provide 80% of revenue; the items X_{12}, X_{10}, X_{11} represent the category B with a share of 15% in the total revenue, while items X_5 and X_9 are part of the category C, generating 5% of the total revenue.

The ABC analysis provides an analytical report on which item ensures the highest return on the capital invested for the company. Based on hitherto given ratings, the future perspective for the Georgian companies is to target on the sales of the products from the category A. Since China and Turkey remain as the largest markets of raw materials for the Georgian companies, applying Just-in-time method will be difficult due to the delivery time factor. Moreover, it is worth to mention that the companies are holding large amounts of imported raw materials and issue orders 2-3 times per year in order to avoid higher future prices because of the high rate of inflation and to ensure timely deliveries. As the items of the Category A plays an important role in the company's sales, the stock shortage is not allowable, it is recommended that the company has tight inventory control over them and establishes safety stock for this group of products. For the items of the category B the company should issue orders in a fixed period of times. As the items of the group C generate low revenue while handling high inventory costs, it is recommended for the company to move to a Just-in-Time production for these items and thus, select a local supplier of raw materials.

The company can categorize the products into A, B or C categories, but if it does not replenish the inventory properly it will not be able to improve the productivity, optimize production process and gain competitive advantage. 4 methods of stock replenishment were singled out in the work: 1. *Fixed replenishment* that is the simplest model where period and quantity are fixed; 2. *On-demand replenishment*, neither the quantity of the inventory nor the date are fixed; 3. *Periodic replenishment*, the idea is to replenish the stock level to the maximum quantity at fixed period of time; 4. *Order point method*, when the company orders the fixed quantity of goods at variable periods.

We think that the most optimal strategy for the Georgian companies is to use Order point method of replenishment, which implies that minimum stock level is defined as the reorder point. When the inventory level drops to the reorder point it will be replenished. In the work the method is discussed using a concrete example (please see the table №3, p.75). We have to take into account, that the company sources the raw material from Turkey, delivery time is 10-14 days and

manufacturing process takes additional 2-3 days. As the goal of the company is to meet customers' demand on time, it keeps stock and by the time of the interview it had 3 000 items of finished goods.

Table 3: Stock replenishment method

Week	Order from customer	Need	Stock	Order to supplier	Supply
W 1	80			80	
W 2	40	120		40	
W 3	70	110		200	80
W 4	114	184		200	40
W 5	83	67		100	200
W 6	126		7	100	200
W 7	62		45	100	100
W 8	75		125	70	100
W 9	105		120	70	70
W 10	93		97	70	70
W 11	130		37	100	70

Source: Developed by the author

Supposing that the company turns to the new method of the replenishment with the zero stock and in the first week the company receives order on 80 items, while in the next week on 40 units. Since the company does not have a safety stock established it will face a deficit of 120 items. As the delivery time requires up to 2 weeks, customer demand will be satisfied after this time and the deficit will increase if the company does not take appropriate actions to replenish the stock. It means that from the third week the company should start establishment of the reserves. It is suggested that for the next two weeks the company orders raw material for processing 200 items of finished goods and afterwards follow the next strategy:

1. If the stock is below 50 items, the company will issue order of raw material to produce 100 units of the finished goods;
2. If the stock is between 50-100 pieces, the order volume will amount to 70 pieces;
3. If the stock is between 100-150 pieces, the order will be issued for 50 pieces;
4. If the stock is more than 150, the order will not be issued;
5. If the stock drops to 0, the company will order 200 units of the raw materials.

The orders will be issued based on the requirement and the order volume will

be determined by remained level of the stock. Applying a new approach will support the company to achieve several goals, such as maintaining the customer service quality through maximizing production efficiency, reducing the costs related to storage and transportation and redirecting this money to improve the product features.

Since the cost management is:

- Knowing where, when and what amount of the company's resources are used;
- Predict where, for what purpose and how much financial resources are needed;
- Ability to utilize resources to maximize return on investment

it can be noted that applying the ABC analysis and adopting inventory management method will assist the Adjara based enterprises to fulfill all above-mentioned tasks. Companies will be able to produce the product that will bring the highest revenue, control the costs associated to the production of each item and make efficient and justified decisions.

As global industries become increasingly connected, the more the firm is engaged in international trade, the more it needs to maintain a balance between cost, simplicity and control. This balance cannot be kept without proper information systems put in place. The information flow and accuracy were often overlooked because they were not viewed as being critical to customers. However, in modern times and the realities of the market economy, information is considered as one of the most important factors in the proper management and operation of the company. It is a phenomenon without which, the successful functioning of the company is not possible, as without applying information technologies companies do not have an organizational vision, in particular it worsens financial and managerial reporting and business analytical capabilities. As a result, all of this leads to low income, weak financial and risk management. Thus the third sub-chapter of the work "Role of information technologies and computerized systems in improving production logistics" broadly defines the role and possibilities of information technologies in optimization of production logistics and minimization of supply costs.

In the era of globalization and informational revolution, the businesses apply information technologies in order to increase efficiency and transparency of the business processes. In the study it is emphasized that along with the efficiency and transparency, comprehensive supply chain initiates, monitors, assists in

decision-making, reports on activities required for completion of supply chain operations and at the same time enables the companies to avoid high supply costs. We declare that the most applicable supply chain information support technology is the ERP (enterprise resource planning) system that ensures the fulfillment of all above-mentioned tasks in an integrated way.

The ERP system is the backbone of most firms' logistics information system and main sphere of its use is manufacturing. The research of production logistics system showed that in respondent companies, application of information technologies is very low. Based on their experience toward usage of informational technologies, three groups of enterprises were singled out:

1. 65% of the companies do not have information regarding the ERP systems. They think that keeping excel document is sufficient for reporting production and inventory level;
2. 25% of the interviewed companies use accounting programs such as Oris management, 1C and Info for inventory management. 40% of them are aware of the ERP system, but due to the lack of finances cannot purchase and apply them;
3. 10% of the surveyed companies have already integrated informational technologies like the Apex (Georgian program) and the SAP (System Analysis and Program Development). They are financially stable companies that are headquartered in Tbilisi and have branches in the Autonomous Republic of Adjara.

During the research it was identified, that among different departments of the surveyed companies information flow on the basis of which the purchase order is issued and production process is planned is quite scattered. It results in inappropriately issued orders and inaccurately launched production process that causes ineffective use of the company's resources. This can be explained by non-use of information logistics technologies that is instigated by the fact that majority of the companies participated in the survey do not recognize the benefits of the ERP system and those who are aware of its advantages mention high implementation costs and incompetent specialists as a hampering factors of its adoption. Accordingly, it is essential to imply activities in two directions: 1) increase awareness of importance on information logistics system among local businesses and 2) find cheaper alterantives to expensive ERP systems.

We consider that awareness-raising activities can be undertaken by Adjara based Logistics, Transport and Shippers Association operating under the Adjara

Chamber of Commerce and Industry. The association can adopt a model of European logistics association that along with offering various services to its members acts as a training center and provides knowledge enhancement trainings in logistics and supply chain design, production planning, warehousing, transportation, information logistics systems, demand and distribution requirements planning, medicine logistics and other logistics issues. As a result, Adjara Logistics, Transport and Shippers Association can contribute to increased logistics competences that in turn will be reflected in introducing of modern logistics concepts and decreasing logistics costs in the local enterprises.

It is worth mentioning, that even in case of raising awareness on importance of information systems and benefits of automated technology, the problem associated with the cost of the programs will still remain unsolved. Georgia based consultancy companies offer businesses high-value and leading ERP programs such as SAP, DirecOne, Oracle, SQL, Microsoft Dynamics NAV and others. These ERP systems are priced on a per-user basis. Implementation cost starts at 5,000 USD, while license per user varies from 1,500 USD to 4,000 USD, based on the number of modules implemented. The paper discusses the working principles and advantages of Cegid Manufacturing PMI that is ERP system developed by a French company Cegid, price of which starts from 2,000 Euros and increase in accordance with customization level.

At the end of the work it is outlined that through implementing the ERP systems in Georgian companies, logistics operations will become automated and the companies will transit to the new stage of development. To emphasize our statement, several examples of the achievable benefits offered by the ERP system are provided:

- As soon as the customer's order is registered in the program, demand on the raw materials will be automatically displayed in the module "purchase" and in case if the products are already available, demand will be displayed in the module "stock" and execution of all these activities will require less than 1 minute;
- Demand on raw materials will be made based on the analysis provided by the program that will facilitate determination of the optimal size of the required materials required. It will considerably decrease stock deficit or surplus and thus costs related to it;
- Inventory management and control, order issuance, production planning and other logistics activities will be simplified and information on

undertaken actions will be available as for the directors, as well as to other employees using the program;

- The program will combine the WMS (warehouse management system) function. The products/raw materials delivered in the warehouse will be automatically displayed in the module “accounting”, so it will not require additional employees to make inventory, thus the company will save on associated money;
- The program will perform the TMS (transport management system) functions that will enable companies to develop optimal schemes for transportation and hence reduce fuel costs and decrease delivery time;
- Time of developing different documents will be reduced and errors occurred during manual entry will be eliminated. Timely and quality information flow will be ensured between different logistic sub-systems that will increase transparency of business operations;
- Part of the labor work will be replaced by the program, thus the money spent on salary will be saved and the company can use this funds on different tasks such as increase of employees’ productivity;
- The ERP system will integrate all business operations in one system, that means that it will not be required for the company to purchase separate software for accounting, administrative, warehousing and other departments anymore;
- Automated management systems will hasten the managerial decision making process and optimize it via virtual logistics.

  If we consider that:

  - ✓ Reduction of logistics costs by 1% has the same effect as increase of sales volume by 10%;
  - ✓ Production logistics costs represent 8-10% of the total logistics cost;
  - ✓ Through proper inventory management it is possible to decrease related costs by 30-50%;
  - ✓ Improvement of the supply efficiency by 20-30% (through decreasing costs) is achievable through effective management of warehouse logistics;
  - ✓ Improvement of sourcing, which represents on average 55% of the production cost, will contribute to decreasing of product’s cost

it can be declared that putting recommendations provided by us into practice will considerably reduce supply costs.

To summarize, logistics is a relatively new and young field of economics and human activity in Georgia. Georgia's production logistics system is still far away from the respective standards applied in the developed countries. If the companies have not adopted an integrative approach, logistics system may remain a fragmented and uncoordinated set of activities spread throughout the organization with individual functions, budgets, priorities and measurements. A non-integrative approach to logistics costs will lead to attempts on reducing specific costs within the logistics function which may not be optimal for the system as a whole and may lead to greater total costs. It should be noted that production logistics system should not be considered in isolation but as integral component of the supply chain. Therefore, for its proper functioning it is important to improve the performance of other logistical elements as well. To conclude, optimization of logistics potential and minimization of supply costs play a key role, and have an important impact on, both well-being of a company and the economy of a country.

Conclusions and Suggestions

Research conducted enables us to provide number of conclusions and formulate several recommendations, including:

1. Development of manufacturing and promotion of supplier-buyer relations have initiated integrated management of raw materials, finished goods and services, that made it necessary to improve production quality of the goods which is impossible without optimizing sourcing, production, selling and other business processes. All above-mentioned created an incentive for development of a new discipline – logistics as a tool of improving production efficiency and management. In Georgia, logistics is on its early stage of development and logistics market of the country is fragmented. We named Soviet Regime as a deterrent factor for the system development. Development process moved further in 1991 following the collapse of the Soviet Union, implementation of market principles and mass privatization;
2. Adjara based enterprises are not aware of modern logistics principles and logistics remain to be a new and unstudied sphere. Development of logistics sector is taking place slowly. On the one hand it is caused by the lack of state resources and inappropriate policy, on the other hand increased competition and low level of infrastructure and production development. Accordingly, we describe Georgia's logistics system by a relatively low speed of production flow from producer to customer, low quality of the reliability and high level of unfulfilled demands.
3. It is important to share foreign experience. Based on the analysis of the logistics system of France, we can declare that in the developed countries improvement of logistics infrastructure plays a key role in perfection of the logistics system; Diversification of logistics services is important to maximize logistics potential of the country; Inventory management is considered as a tool of supply costs minimization; Importance of information logistics increases in businesses; Geographic dispersion of logistics services increases and industrial zones are massively transformed into logistics centers; Raising logistics competence level in employees is a quite actual issue in companies and finally, involvement of the government in the development of logistics industry is necessary in order to attract new investments in the field and plan specific actions focused on logistics evolution;

4. Analysis of logistics potential of the Autonomous Republic of Adjara has demonstrated that its geographical location offers quite large logistics opportunities to Georgia, especially for becoming a regional transit center. However, the study has also revealed that existing potential is not fully utilized at the regional level and it is highly affected by micro, macro and meso factors. The study of the trends of improvement of the business environment has showed that Georgia's business environment is still facing significant challenges, which impede development of the logistics sector not only at the regional but at the national level. The future strengthening of Georgia's transit function depends on coordinated work of all supply chain actors, development of railway, port and road infrastructure and logistics centers;
5. The main challenges remaining in the logistics sector are: - manufacturing process is not planned according to customers' requirements; - purchase of raw material is carried out in advance and in large quantity; - technical specifications of machinery is very low; - Application of information technologies is low; - Time of the personnel involved in manufacturing process is managed inefficiently and finally, logistics sector is fragmented;
6. Production logistics acts as a mediator in the integrated logistics system, as it depends on procurement department and its performance affects a performance of the sales department. Accordingly, findings of the production logistics research conducted in the Autonomous Republic of Adjara confirm that in Georgia appropriate measures need to be taken not only for improving the production logistics system, but for perfecting the whole logistics system. A systemic approach is required to achieve production logistics operational excellence, therefore, it is recommended to develop a logistics system in accordance with supply chain operations reference model and key performance indicators;
7. The precondition for optimizing production logistics is defining the highest income-generating group of the products. We consider that applying the ABC analysis is the most optimal decision for Georgian companies, due to its simplicity, rapidity and reliability, as implementation of the method does not require additional time or financial resources;
8. Optimization of the production process is not achievable without establishing appropriate sourcing strategy. As majority of the Georgian companies import raw materials, Just-in-Time method cannot be applied in manu-

facturing process. Moreover, due to variable and uncertain market demand it is not reasonable to purchase raw materials in large quantity. As deficit of the stock leads to economic losses, the same effect has stock surplus. Therefore, it is important for Georgian companies to establish a safety stock and issue orders based on the stock level. For determining accurate volume of the order it is important to opt for an appropriate stock replenishment strategy. There are 4 methods of stock replenishment, but we consider that for Georgian companies it is advisable to use Order Point Replenishment method;

9. Appling the ABC analysis in manufacturing process and using order point replenishment method will enable the companies to produce the products that will generate the highest income, control production cost, minimize inventory and make effective managerial decisions. All this will positively impact supply costs, in particular, costs of producing less profitable products, inventory management and warehousing operations will decrease.
10. One of the important aspects of optimizing production logistics system and minimizing supply costs lies within introducing informational technologies in business operations. First of all, it is vital to raise awareness on the advan-tages of information logistics and automated technologies in Georgian companies. The trainings and qualification courses will support development of the whole logistics system. We consider that in this direction the role of the Adjara Logistics, Transport and Shippers Association is significant. With support of the Government the development strategy of the association should be drawn out as well as the trainings modules have to be developed in order to create access for local companies to different logistics services aimed at enhancing their logistics knowledge that in turn will be reflected in introducing of modern logistics concepts and decreasing logistics costs in the local enterprises;
11. With the rationalization of logistics, more attention is drawn to the information flow. Improvement of information flow can often bring a greater effect than technical innovation. Introduction of the ERP (Enterprise Resource Planning) system is the most efficient tool to manage inventory, plan production process accurately, organize transportation processes and implement other technical operations. With the help of the ERP system, the companies can foresee and balance demand and supply; effectively use human resources; receive all necessary information on time; plan, control and

analyze expenditures and revenue; improve accounting and reporting; control costs and profit; increase error-free documents and decrease related costs;

12. Production logistics should not be considered in isolation but as integral component of the supply chain. Therefore, for its proper functioning it is important to improve the performance of other logistical elements as well, where the role of the Government is as significant, as of the private sector. It is particularly important to develop transportation logistics system and its infrastructure. We consider that improvement of the transport infrastructure will have a synergy effect on the development of production logistics system. We believe that from the state's perspective, development of the transportation system should start from strengthening technical regulations applied to the road transport and executing of existing laws that will oblige transport companies to bring their fleet in accordance with international standards. This on its turn will support Georgian companies to be engaged in a competitive struggle and international trade, at the same time the local businesses will have access to improved and quality transportation services;
13. Improvement of the transportation system has a vital role in fulfillment of logistics potential of the Autonomous Republic of Adjara, particularly if we consider different projects such as "Silk Road", "TRACECA", "Baku-Tbilisi-Karsi Railway" that promotes the transit role of the Autonomous Republic of Adjara. It should be noted that increased volume of cargo will raise the issue of necessity of improving transportation system in the Autonomous Republic of Adjara, as with existing infrastructure Adjara based road haulage companies, Batumi port and railway can not provide the quality transportation service. We consider that development of different sector of transporation systems depends on their strong collaboration and coordinated work which can be achieved thourgh forming the logistics clusters. Logistics clusters will ensure development of integrated transport system and collaboration not only between transport market actors but with the state institutions. It is an effective tool that will lead to improved information flow, optimization of business processes, stimulation of innovation through knowledge and expertise transfer, minimization of logistics costs and improvement of service quality. All abovementioned outcomes will increase the competitives of the Autonomous Republic of Adjara, enhance its investment attractiveness, support development of integrated logistics

system and engagement of the Autonomous Republic of Adjara in the global logistics network;

14. Perfection of logistics system cannot be imagined without competent and qualified human resources. In this regard, the role of the Government is immense as it can ensure integration of the logistics in higher educational establishments and at the initial stage offer full funding of the discipline. This in turn will guarantee providing qualifying personnel to the logistics labor market and will impact the performance of the pirvate sector logistics actors.

The approbation of the work. The main conclusions, sentences and recommenddations are given in the Author's (N. Tchilaia) articles and in the materials of scientific-partial conferences:

1. Tchilaia N. „ABC analysis as an approach of Inventory management". IV International Research and Practice Internet-Conference of students and young scientists -"Innovative Development and Cross-Border Security: Economic, Environmental, Legal and Socio-Cultural Aspects", pp. 807-809, Chernihiv 2015

2. Tchilaia N., Gechbaia B., „Logistics challenges confronting Georgia on its path to EU integration". Proceedings of International scientific works -„Ukraine - EU. Modern Technology, Business and Low" (ISBN 978-966-7496-71-5), pp. 40-42, Republic of Slovakia-Poland 2016

3. Tchilaia N., "Importance of information flow in supply chain and innovative solutions". Proceedings of International Scientific-Practical Conference for students and young scientists - "Youth Science-2016: Socio-Economic and Humanitarian Aspects of Society Development", pp. 172-176. Chernihiv 2016

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5. Tchilaia N., "Georgia's logistics system: problems and perspectives", Monthly International Reviewed and Refereed Scientific Journal „Economics" (ISSN 0206-2828), №7-8. pp. 17-32. Tbilisi 2017

6. Tchilaia N., "Evolution of logistics system and Georgia's experience face to it", International Scientific Refereed and Reviewed journal "Innovative Economics and Management" (ISSN 2449-2418), № 4, pp.44-48, Batumi 2017