

## TOTAL LOGISTICS MANAGEMENT CONCEPT AND PRINCIPLES IN MANUFACTURING ENTERPRISE

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### *Abstract*

Strong dynamics of social, political and economic changes in 21st century generates new problems the citizens, politicians and managers need to face. Significant increase in the variety and scale of the problems has been evident in the economic sphere, particularly in case of manufacturing companies. It resulted in the continuous search for better solutions to be implemented in company organization and management.

The analysis of academic studies in logistics indicates one of the serious issues is the existing knowledge implementation and its long-term improvement. Lean Supply Chain, Agile Supply Chain, Leagile Supply Chain, Flexible Supply Chain, Resilient Supply Chain, Green Supply Chain are some of the new concepts developed for the complimentary use in logistics. The legitimate questions arises whether the above-mentioned logistics management concepts could be combined into one coherent idea called Total Logistics Management.

The article presents the concept and assumptions of Total Logistics Management used as the 21st century manufacturing company management perspective.

**Key words:** concept, logistics, management, company, TLM

### 1. INTRODUCTION

The range of theoretical and practical academic studies in manufacturing enterprises management in 20th century is exceptionally wide. Concepts of Lean Management, including Lean Manufacturing (LM), Flexible Manufacturing Systems (FMS), Just in Time method (JiT) used in Toyota Production System (TPS) had an enormous impact on the companies operation at the end of the 20th century. Simultaneously, the need for continuous quality improvement was acknowledged. Total Quality Management (TQM), Six Sigma and quality management standards developed by the International Organization for Standardization (ISO) are the best examples. The application of specific tools related to the above-mentioned concepts, such as waste reduction (Muda), Value Stream Mapping (VSM), 5S practices or the

use of quality improvement methods and techniques, f. ex. Quality Function Deployment (QFD), Failure Mode and Effect Analysis (FMEA) and Six Sigma (DMAIC - Define, Measure, Analyze, Improve, Control or DMADV – Define, Measure, Analyze, Design, Verify) are becoming insufficient to enhance company's competitiveness in the global market. Similarly, quality standards based on ISO, have become excessively bureaucratic tools which promote the organization's development to a lesser extent. The quality theory of „full customer satisfaction” put forward by Deming has been confronted by an economic challenge. Excellent products have not been replaced, thus decreasing the demand in the market. At the same time, facing the exceeding globalization process, many companies have realized the significance of the effective and efficient goods and information flow reflected in the Supply Chain Management (SCM) concept. It is worth noting numerous companies have adopted the presented organizational solutions as their standard procedures, however, they have not been able to address the 21st century challenges. The evolving Supply Chain Management following the 7Rs principle - right product delivered at the right quantity and condition to the right place at the right time and price to the right customer, (Shapiro & Heskett, 1995, p. 6), at the turn of the centuries, had to respond to the globalization consequences such as the offers individualization or extended networks between supply chain participants. It was an incentive to search for new organizational solutions which might rationalize and optimize the goods, materials, products and related information flow, providing the ground for the new logistics concepts development.

## **2. SELECTED CONCEPTS OF LOGISTICS MANAGEMENT IN MANUFACTURING ENTERPRISES**

Based on the literature review, the following concepts related to the logistics management or supply chain management are currently frequently discussed:

- lean (management, manufacturing, supply chain, logistics),
- agile (management, manufacturing, supply chain),
- leagile (manufacturing, supply chain),
- resilient (supply chain),
- green (manufacturing, supply chain, logistics).

In order to give an overview of the issues connected with the above-mentioned concepts and incorporate them adequately into the TLM philosophy, their key elements will be briefly discussed.

The first concept discussed, Lean Logistics, is deeply rooted in Lean Management and Lean Manufacturing principles. Lean Thinking idea was developed by Womack and Jones in their book of the same title (Womack & Jones, 2001, p. 27). Toyota Production System, based on TQM philosophy, and JiT method (transferred to any production type, including unit and low-volume production) provided the foundation for their considerations. They also highlighted concepts such as: value (value stream), flow, waste and excellence/perfection. Another Lean concept key element is the change from “push” production system based on forecasts to “pull” production system based on actual customer needs. On that basis, a number of „lean

thinking” elements have been transferred to logistics. According to Hines, Jones and Rich, Lean logistics is based on TPS, implementing extended TPS principles throughout the whole supply chain from the customer to the raw materials and materials necessary for production. As the authors point out, Lean Logistics key words are identical as the above-mentioned TQM philosophy key concepts: value, value stream, flow, pull system and excellence (Jones et al., 2004, p. 153-156). The authors’ explicit reference to excellence indicates a great impact of TQM and continuous improvement KAIZEN philosophies. Therefore, it seems Total Logistics Management concept assumptions should include selected TQM elements. Additionally, the same authors, referring to the book by Womack and Jones (1996, p. 12, 129, 134) developed an idea of lean thinking in logistic processes, i. e. lean manufacturing, lean storage, lean orders handling, which could be naturally followed by lean packaging or lean transport. Swamidass (2000, p. 346) defines Lean Logistics as the Lean Management philosophy principles implementation into supply chain processes. The statement could be extended to functional and phase logistics division. Therefore, Lean Logistics philosophy is an implementation of principles connected with waste reduction, value creation, flow improvement, pull production system, striving for perfection in all logistics phases (supply, manufacturing, distribution, disposal and returns) and functions (transport, storage, inventory management, orders handling, packaging) in the enterprise. Lean Logistics refers to the idea of Lean Supply Chain, which focuses on the waste reduction at every supply chain phase. In many cases Lean Supply Chain is presented as the logistic chains strategy (Goldsby et al., 2006, p. 58), however, having analyzed the above-mentioned facts, one might challenge this approach.

Whereas Lean-based management concentrates on generating maximum output value while reducing any waste, Agile management focuses on increasing efficiency, flexibility to adjust to the customer needs as quickly as possible.

Agile management or manufacturing is strongly related to the supply chain flexibility. The concept of Agile Supply Chain was defined by Harrison and van Hoek (2010, p. 273). They indicated four basic agile supply chain dimensions:

- client orientation (market sensitivity), understood as the ability to identify and satisfy the actual customer needs,
- partnership in relations (partnership cooperation) among all supply chain participants understood as joint and compliant cooperation of the supply chain participants,
- process approach to supply chain (processes integration), interpreted as combining and integrating all supply chain business processes into one coherent system,
- IT use in supply chain (virtuality), promptness, accuracy and efficiency of the information transferred becomes the key to the whole system flexibility.

Saadoon Al. Samman (2014, p. 1093) claims that agile manufacturing, the basis for agile supply chain, should indicate the following features:

- high quality and high adjustment level to the customer needs (customization),
- high information availability related to the products and services and added value maximization,
- key competences absorption,

- sensitivity to social and environmental issues,
- use of numerous technologies combination,
- capability to respond to a volatile and multidimensional demand,
- internal and external enterprise integration.

The same author pointed out some of the basic advantages of Agile manufacturing which include: prompt and effective response to the customer needs in the changing market, ability to adjust and deliver the products according to the customer needs, the ability to produce and deliver new products while optimizing costs, decreasing manufacturing costs, increasing customer satisfaction, higher competitiveness, reduction of no-added-value processes.

The decision which concept (Lean/Agile) should be superior, in the view of presented Agile supply chain and Agile manufacturing dimensions, is challenging. It should result from the concepts comparison and identifying key differences between them. Additionally, such comparison should facilitate understanding the assumptions behind the Leagile Supply Chain concept.

Christopher (2000, p. 38-39) performed the comparison and recommended Lean concept for high-volume and mass production, with little product diversity and predictable environment. Agile concept, according to Christopher, should be dedicated to more dynamic environment, with the tendency to an increased product diversity. In his opinion, a crucial barrier for the company to experience full benefits of Agile concept is product diversity caused by the extensive marketing activities. The synthesis of both concepts inevitably leads us to the Leagile concept presentation.

Leagile supply chain concept was accurately defined by Mason-Jones, Taylor and Towill (2000, p. 4064). They define Leagile concept as a combination of lean and agile concepts in supply chain management. It is based on material decoupling point, the furthest in material flow to which the customer orders can reach. In other words, it is the place where the orders handling-related activities (demand) meet manufacturing-related and forecasting activities. Saadoon Al. Samman (2014, p. 1094) claims the decoupling point is a place where manufacturing efficiency and effectiveness are more important than other supply chain elements. Mason-Jones, Taylor and Towill indicate that demand-driven processes should follow Agile philosophy principles, forecasting activities should rely on Lean philosophy principles, thus creating Leagile idea. The authors also highlight the Lean processes direction which, according to pull production system concept, should be opposite to materials flow – pulling in the goods from the system in a way that the Agile concept processes follow the same direction as the materials flow. This should ensure meeting the diversified market needs. Leagile concept is a lean, flexible response with a given product to volatile customer needs at the turbulent market acquired by lean processes used to manufacture the product. It clearly shows the Leagile concept's dichotomous nature of lean production and agile response to customer needs (not necessarily based on Lean philosophy) (Pietroń et al., 2016, p. 48).

Another concept that deserves to be discussed is the Resilient Supply Chain (RSC) Christopher and Peck (2002, p. 2-3) describe it as constantly developing branch in management studies. They define resilience as the system ability to return to its initial state or new, desired state after the negative processes that influence the system have been eliminated. The resilience is strongly related to risk. Deloitte (2013, p. 6)

determines the need to create Resilient Supply Chains addressing the following risk types:

- macro environment risk (resulting from globalization and gaining access to new markets which increases the supply chains complexity and vulnerability to issues such as natural disasters, political turmoil or economic crises),
- extended value chain risk (resulting from outsourcing and core competences issues – dependence on suppliers and sharing outsourcing and commissioning risks),
- operational risk (resulting from enterprise internal processes and their risk – development, planning, manufacturing, distribution, returns and resources) ,
- functional risk (relating to the business functions that support supply chains, such as Finance, Human Resources or IT).

In the same Report Deloitte proposes four key pillars of Resilient Supply Chain: visibility, flexibility, collaboration and control. In fact, the key attributes of Resilient Supply Chain could easily become a foundation for any supply chain. All four pillars, supported by processes, human resources and technology, constitute the Resilient Supply Chain concept.

Bukowski (2012, p. 530) presents RSC as a supply chain management strategy aimed to reduce risks within the entire supply chain and the enterprise itself. He indicates a number of the concept's characteristic features such as demand-adjusted supply chain design, creating alternative ways, supply chains reduction, taking dependability into account when designing supply chains, increasing inventory and pace of goods transfer in the supply chains, generating spare capacities in the process, partners' collaboration and trust, the use of decoupling point initiating the Agile and Lean concepts implementation, relations management with the suppliers, processes standardization and unification and visibility understood as information availability for all supply chain participants. Bukowski points out there is a threat when implementing Resilient concept to reduce the existing supply chain efficiency where the processes are stable and predictable. Another study by Shefei and Rice defines RSC as capable of responding to unexpected situations and restoring the regular functions (Shefei & Rice, 2005, p. 41). Bukowski and Feliks (2012, p. 529) stress the RSC concept's multidimensional context. They concentrate on the dependability qualitative definition (in terms of resilience) which includes the idea of trusted (reliable) services supply. Interestingly, such dependability definition has been so far rather used in the Information Technology and computer sciences.

Original approach to supply chains safety measurements was presented by Rice and Caniato (2003, p. 24). They notice the companies usually refer to safety measures undertaken in three areas: physical, information and transport.

The literature review of RSC concept leads to a conclusion it has become one of the most widely discussed and dynamically developing issues in logistics. If we combine it with the issues of company security in 21st century it will definitely remain the key element of logistics management.

The final concept to be presented is called Green Logistics (GL) or Green Supply Chain Management (GrSCM), a pro-ecological logistics management concept. According to Srivastava (2007, p. 53) the increased significance of GrSCM directly stems from the deteriorating environment condition reflected in lower supply of raw

materials, excessive waste and increased pollution levels. The author sees GrSCM as a natural consequence of the evolutionary change in manufacturing companies which replaced a reactive approach to environment management based on developed programs with a more pro-active approach reflected in "various Rs" principle:

- Reduce,
- Re-use,
- Rework,
- Refurbish,
- Reclaim,
- Recycle,
- Remanufacture.

Green Supply Management concept is in fact a combination of environment management and supply chain management. The scope of GrSCM definition is extensive. The notion "green" (meaning eco-friendly) has been assigned both to purchasing and integrated supply chains which forward the goods from the suppliers via manufacturers to the final customers (Zhu & Sarkis, 2004, p. 266). Srivastava (2007, p. 54) defined Green Supply Chain Management as an integrated environmental thinking within the framework of supply chain management which includes product design, search and selection of materials and raw materials for the given product, manufacturing and delivery to the final customer, pro-active approach to exploited product – Reverse Logistics. It is important to note here the notion of "green design" which takes environmental aspects into account throughout the whole product life cycle. This enforces a multivalent approach to product design which takes into consideration issues of environmental risk management, occupational health and safety, rational materials use or waste reduction.

Green Logistics concept has been defined in a wider company strategic perspective. Sbihi and Eglese (2007, p. 99) claim Green Logistics focuses on goods manufacturing and distribution related to sustainable development idea which considers social and environmental factors. Not only do logistic processes economic aspects matter but also their widespread impact to the society. Additionally, the authors argue any GL activities should include the environment impact measurements of the distribution strategies used, minimizing energy use in logistic processes, waste reduction and precautionary measures undertaken.

It is clearly seen both GrSCM and GL concepts have roots in Lean philosophy and Resilient Supply Chain concept, particularly in the areas of security, safety and risk (although from a different perspective). Such similarities and differences become a perfect foundation to define the basic assumptions of the total company management through logistics.

The discussed logistics management concepts differ slightly in the essence and the comparison between all of them might be difficult. Agarwal, Shankar and Tiwari (2006, p. 212) compared Lean, Agile, Leagile Supply Chain concepts according to the following criteria – Table 1.

**Table 1. Comparison between Lean, Agile, Leagile Supply Chain concepts**

	<b>Lean</b>	<b>Agile</b>	<b>Leagile</b>
Market demand	Predictable	Volatile	Volatile and unpredictable
Product range diversity	Low	High	Medium (Optimized)
Product life cycle	Long	Short	Short
Buyers preferences	Cost	Lead time and availability	Service quality
Dominant costs	Actual operating costs	Costs to maintain market availability	Actual operating costs and costs to maintain market availability
Ways to make the products available	Long-term contracts	Immediate and changeable	No possibility to run out of stock, permanent availability
Purchase policy	Goods purchase	Suppliers capabilities management	Purchase management by the supplier
Information enrichment	Highly desired	Essential	Significant
Typical goods	Goods	Fashion goods	Customer-adjusted goods, Customized goods
Lead time reduction	Significant	Significant	Desired
Waste reduction	Significant	Desired	Optional
Relations stability	Optional	Significant	Desired

Source: own work based on (Agarwal et al., 2006, p. 212)

As can be seen in the Table presented, the authors indicate a number of approach differences between Lean and Agile concepts. They also highlight where Leagile concept draws the most from Lean and Agile Supply Chain concepts. The authors confirm that supply chain „leanness” in certain conditions can be an element of “agility”, at the same time it impedes the organizations ability to meet the customer needs promptly. It is important to note that the criteria selected by the authors are mainly based on two operational elements – meeting the customer needs and the elements characteristic to those activities as well as the processes operationalization which leads to meeting the needs. In particular, the last four items, i.e. quality, cost, lead time and service quality level are only partly realized to the benefit of the customer and three quarters become an element of the market supply-demand “game” and are controlled by the market hidden hand.

From the presented table we can see that the “agility” concept mainly refers to fashion goods for which style and originality are more important than price. This in turn suggests Leagile concept should address the precise customer needs in accordance with the market supply, therefore the product range should be highly

customized and the offered service quality should be a major concern. It seems that the comparisons included in Table 1 are somewhat in their extreme, as in case of forecasting mechanisms.

It indicates Lean Supply Chain concept is based on algorithmic supply forecasts which is more relevant to push manufacturing system rather than pull manufacturing systems (an integral part of Lean concept). Similarly, determining supply as predictable for Lean and unpredictable and volatile in case of the two remaining concepts seems unjustified. Supply predictability in Lean concept is a result of its “manufacturing” approach to the offered product range rather than concentrating on goods aimed to meet any possible imaginable customer needs. These concerns do not impact the importance of the comparison in the attempt to define the assumptions of Total Logistics Management concept (Pietroń et al., 2016, p. 52).

The criteria selected by the authors make it difficult to include Resilient Supply Chain and Green Supply Chain into the comparison. In many cases they constitute an additional criteria supplementation. It proves the Total Logistics Management multidimensional character which results from the complexity of conditions in which modern logistics and supply chains operate nowadays. In the author’s opinion, the discussed concepts seem insufficient to define thoroughly the Total Logistics Management.

### **3. TOTAL LOGISTICS MANAGEMENT**

The review of selected Logistics Management concepts may serve as the basis to define the assumptions of Total Logistics Management (TLM) concept. At the same time, there is the need to perform a literature review of the studies which discussed the issue.

Bukowski is one of the Polish authors who covers the TLM issues and his findings are worth mentioning. He maintains (Bukowski, 2014, p. 1709) the essence of Total Logistics Management concept should be based on a combination of three dominant concepts in Logistics Management, namely Lean, Agile and Resilient. One needs to notice that part of those concepts – Table 1 are contradictory in nature which might impede the attempt of complete and systematic Total Logistics Management conceptualization. The author justifies his approach by formulating the main strategic and operational goals in supply chain and they are the rational risk management and supplies continuity in his opinion, with such goals defined, the issues of safety and security, dependability, survivability and resilience needs to be taken into special consideration. However, it should be noted, his TLM definition ignores two significant aspects: ecological aspect addressed within the framework of Green Logistics concept and Leagile Logistics concept. What is more, there are other fundamental areas in company management, for example, quality management, which have strong impact on the TLM concept. With his approach one can assume TLM concept puts Logistics and Supply Chain management in the sphere of operational company management.

If we adopt a different view of the TLM concept seen as a strategic tool in company operations, similarly as the idea of global logistics, we can find numerous



references in literature. Kotabe and Helsen (2010, p. 322) define global logistics as a designed and managed system in which managing and monitoring the goods and information flows takes place in three dimensions: internally within the organization, by the organization and externally at the global scale. The whole system is aimed at the strategic goals achievement at the lowest possible total cost. It is difficult to achieve due to regional differences concerning transport, storage, packaging, orders handling and inventory managing. It requires taking a strategic look at the company.

The assumptions of the TLM concept first need to be embedded in Logistics Management and Supply Chain Management concepts either in the view of the enterprise's strategic/operational functioning or its functional/process categories.

If we take a closer look at the TLM concept proposed by Bukowski we can clearly distinguish internally and externally integrated operational approach to logistics characterized in functional/process categories for the whole company. Obviously, strategic decisions on adopting Lean, Agile, Leagile or Resilient concepts are crucial for the company, however, they concern only company logistic functions and they should not enforce other organization processes subordination to logistics. Purely operational and slightly process approach has been adopted by the Global Logistics Excellence authors. Similarly to TLM concept, strategic choices are limited to key supply chain elements, regarded as one of the organization management aspects – a more functional approach. In both cases the organization searches for solutions optimizing their activities with respect to 7Rs (right product, client, price, place, amount, quality (condition), logistic activities). Logistics does not become a superior element of the business model creation but is one of the functional areas which undergoes management processes (Pietroń et al., 2016, p. 61).

It seems that Global Logistics Management or Global Supply Chain Management enforces a different look at the company's logistic issues. For many enterprises marketing-supported logistics should become a strategic operating element and other company operations are subordinated. According to this approach, TLM should be defined as the realization of all organization operations and processes in order to obtain an effective and efficient goods and information flow. The subordination should not have a "monopoly" character. Logistics (effective and efficient goods and information flow) should be the main and superior assumption in the company functioning. Two dimensions of the phenomenon need to be indicated here. The first one concerns the physical flow of goods and information beginning from the raw materials, through manufacturing and final customer to reverse logistics. The other concerns the products and services development from the logistics perspective. Neither of the two presented approaches undermines the existing practical and theoretical knowledge. They are complimentary and constitute a new and more mature stage in the logistics development within the organization.

The second assumption seems particularly important. The product design processes are key elements in this Total Logistics Management definition. Quality Management concept mainly focuses on continuous processes improvement, however, the very product is equally important. In many cases it is modified to meet the requirements of internal and external clients. The care about the external client satisfaction is obvious, whereas the conceptual product design which takes into

consideration process and staff needs reflects the enterprise's maturity and high organizational culture (Bielecki & Szymonik, 2013, p. 5).

Similarly, in Logistics Management and Integrated Supply Chain Management, the very product, with respect to its properties and features, is of great importance. Depending on the possible range in design changes, the appropriate strategy can be selected. Bielecki (2013, p. 176) proposed two strategy types: conceptual and adjustment, both related to the same product. In case of adjustment strategy, there are few possibilities to implement changes in the product and this, in turn, determines the necessity to use the adjustment logistics management (effective and efficient is limited to specific logistic activities optimization). As for conceptual strategy, it is oriented to new products and processes development in terms of logistics, the product role is stressed and the notion of logistically efficient product appears.

Logistically efficient product is defined as a material object in market exchange characterized by a set of properties and features which enable an effective and efficient internal and external flow of the product itself and the related information in the spheres of supply, manufacturing, distribution, disposal and returns. The properties and features at the internal level allow for an effective and efficient integration of IT, transport, storage, packaging, inventory management, order handling processes within the framework of an Integrated Supply Chain Management concept. Logistic product efficiency enforces an inquisitive product analysis and a selection of an appropriate strategy: conceptual or adjustment and the use of relevant methods, techniques and tools to adapt the chosen strategy to the market conditions.

Neither of the two options should, however, impact the Total Logistics Management underlying assumptions. Bielecki and Szymonik (2015, p. 31) formulated 6 Total Logistics principles. They have been slightly modified and amended by the author and are presented below:

- 1) Logistic quality guarantees full customer satisfaction and continuous logistic quality improvement and supply chain optimization should become a routine.
- 2) The pursuit of logistic partnership is based on professionalism and trust.
- 3) The safety and security assurance for people and goods and information flows
- 4) The pursuit of "one click" activities implementation based on flow processes automation and computerisation.
- 5) Sustainable logistics development ensures an appropriate organization's impact on its environment.
- 6) Total Product Management based on product logistic efficiency is the foundation to secure effective and efficient goods and information flow.

All the above-mentioned principles have been briefly discussed and justified below.

Logistic quality is the first notion used in the TLM concept. Naturally, logistic quality should be interpreted in the view of the previously mentioned 7Rs principle, which is described in detail by Szymonik and Bielecki (2015, p. 31). It seems, however, logistics quality should be closely related with three basic Logistics or Supply Chain Management elements: product, processes, relations. Referring to the first element, in the initial phase of product design, to ensure the product is innovative,

no boundary conditions should be imposed on the designer. In the next phase the concept should be challenged in the view of four basic dimensions: marketing, manufacturing, quality and logistics. If we adopt TLM concept, logistics criterion should be superior, however, there should be a common ground for all areas. The developed product should be right for the customer (the customer wishes to purchase the product), “easy” to manufacture, allowing to meet quality standards and flow effectively and efficiently through all the logistic phases in the supply chain (supply, manufacturing, distribution, disposal and returns (Pfohl, 2010, p. 17-19). Development of such products, in many cases, will not be possible. The concept, however, highlights the close relationship between various organization and management functions. Logistics quality in the process context aims to quantify the designer’s idea on the basis of 7Rs principle. Organization must adopt knowledge-based management assumptions in which every process is modelled with an active participation of stakeholders and the emphasis is put on waste reduction and added value. Continuous collaboration and logistic quality improvement borrowed from Kaizen, Logistics Small Group Activities (LSGA) within the company and collaboration with suppliers in the form of Supply Chain Group Activities should result in internal and external customer satisfaction (Pietroń et al., 2016, p. 64).

Partnership and professionalism in supply chain constitute the second principle of the TLM concept. Ellram and Cooper (1990, p. 4) define strategic collaboration between supply chain participants as a collaboration within the framework of determined goods and information flow channels where the main aim is to obtain diversification and benefits for all supply chain elements in medium and long-term perspective. The same authors argue this collaboration type is future-oriented and relies on the mutual trust. The partners share information, risks and benefits of joint operations/activities. Main advantages of this approach include benefits for the suppliers, economic benefits resulting from shared risks, reduced costs, increased quality level, managerial and strategic benefits. Trust is also often indicated as the key element in Deming’s TQM concept (Latzko & Saunders, 1995, p. 78), among the organization weaknesses he points out the emphasis on the short-term profitability, lack of persistence to act consequently and high legal costs which are usually a starting point in any collaboration between organizations. Professionalism is another important issue to be concerned. Greenwood (1957, p. 45) describes a professional using four features. It is a person who always acts based on their knowledge, socially-recognized authority and ethical principles governing the relationships within the society and among the clients and it occurs within an organization with a professional organizational culture. Leadership plays an important role in TQM concept and is also vital, at a bit smaller extent, in Total Logistics Management concept.

The third basic element of Total Logistics Management concerns the implementation of modern technologies in the aspects of material processes and information. Obviously, this point should not be regarded as an incentive to implement specific activities but as an encouragement to apply an innovative approach of “one click” concept. The idea was developed by Ericsson company based on their telecommunications services market research. The concept, described in the report, is based on the client expectations in their mobile devices use. They expect to have the “step-by-step” procedures simplified without any unnecessary options. It is

a challenge that undermines the current organizations' approach to the issue. It enforces the management and data synchronization within the internal and external organization integration. „One click” concept in Logistics and Supply Chain Management should be supplemented further. One click should generate one activity that gives a specific added value for the company and the client in the whole logistic chain. Automation, bar codes and constantly developing Radio-frequency identification technology (RFID) should become the tools for effective “one click” concept implementation.

Another basic element in Total Logistics Management concerns sustainable approach to logistic aspects which guarantees the right supply chain impact on the widely-understood environment. According to Sadowski (2008, p. 129) practical aspect of sustainable development is based on integrated governance where ecological, social, land, institutional and political aspects become the superior spheres of politics and management. Therefore, sustainable approach to logistics should be founded on two key areas:

- ecological supply chain optimization concentrated on the goods and information flow from the raw material acquisition to the delivery to the final client,
- the use of Reverse Logistic concept interpreted as (Rogers & Tibben-Lembke, 2001, p. 130) the activities that are encompassed in traditional logistics concept but the emphasis is put on their reverse operation.

Rogers and Tibben-Lembke define Reverse Logistics as the process of planning, implementing and controlling the efficient, cost effective flow of raw materials, in-process inventory, finished goods and related information from the point of consumption to the point of origin for the purpose of recapturing value or proper disposal. Therefore, it seems accomplishing the logistics ecological aspect and the use of Reverse Logistics might become one of the biggest challenges for the researchers and practitioners in the coming decades. It is important to note that nowadays the consumption goods generally are not designed in a way to facilitate future value recapturing or proper disposal of the used goods. Product designs often assume waste and strengthened consumption rather than rational management. This creates a space for the product and its total management in the Total Logistics Management concept.

Product logistic efficiency and related issue of total product management have been defined on the basis of the author's own research. Logistic product efficiency or logistically efficient product was defined by Szymonik and Bielecki (2015, p. 41) as a material object of market exchange possessing specific properties and features which allow for the effective and efficient internal transfer of the product and related information through supply, manufacturing and distribution phases, and externally enable to integrate effectively and efficiently processes of storage, transport, packaging, inventory management, handling orders within the concept of Total Logistics Management. The product logistic efficiency additionally contributes to achieve goods and information flows coherence between all supply chain participants. The idea of product logistic efficiency has been extended and also includes the issues of the design, transport, storage and organizing adaptability which might become the basis for the product logistic efficiency appraisal. Total Product Management should be closely related to the product logistic appraisal and become the foundation for the

appropriate logistic strategy adoption (Bielecki, 2013, p. 180). High product design adaptability in the supply chain enables to choose conceptual logistic strategy, the approach where the product, the processes necessary to form and withdraw it from the market (Reverse Logistics) can be precisely planned at the design stage. However, there is a group of products with low product design adaptability (the properties and features are impossible to modify due to legal, economic or market reasons). In such situation the adjustment logistics strategy should be adopted and Total Logistics Management is then based on continuous current processes improvement and the search for innovative ways to implement Total Logistics Management concept.

The presented assumptions are summarized in the conclusions as well as the directions for the future authors' research.

#### 4. CONCLUSION

The assumptions of Total Logistics Management concept remain closely interrelated. The product analysis and logistics strategy choice (between conceptual and adjustment strategies) are crucial starting points when implementing Total Logistics Management concept. Both strategies are acceptable in TLM approach, however, the conceptual logistics strategy has higher potential to implement more innovative approach to Logistics Management. This does not necessarily make the implementation of Total Logistics Management impossible in case of low design adaptability products (f. ex. a building brick with standardized dimensions). In such cases, the continuous Logistics and Supply Chain Management improvement is the basis to shape the pro-logistics company culture. If the company does not strive for continuous logistics improvement and Total Logistics Management principles implementation, it should adopt a passive approach in the context of Logistics Management. It refers to corrective actions in logistics processes which allow to reduce problems resulting from wrong decisions taken in the spheres of logistics and supply chains.

Proper product management means considering the mass production aspect and product range limitations accompanied by a high customization rate. The first two parameters let optimize logistics stages (supply, manufacturing, distribution, disposal and returns) and logistics functions (transport, storage, inventory management, orders handling, packaging). The third parameter is responsible for the customer satisfaction.

A thorough product analysis allows to build a logistics system based on TLM assumptions. The system should be purposefully designed and organized around the available human, material, financial and information resources taking into consideration people and goods and information flows security and safety, as well as the automation of goods and information flows with the use of "one click" type activities. The system should be based on sustainable logistics development where the pursuit of logistics partnership built on professionalism and trust creates logistics quality that guarantees full customer satisfaction.

Further authors' studies shall focus on the issue of Product Logistic Efficiency, its impact on Total Logistics Management concept and phenomena such as customization and modularity.

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