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THE IMPACT OF INCREASED EFFICIENCY IN LOGISTICS PLANNING OPERATIONS ON LOGISTICS PERFORMANCE

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Introduction/Motivation

The main challenge of our times is finding strategies to successfully compete in today's modern and dynamic markets. Researchers will have to develop new, efficient solutions to handle a complex multitude of problems triggered by an ongoing change in economy and society [1] and rapidly raised competitive pressure [2]. In the flied of logistics and supply chain management in particular there are several opportunities to increase the overall efficiency of a modern manufacturing enterprise [3]. A precise planning system could achieve a higher logistics performance (on time delivery rate, stock-outs) or lead to lower logistics costs.

The primary purpose of this paper is to develop a theoretical framework which could be used to enhance the quality of logistic planning processes. Therefore this paper provides a framework by reflecting and combining significant publications in the areas of organizational theories, logistics management and strategic planning. It creates a SEM (structural equation model) which could be used to improve the logistic performance of a company by developing an accurate planning process to achieve a continuous adjustment to the dynamic environment, which significantly contributes to a long-term protection of the company's market position [4]. The SEM (structural equation model) will be validated in further research.

Problem Scenario

The following observations exacerbate the planning and execution of logistic processes: Increasing globalization has not only created new markets for today's working world, but also has produced new, ever more capable competitors. The complexity of value adding processes is permanently on the increase, leading to a specialization and a strong division of labor within and between companies. As a result an ever-increasing number of employees and different departments are involved in complex processes. This leads to a high number of interfaces and media breaks which could create barriers for a logistics system. This is forced by the fact that enterprises attempt to focus on their core competences: *"Do what you can best, outsource the rest"*.

Markets are becoming more and more volatile and risky [5]. Market volatility can disrupt supply chain partner's operations and lead to a logistics performance reduction and in worst case to inventory stock-outs throughout the supply chain. This is intensified by the scarcity of global resources [6] (getting the right resources in the right quality, quantity and costs at the right time to the right place) and the dynamics of capital markets.

Furthermore global markets keep on developing from seller to buyer markets and from the focus of product orientation to service orientation. Customers are becoming more demanding and asking for higher quality at lower costs [7]. This increased market pressure forces companies to higher their customer orientation by using individualization strategies (e.g. mass customization) [8]. As a result of these strategies customized products and processes can be useful in order to achieve a higher competitive advantage, but they also lead to a higher complexity and cost increases for all internal and external processes [9], [10], [11], [12]. Already Henry Ford observed the challenges of product individualization by mentioning: *"Give the costumer any color they want, as long it is black"* [13].

Summarized it is a fact, that the modern business environment is seen as very complex [14] and dynamic which is why it is also called hyper-competition. If a company wants to successfully survive in the global market it must continuously implement activities to generate new competitive advantages, thereby engendering a clear differentiation between competitors [15].

The precise planning of all integrated logistic processes is the key to success when it comes to achieve a better logistics performance or reduce the logistics costs [16].

Logistics and Supply Chain Management

Definitions

Logistics management is defined as the process of planning, implementing and controlling efficient flow and storage of goods, services and related information from the point of consumption for the purpose of conforming customer requirements [17].

The logistical core function is described as getting the right resources in the right quality, quantity and costs at the right time to the right place. Logistics management is responsible for moving materials from the supplier into the company (inward logistics), moving materials out to customers (outbound or outward logistics) and moving materials within the organization (material management). Materials are all the things that an organization moves to create its products. These materials can be both tangible (such as raw materials) and intangible (such as information) [18].

Logistics management is focused on a single organization. If the focus of view is expanded from internal processes to the entire supply chain, logistics management is called intercompany logistics or supply chain management.

Supply chain management is defined as the management of a network of relationships within a firm and between interdependent organizations and business units consisting of material suppliers, purchasing, production facilities, logistics, marketing, and related systems that facilitate the forward and reverse flow of materials, services, finances and information from

the original producer to final customer with the benefits of adding value, maximizing profitability through efficiencies and achieving customer satisfaction [19].

In the near future the increasing global competition will force organizations to compete supply chain versus supply chain instead of company versus company [20]. Straight-lined supply chains will not occur in the future. There will always be crosslinking activities between the different suppliers and customers along the same supply chains [21].

Components of Logistics Management

Logistics is responsible for the movement and storage of materials and information as they move through the supply chain [22]. Figure 1 [23] displays the main components of logistics management:

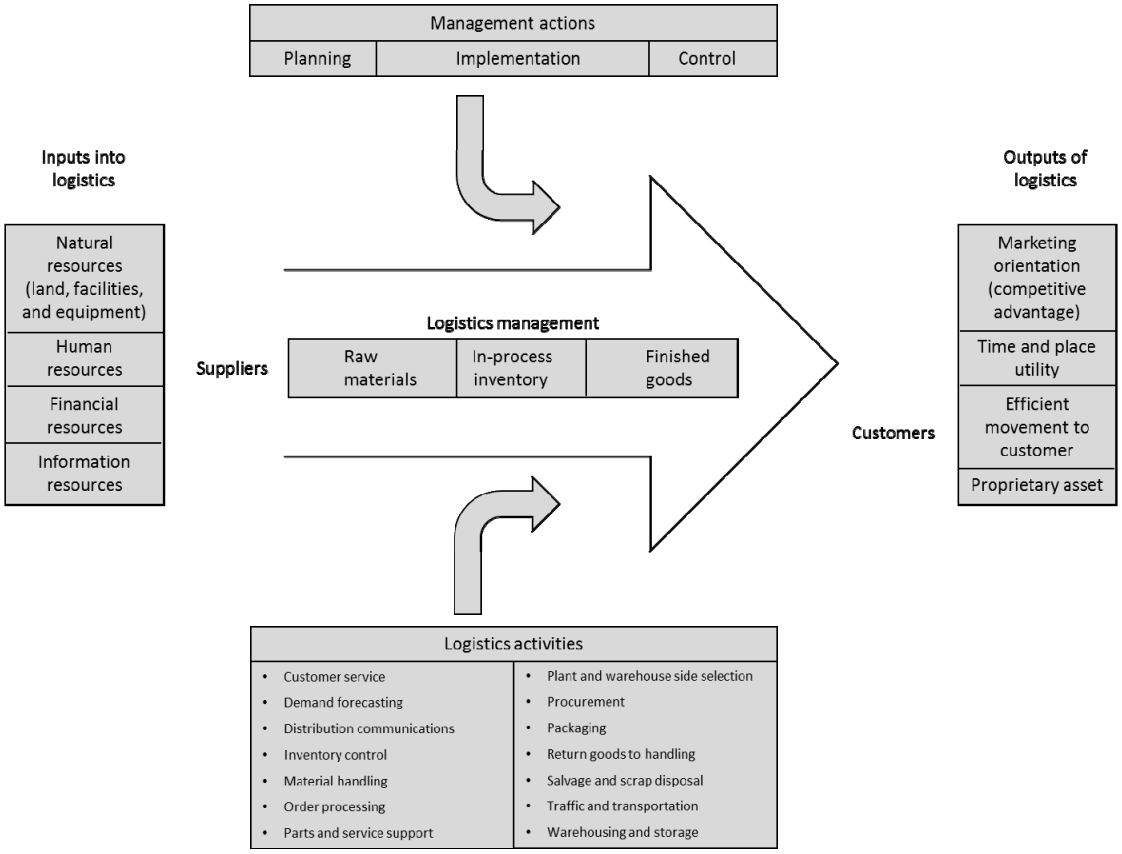

Figure 1. Main Activities of Logistics Management

Natural resources, human resources, financial resources and information resources are defined as the main inputs into a logistics system. Purchasing or procurement (purchasing order to supplier) usually initiates the flow of materials through an organization. This process is initiated by a purchasing order to a pre-selected supplier (including: terms and conditions, delivery, insurance and payment).Traffic or inward transportation moves the required materials

from the supplier to the organization. Therefore Logistics must choose the type of transport, find the best transport operator, design a route, make sure that all safety and legal requirements are met and ensure to get the deliveries on time and at reasonable cost.

After receiving the goods will be checked and moved to the warehouse section to keep them in good condition. The required inventory data will be stored in the company's ERP system (material master data). Materials handling moves materials through the operations within an organization. The aim of materials handling is to give efficient movements, with short journeys, using appropriate equipment, special packaging and handling where needed. Logistics management is also responsible for recycling, returns, waste disposal and replacement of parts [24], [25], [26].

The Role of Logistics in Modern Economy

Logistics solutions have a large potential and should not be limited to basic functions such as transport, transition and storage, because the logistics performance of a company can be a decisive competitive factor and a significant differentiating feature. In fact classic concepts of internal material flow optimization (optimization of interfaces, parallelization, synchronization, stabilization of processes, etc.) are already starting to reach their limits, which leads to the cognizance that managers have to find new methods to optimize their internal and external processes [27].

There is enormous need for better planning processes [28]. 1) All internal material flow optimization concepts could only reach a restricted degree of leverage on the overall lead time. No matter how optimized the internal processes are, there will always be a high dependency on the integrated suppliers and a need for advanced planning and integration concepts. 2) When it comes to the point of handling complex systems with nonlinear dependencies and multi-factorial dynamics, internal material flow control concepts could only be a part of the solution. A total control is not possible and so it will be necessary to plan safety stocks to assure the costumer promised level. 3) The data of an enterprise resource planning system could never be a hundred percent correct, so there always will appear errors caused by wrong or missing information.

The efficient use of data, information and knowledge as a production factor continues to be the initial point for a continuous improvement of processes and for activities to enhance organizational learning. In today's global environment, companies can only be competitive if they manage their knowledge elements as diligently as their use of materials, machines and equipment [29]. Even the half-value period of knowledge continues to decrease. The life cycles of technology are becoming shorter, in such way that a clear acceleration of an expiration of knowledge becomes apparent. [30]. The scarcity of resources in companies and the innate limit of human information processing abilities mean that companies cannot be limited only to internal resources, additional external sources of knowledge are also required. [31].

However, not merely the aggregation of knowledge but its flexible availability and application are most important [32]. Since not all data is proper information for everyone in the company, it is important for the right data to be available in the right place, at the right time and in the right quality [33]. This brings us to the conclusion, that there is a need of better understanding how planning and decision making processes in logistics operations work.

Influencing Theories and Approaches

There is a strong necessity to develop new concepts for logistics and supply chain management based on organizational theories [34]. Many researchers are testing different organization theories on their applicability in supply chain management [35]. They came to the conclusion, that there is a huge potential in applying theories (e.g. the knowledge-based view, strategic choice theory, agency theory, institutional theory, and systems theory) in the field of logistics and supply chain management and that definitely more research has to be done in this direction.

Planning and Information Flow in Logistic Processes

Definition

There is no concise definition of planning in the management literature. It is best described as a rational, target-orientated process which includes future actions. Planning is a process of decision making, while considering relevant information. Without the right data, information and knowledge, planning is not possible [36]. Planning could be classified in long-range, mid-range and short-range planning, or strategic, tactical and operative planning or it could be classified by the function of planning (e.g. logistics planning) [37].

Need of Precise Planning Activities in Logistics Management

A precise planning process of logistics activities is the key to a better logistics performance and to lower logistic costs. Regardless of industry or whether the company is a manufacturer, wholesaler retailer or service provider, effective planning and demand forecasting helps organizations identify market opportunities, enhance the channel relationships, increase customer satisfaction, reduce inventory investments, eliminate product obsolescence, improve distribution operations, schedule more efficient production and anticipate future and capital requirements. [38]. A few publications claim that planning in a dynamic environment is not possible: “planning is like a ritual rain dance and has no effect anymore” [39], “planning is unnecessary evil” [40].

State of the Art: Planning

After a comprehensive literature review we came to the conclusion, that there are no relevant publications regarding the impact of planning quality on the performance of logistics operations. Only a few useful publications can be found in the related field of production sciences [41], [42].

The majorities of existing publications conceptualize the planning process by conducting a systematic research on existing planning systems.

Dyson/Foster [43] defined twelve parameters to evaluate the efficiency of strategic planning (e.g. integration of planning function in managerial decision making, catalytic action of planning function, richness of formulation, breadth of evaluation, treatment of uncertainty, data quality, iteration in process, control measures, resources, planned, explicit mentioning of assumptions, definition of goals and feasibility of implementation). King [44] measured the planning system by considering the available resources, the grade of the achievement of targets,

the process maturity of the planning system and the planning system output. Prekumar/King [45] rated planning systems by the quality of the information system, the quality of available resources, the target definition and the grade of integration.

Only a handful of publications are focusing the main influences on the planning efficiency. Neuert [46] measured the efficiency of operative planning processes by the formal efficiency, the substantial efficiency and by the personal efficiency. Charavarthy [47] reviewed the efficiency by comparing the external and internal fit, the control cycles and the grade of innovation of the planning system. Schäffer/Weber/Willauer [48] scaled the planning system by efficiency and effectiveness, by grade of implementation of planning activities, grade of new planning activities and by the intensity of planning.

Construct Development, Structural Equation Model

Figure 2 displays the SEQM and the main hypotheses based on the literature review.

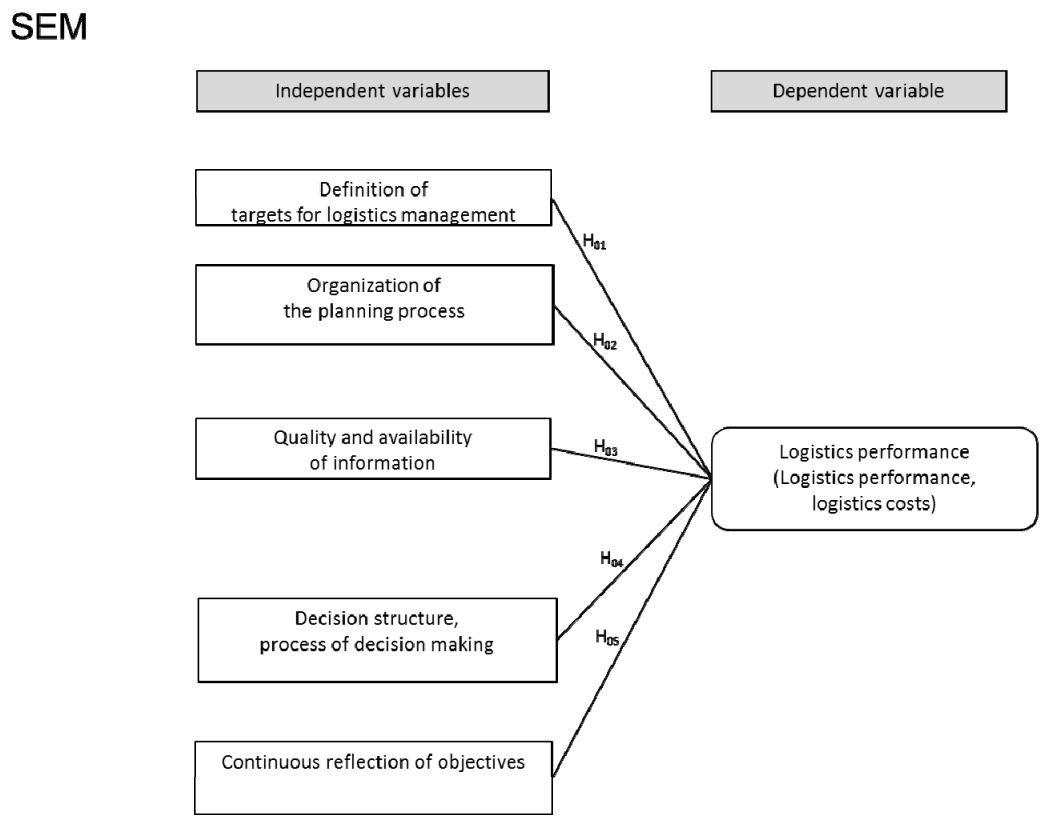

Figure 2. SEQM

Hypotheses:

H0: The quality of information processes within the logistics planning system is positively related the logistics performance.

H01: The grade of logistics target definition is positively related to logistics performance.

There is always a conflict in the definition of logistics targets (e.g. delivery performance and inventory levels). A clear definition will positively influence the logistics performance.

H02: The grade of the organization of the planning processes is positively related to logistics performance.

A better organization of the planning activities (structure, grade of organization), will positively influence the outcome.

H03: The quality and availability of information is positively related to logistics performance.

The availability and quality of data information will improve the logistics planning quality. It is very important to measure the performance of production and supply, to include forecasts in the planning process to process knowledge information systems and to share knowledge among the entire supply chain.

H04: The grade of integration of planning functions in managerial decision making and the decision making process quality is positively related to logistics performance.

H05: Continuous reflection and adaptation of objectives is positively related to logistics performance.

Further Research and Next Steps

The causal relations will be tested within a structure of the SEQM (structural equation model).

Structural equation modeling (SEM) is a collection of statistical techniques that allow a set of relationships between one or more independent variables (IVs), either continuous or discrete, and one or more dependent variables (DVs), either continuous or discrete, to be examined. Both IVs and DVs can be either measured variables (directly observed) or latent variables (unobserved, not directly observed). Structural equation modeling is also referred to as causal modeling, causal analysis, simultaneous equation modeling, analysis of covariance structures, path analysis, or confirmatory factor analysis [49].

We will develop a questionnaire based on literature review and explorative interviews with experts in the field of logistics and supply chain management. We will get the required data from over 120 industry enterprises having similar size and operate in similar markets in order to make them comparable.

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