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## **PROCESS APPROACH IN SUPPLY CHAIN STRUCTURE ANALYSIS**

**Summary.** The aim of the article is the presentation of process approach in supply chain structure analysis. The structure of supply chain, especially the its forming is important possibility for relationship construction between supplier and recipient. Correct process implementation decide about efficiency of cooperation and added value growth for costumers. The article is completed with process maps for supply chain of clothing branch.

**Keywords:** supply chain, process, added value, process map

## **PODEJŚCIE PROCESOWE W ANALIZIE STRUKTURY ŁAŃCUCHA DOSTAW**

**Streszczenie.** Celem artykułu jest przedstawienie podejścia procesowego do analizy struktury łańcuchów dostaw. Struktura łańcucha dostaw, a zwłaszcza możliwość jej kształtowania stanowią ważny aspekt budowania relacji między dostawcami i odbiorcami. Właściwie realizowane procesy decydują o efektywności współpracy i wzroście wartości dodanej dla klientów. Artykuł uzupełniają mapy procesów realizowane dla łańcucha dostaw wyrobów odzieżowych.

**Słowa kluczowe:** łańcuch dostaw, proces, wartość dodana, mapa procesu

## 1. Introduction

Logistics and effective management of the supply chain are important tools of the market game. Appearance of supply chains has led to changes in relations between companies which now are based on common interest, trust and partnership<sup>1</sup>. The driving force of the changes that are taking place in the supply chain are needs and requirements of the customers. Their choices influence the processes of the supply chain associated with design of the goods, quality of their manufacture and commencement of their orders. Needs and requirements of the customers necessitate flexibility and prompt supply time. Subduing to the needs of the customer associates with improvements in functioning of businesses which are particular links in the supply chain, as well as with increased benefits for the customers. Therefore, it has become necessary to identify the processes which output is of high value and those which value is low and thus can be outsourced to other companies. Research on the supply chain structure and its assessment conducted in such a way as to look for methods of improvement, which is nowadays one of crucial issues of management. Changes in the supply chain structure undermine functioning of each its link and, consequently, of the whole chain structure. In Polish reality, the problem mainly affects those corporations which did not develop properly formed supply chains after the economic changes period. They found themselves on the edge of bankruptcy due to numerous reasons, such as the breakdown of the Eastern markets, lack of adequately formulated national market strategy, cheap goods flooding the market from outside and increased competitiveness caused by low entry costs for the newcomers in the business. The clothes manufacturing branch of industry was one of those which were affected by the above described factors.

The article presents the essential issues of the process approach to the analysis of the supply chain structure. Moreover, it can be extended and supplemented by visualization based on a process map to show the dependencies that take place in the supply chain.

## 2. Supply chain structure analysis

First of all, the analysis of the supply chain is conducted at the formal structure level. For that type of focus, it is recommended to conduct field research comprising e.g. surveillance method, survey study and analysis of the source materials. Information gathered in such way is then supplemented with opinions of experts in a given field who point out factors that

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<sup>1</sup> Williamson L. R., Esper T. L., Ozmet J.: The electronic supply chain. Its impact on current and future structure of strategic alliances, partnerships and logistical leadership. „International Journal of Physical Distribution and Logistical Management”, Vol. 32, No. 8, 2002.

influence creation of supply chains among various companies. That stage of the analysis leads to identifying the companies that become particular links of the supply chain.

Such analysis is necessary as once a simple supplier – receiver relationship has evolved with many additional indirect links. Moreover, the number and scope of activities those middlemen companies perform constantly changes and such a structure is very difficult to identify and, even more, to be managed.

Identified participants of the supply chain are interconnected with various relations. Such relations can be described from the formal point of view, in which it is possible to assess the position of the company as a chain link in the whole structure. Such assessment allows for further establishment of dependencies between the particular links and strength of their mutual influence and dependence on other links. Establishment of the formal structure is a starting point for further research of flow structure of the supply chain. Processes executed in companies are usually parts of one, bigger process which stretches over the whole supply chain. The analysis of processes present in the supply chain and their relations to the process of creation of the added value is presented further in this article. Figure 1 shows the research procedure for the formal and flow structures of the supply chain.

In order to design a supply chain model, it is essential to put the chain links in a clear structure with explicitly assigned functions for each company. That can be achieved with use of a chain model described with M. Porter's value or with use of the morphological approach<sup>2</sup> analysis. The supply chain structure described with use of the M. Porter's approach, should reflect the real structure of the supply chain and should allow to identify the processes which create the added value. M. Porter's value chain comprises strategically important processes connected with creation of the added value, simultaneously pointing out the essential ones, which create the added value in a direct way. At the same time, the method classifies supplementary processes, which support creation of the added value. The result of the supply chain analysis performed with use of the value chain model is preliminary elimination of intermediary companies that do not create the added value. That, in turn, saves a lot of work on analysis of processes and activities performed in supply chains. The identification procedure comprises the following actions<sup>3</sup>:

1. Isolation of action sequences subdued to services provided for a particular type of receivers. The purpose of this stage is identification of internal value chains in a given organization.

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<sup>2</sup> more in Kruczek M.: Identyfikacja struktury łańcucha dostaw, [w:] Matuszek J.: Metody i techniki zarządzania. Wydawnictwo ATH, Bielsko – Biała 2006.

<sup>3</sup> Czakon W.: Łańcuch wartości w teorii zarządzania przedsiębiorstwem. Wydawnictwo AE Katowice, Katowice 2004.

2. Creation of a chronological list of all activities performed to provide services for a given type of customers. A chronological order ensures that no activity is omitted.
3. Grouping of activities in actions different as far as the technological and economic scope of performance is concerned for a given company.
4. Establishment of relations and vectors between separated activities, which leads to identification of connections.
5. Designing a graphics model in order to verify and assess validity of the created representation of the activities system in a given company.

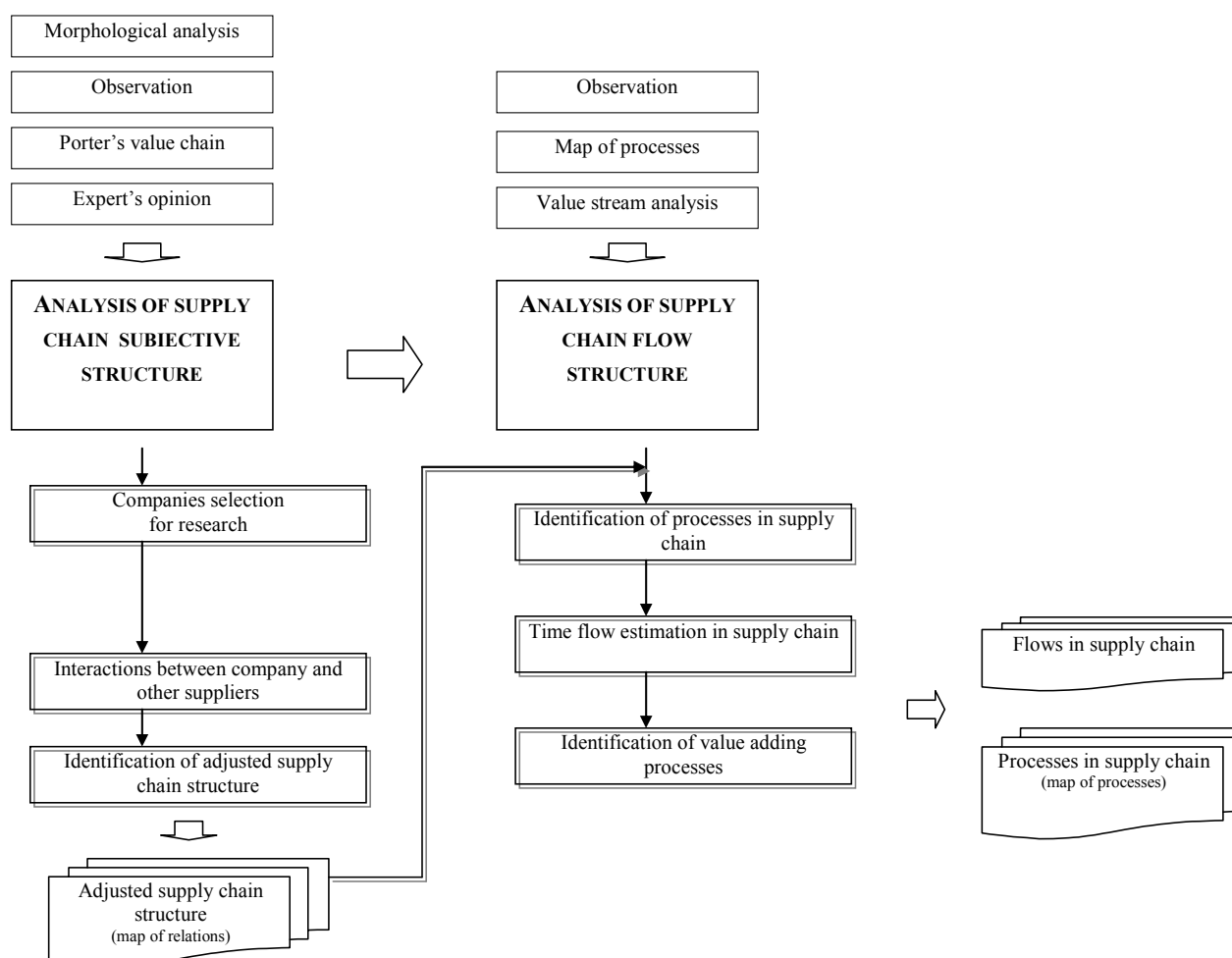


Fig. 1. The procedure of object and flow supply chain structure analysis

Rys. 1. Procedura badania struktury podmiotowej i przepływowej łańcucha dostaw

Source: Own study.

Morphological analysis can be of slightly different importance in the process of establishing the supply chain model, as it allows for simultaneous design of numerous supply chain models. Among those models, there exists one which reflects the existing supply chain

and many others, which may reflect supply chains present in other companies. Moreover, research conducted with use of the morphological analysis approach allows for creation of models of supply chain structures which do not have any real counterparts, yet may be found useful in future as a starting point of a supply network reconfiguration procedure or to build bases for new development strategies of supply chain management. Models created in such a process can be then verified and evaluated with use of a group of experts assessment method. The morphological analysis method allows for identification of the formal structure of the supply chain because it requires unique configuration of company structure for every branch of industry. Yet, in each case, identification of elements can prove to show some variations in each case, particularly due to differences in the subject of the flow sequence, i.e. different goods.

Research of the supply chains structure allows to obtain a clear mutual relationship map of the supply chain. Such designed map of relations comprises the most important relations between particular links of the chain and its environment, as well as between the central link of the chain and other links. Due to the fact that the relationship map depicts feeds and results of flow actions between particular links and branches, it subsequently presents what happens in the “white space”, that is between the rectangles of a classic company organization diagram. Relationship maps are mainly used for understanding the real conduct of works in researched areas and to identify crucial problems that occur in the places where particular links and branches interconnect. It helps to reveal irrelevant connections, wrongly directed feeds or results. The relationship map is a starting point for a more detailed analysis conducted in the supply chain and for each link of the process.

### **3. Supply chain as a group of processes**

In order to deepen the analysis of the supply chain it is necessary to identify and examine the processes and activities executed in a given chain. That stage of research results from necessity of identifying places in which waste of time and resources due to worthless actions occurs. For the purpose of that stage, the following elements can be used: process maps, reference models and other tools of business process analysis<sup>4</sup>. Most of all, use of tools which visualize processes executed in the supply chain allows for better management of those processes. It especially helps to find solutions for the issue of sub-optimization in traditional hierarchical structures. From the point of view of executed processes, the analysis of the supply chain is customer-oriented and aims at elimination of boundaries that exist between functions played by particular links and in the chain as entirety. The essence of changes that

occur in the supply chain and particular links is to treat them as a set of processes. The process approach, initially used at the operational level to optimize actions executed at each work post separately, becomes a way of identification for actions which aim at achieving advantage over the competition and creating the added value from points of view of various enquirers, and the customer in particular.

The available literature<sup>5</sup> proves the process analysis to be particularly effective, as that approach allows for fast and radical re-design and improvement of strategically-important processes, i.e. those that are directly connected with creation of the added value in the company itself. The process approach to management of a company allows for execution of research in the organization, assuming continuous improvement and adjustment to the needs of customers, which becomes a starting point for the analysis of needs and improvements in subsequent stages of the processes. Advantages of the process approach are as follows<sup>6</sup>:

- better understanding of dependencies which occur and should occur between the organization and the customer,
- the employees understand and notice their role and influence of their participation on the results of the company activities,
- reduced number of errors which can occur during execution of a process owing to elimination of delays and unnecessary delegation of actions from one employee to another,
- easier assignment of authorities and responsibilities for the executed tasks,
- limitation of detailed supervision over the executed tasks in favour of supervision over the whole process,
- possible detection of discontinuity of executed processes,
- detection of processes which exceed boundaries between functional activities,
- untroubled co-existence with the present organizational structure, as:
  - the process approach does not change the direction of the actions performed by the organization,
  - does not require changes in dependency-subordination relationships in the structure,
  - does not change the scope of authority and responsibility in the organization,
  - allows for rational use of resources present in the organization.

The process approach to the research of the supply chain starts with identification and analysis of the key processes. Knowledge of the mechanisms of functioning that exist in the

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<sup>4</sup> Kasprzak T. (red): Modele referencyjne w zarządzaniu procesami biznesu. Difin, Warszawa 2005.

<sup>5</sup> Durlik I.: Restrukturyzacja procesów gospodarczych – reengineering – teoria i praktyka. Placet, Warszawa 1998

whole supply chain and in each link is dispersed and must be integrated through gathering and confronting data. There are ready solutions which can help to identify processes, their principle of work is decomposition of actions on the basis of a general chain model of the added value. In such way, a universal scheme of process classification is created, which allows for distinguishing of seven basic and six supplementary processes at the corporate level (Fig. 2).

Subsequently, the identified processes undergo a more detailed analysis and then are classified according to previously assumed criteria. Classification of the processes is simple as various criteria can be assumed to distinguish between them. In general, those can be summed up as two trends<sup>7</sup>:

- related to the whole process (continuity sequence),
- related to a fragment of the whole process (chosen activities).

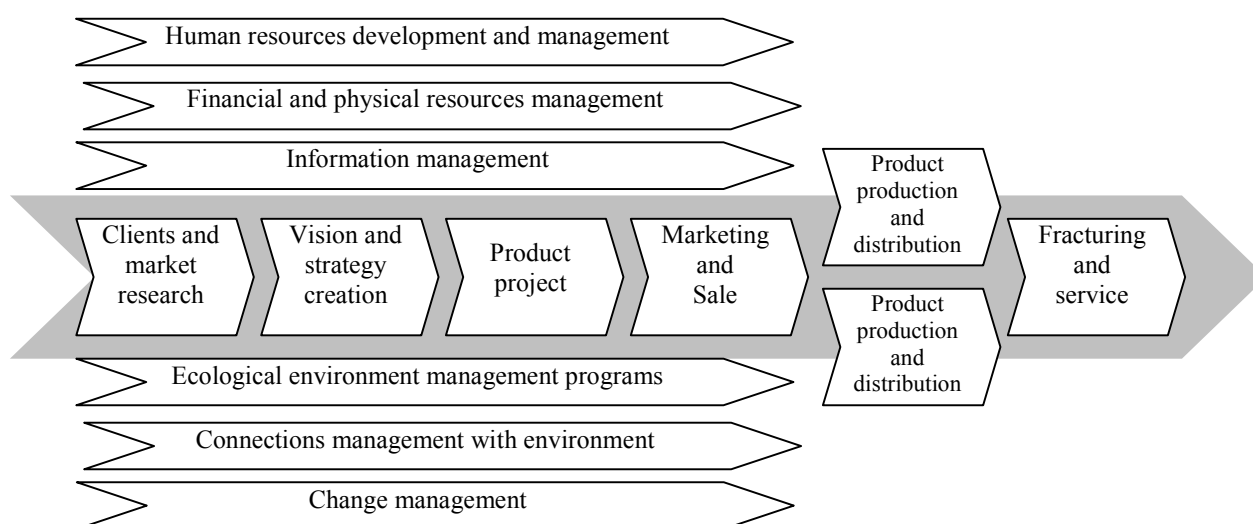


Fig. 2. Process orientated enterprise

Rys. 2. Przedsiębiorstwo zorganizowane procesowo

Source: Brillman J.: Nowoczesne koncepcje i metody zarządzania. PWE, Warszawa 2002.

Among most frequently used criteria for classification of the processes are: process hierarchy, type and subject of the flow and its relationship with creation of the added value. The hierarchical criterion shows processes that occur in the company at various levels of aggregation. In such system, complex processes can be transcribed into more simple ones, down to the level of single activities and elementary actions. The level of detail in presentation depends on the needs of a particular analysis. Division of processes according to the subject and type of flow differentiates between the processes of various object and type of

<sup>6</sup> Brillman J.: Nowoczesne koncepcje i metody zarządzania. PWE, Warszawa 2002.

<sup>7</sup> Blaik P.: Logistyka. PWE, Warszawa 2001.

activity, which, in turn, allows for assessment of properties and structure of activities and processes. From the point of view of the analysis of supply chains, the most important is division of processes due to their relation with the added value. The processes that occur in the company can have influence on the added value or can have no relation with it whatsoever. The latter kind of processes should be eliminated whenever possible. Relationship between the processes and increase of the added value lays at the basis of effectiveness assessment for those processes and the organization as a whole. While verifying efficiency of a given organization as a whole or a chosen part of it, choosing a specific method of description for the ongoing processes is a crucial step.

Creation of value is in the available logistics literature treated as the proper transformation process<sup>8</sup>. Its essential aim is to achieve positive market value. The creation chain for the added value joins its links or phases of the transformation process, during which the product is executed from the starting point and until it reaches the end user. In such case, the chain of value creation is purposed at distinguishing those processes of the supply chain which influence creation of the added value and is based on the value chain model. Taking that into assumption, P. Schuderer categorizes the value creation processes taking into focus their relationship with the customer. He distinguishes between the following types of processes<sup>9</sup>:

- primary, directly connected with the customer and thus directly creating the added value,
- secondary, indirectly connected with customers and indirectly creating the added value,
- third-rate, with general and relative connection with the customer and creation of the added value,
- with no connection with the customer or no positive influence on increase of the added value.

Furthermore, primary processes can be divided into main and supplementary types. Main processes are executed in close relationship with the customer, require direct contact with him and their result in the customer receiving a product of higher value than the products of the competition. Such processes include: design and creation of new products, minimization of costs in the supply chain, execution of orders, product shipment, etc. Supplementary processes which also create primary processes are derivatives of main processes and are triggered by them. Those include: assembly, preparation for production, activities related to flow of production materials, etc. Secondary processes support the primary processes and

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<sup>8</sup> Blaik P.: op. cit.

<sup>9</sup> Schuderer P.: *Prozessorientierte Analyse und Rekonstruktion logistischer Systeme. Konzeption – Methoden – Werkzeuge*. Galber Verlag, Deutscher Universitäts Verlag, Wiesbaden 1996.



indirectly positively influence creation of value. Those processes can be: quality control of purchase, predictions, staff development, etc. Third-rate processes are those with no direct connection to the primary processes, however playing some role in the process of value creation. Their importance for the process of creation does not manifest during their course of action but only after some time, due to their position in the hierarchy. Among those can be named such processes as: research and development, public relations, improvements in health and safety of work, etc. The last group includes processes which do not add any value, that is having no connection with the customer. Those include such processes as: processing complaints, repetition of some activities, stoppages, etc. Those processes result in waste of resources of the organization and do not increase the value of the product. Efforts aimed at their identification are the basic principles of improvement both the company and its supply chain.

Distinguishing between processes which create and do not create the added value and their analysis in co-relation to the customer allows for better knowledge of needs and expectations of the customer. Such division is a foundation for strategic decisions and introduction of changes in the whole supply chain and stretches over the whole chain of classified processes. Therefore, integration of the supply chain around the process of creation and delivery of value can be observed in such case.

One of the most universal tools used for description of processes that occur in an organization is a process map, that is a graphical representation of operations executed as parts of that process. Such map is used for analysis of complex processes in various functional areas of corporations<sup>10</sup>. Creation of a process map begins with identification of all subjects-participants of the process. Identified elements of the process are depicted in a column chart. In such way, a general scheme of the structure of a researched object and its level of organization is created. Then, taking the organization structure as a starting point, an analysis of tasks and activities executed in the organization is conducted, which results in a process scheme. Decomposition of executed activities into particular elements of the organization structure allows to create a description of the process conduct for transformation of chosen flows (feeds) in particular activities executed by those elements of the structure, up to the point where a final result of the process is achieved. Therefore, the map shows involvement of each element of the structure in execution of a given task or action, thus allowing for assessment of that involvement both in terms of the end result (process exit) and in terms of required feed (process entry) and involvement of own resources. The author has attempted to map processes of more than one organization in order to show creation of the

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<sup>10</sup> Witkowski J., Zarządzaniem łańcuchem dostaw. PWE, Warszawa 2003.

added value in relation to the supply chain. General course of flow for such process between different organizations can be then shown as in the figure 3.

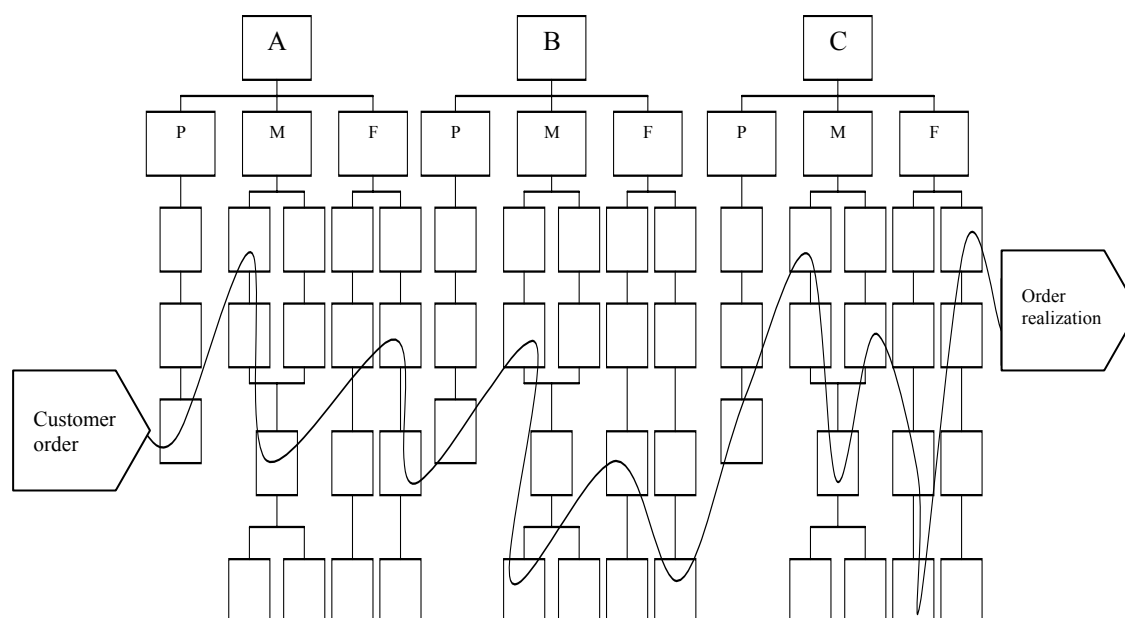


Fig. 3. Process realization in many enterprises.

Rys. 3. Przebieg procesu przez kilka organizacji

Source: Own study based on Manganeli R., Klein M.: Reengineering. PWE, Warszawa 1998.

#### 4. Analysis of supply chain in the clothes manufacturing industry

For the purpose of research conducted on the supply chain in the clothes manufacturing industry, the following division of its structure was assumed, which allows to detect the most important processes that occur there and, at the same time, to preserve relations between particular links of the supply chain.

- General level – describes relations at the highest aggregation level of the supply chain. The supply chain structure has been shown as a scheme with connections between particular links. It can serve as a starting point for presentation of flow vectors and main purposes of the processes (Figure 4 – map of relations).
- Real process level – shows connections between the flow of information and authorities and management levels in each company of the process. The chosen process shows resources used in its execution, the conduct in particular areas of the chain and influence of particular links on the overall performance (Figure 5 – map of processes).

- Single process level (for work posts) – is the lowest level at which the analysis of processes should be conducted. The processes executed at that level are the most basic activities that can be performed.

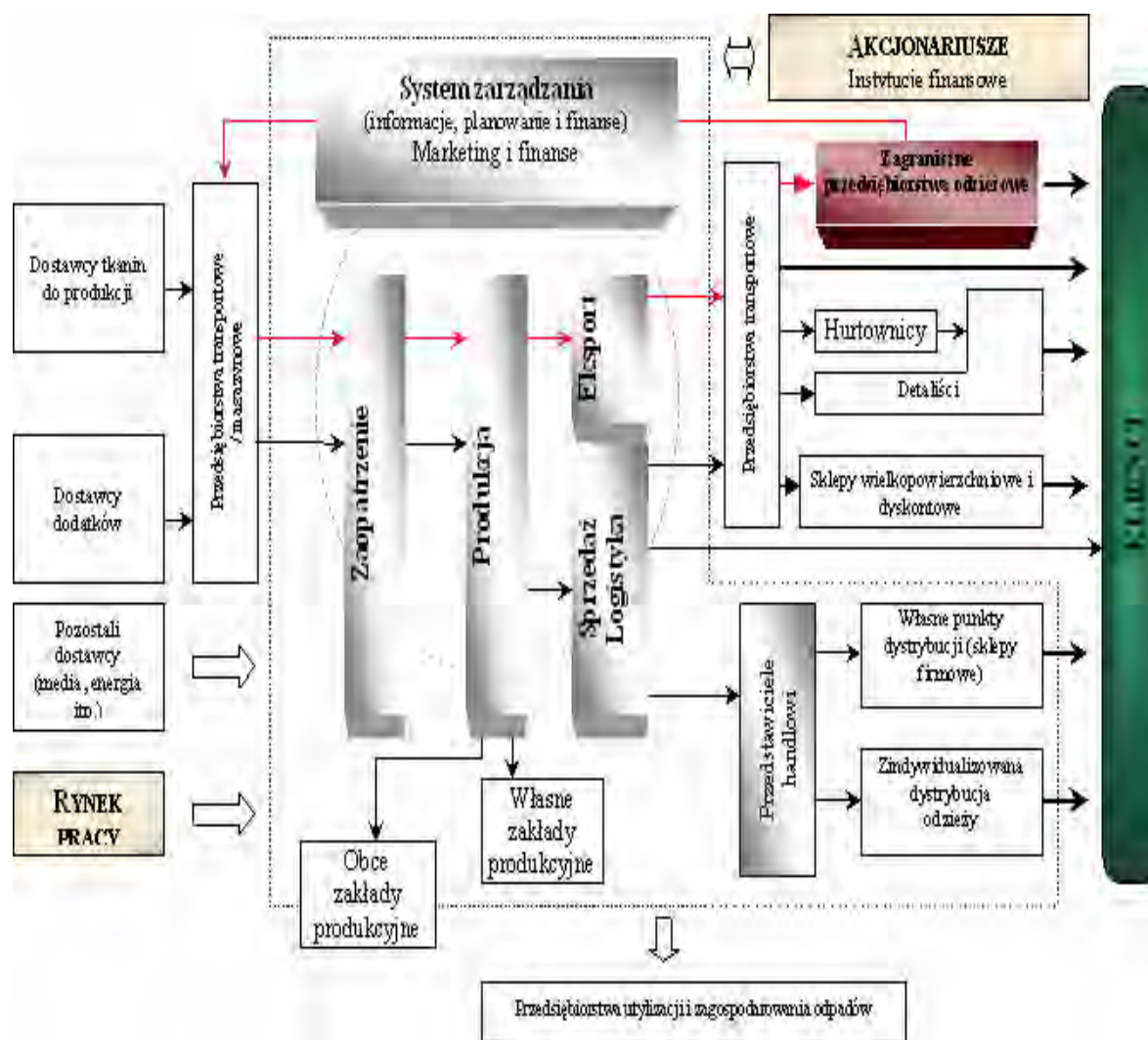


Fig. 4. Relations map in supply chain of clothes manufacturing industry

Rys. 4. Mapa relacji łańcucha dostaw branży odzieżowej

Source: Kruczek M.: Metody szacowania wartości dodanej w łańcuchach dostaw przemysłu odzieżowego, Rozprawa doktorska, Zabrze 2007.

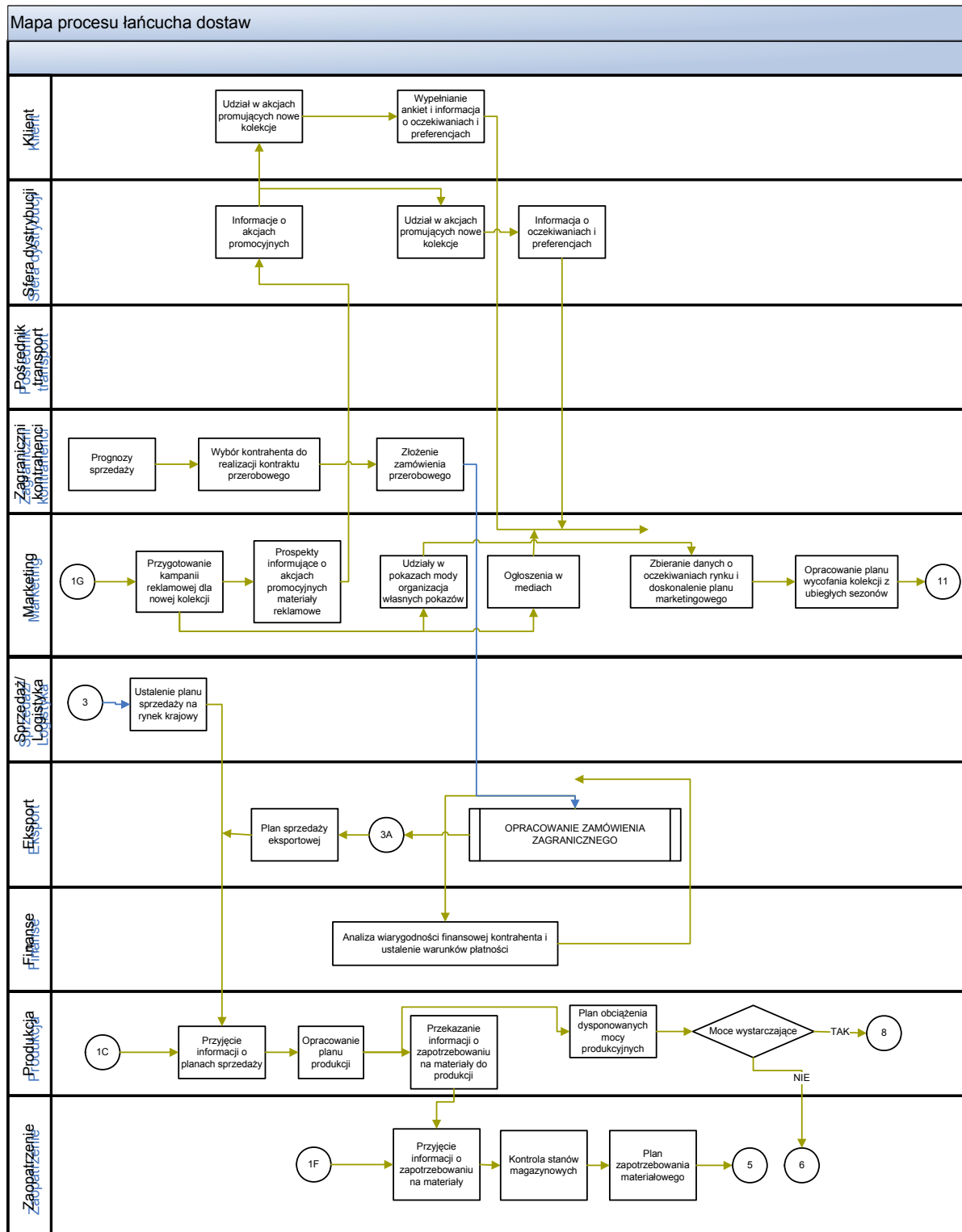


Fig. 5. Relations map in supply chain of clothes manufacturing industry

Rys. 5. Fragment mapy procesów dla łańcucha dostaw branży odzieżowej

Source: Kruczek M.: Metody szacowania wartości dodanej w łańcuchach dostaw przemysłu odzieżowego, Rozprawa doktorska, Zabrze 2007.

The presented process map for the supply chain in the clothes manufacturing industry focuses around a leader company which is responsible for preparation of the commercial offer, execution of the manufacturing process and distribution of the products among the customers. The conducted analysis of the processes executed in the supply chain allows for assessment of those which do not create any value for the end receiver and thus can be eliminated. Improvement of processes from the point of view of the whole supply chain is complex, as changes in one link influence other links and therefore such subsequent changes should also be taken into account. As it often occurs, improvements which purpose was to introduce positive changes, can output as negative consequences for the whole process and can worsen the relationship between the suppliers and the receivers.

## 5. Summary

Analysis of processes in the supply chain allows for designing such model of its functioning that can be subsequently used for identification of strategies and actions aimed at creation of the added value in the company and can help in describing resources, their place in the chain and their involvement in the execution of processes. Therefore, the process analysis of the supply chain structure is the first step in understanding the possibilities which can improve effectiveness of its functioning. An important concept which exemplifies such possibilities is the idea of time adding value and time not adding value. Even though some activities do not add any value, they are sometimes necessary to perform due to the design and flow of the analyzed process. However, they still incur costs and should be eliminated if possible. Gathering information on activities performed in the company should result in designing such a map of processes executed there as to achieve their integration and increase efficiency of functions performed by the organization. In order to achieve such results, particular techniques can be used, those including:

- creation of the process model – enables graphical representation of the process, the related sub-processes and consecutive actions ordered chronologically. That allows to find all resources fed to the process, its products and basic factors that influence its possible success,
- a map of the organization – used for analysis and recording of relationships between the present functional structure, executed tasks, responsibilities and the process itself,
- analysis of the added value created by the process allows to put the processes in an orderly sequence, according to their potential influence on realization of the aims in the organization.

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