

THE RELATIONAL SYSTEMS OF COORDINATION FLOWS IN LOGISTICS NETWORKS OF NATO

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Abstract

Logistics chains are the result of the practical application of economic principles (orientation) of flow. Most close to the essence of logistics chains is a functional approach, where the essence is the technological connection points of storage and handling roads transport of goods and coordinate the organizational and financial operations, procurement processes and inventory policies of all links in the chain. Increasingly, in a globalized economy in logistics and areas of the economy associated with the logistics uses the term “network”. There are networks of strategic, economic networks, network based, supply chain, logistics networks. Most network solutions is directly related to the logistics of NATO and international cooperation entities militarized. The article is an attempt to isolate the relations between the parties cooperating in NATO’s logistical networks.

Key words: chains and logistics networks, coordination, relational systems.

Introduction – evolution of global logistics chains

Logistics chains are the result of the practical application of economic principles (orientation) of flow. Most close to the essence of logistics chains is to bring functional. An example is the definition of E. Gołemska: “The logistics chain as a logistics base is a chain of warehouse and transport, which is a combination of technological points of storage and handling and road transport of goods organizational and financial coordination of operations, procurement processes and inventory policies of all links in the chain”.

The logistics chain should pursue the following objectives:

- ensure the rapid and efficient movement of goods,
- reducing the cost of this flow.

The concept of supply chain dominates different philosophy than in the concept of the logistics chain. The concept of the logistics chain enterprise composing it focused its efforts primarily on the efficiency and effectiveness of the flow of goods.

The concept of supply chain dominates the philosophy of the close integration of the sender with suppliers and customers in order to achieve the intended purpose. How they say P.B. Schary and T. Skjott-Larsen, supply chains began to emerge because entrepreneurs have discovered the ability to solve the problems of duplication of activities and response to changes in the market [10].

In the supply chain, it is assumed that the recipient initiate decisions in the supply chain. Hence the supply chain starts with the customer, and decisions flow in the opposite direction than the supply of products. A. Kuhn and B. Hellingrath recognize it: "We need to see all the processes in a specific connection - from the end customer back to raw materials, in a steady stream without roads circular, which will provide faster flow times, higher quality and lower costs. To sum up, the relationship the customer - supplier can refer to M. Christopher, according to which: "The supply chain is a network organization organized through linkages with suppliers and customers in a variety of processes and activities that create value in the form of products and services provided to the ultimate customers".

Descriptive thesis

We can conclude that the scope of cooperation in the supply chain is much broader than in the logistics chain. Supply chains include on the one hand the typical logistical activities associated with the supply of materials, organization of production and distribution, and on the other hand, include demand management and development of products that are in the areas of marketing and production management.

Years of research on military logistics highlighted the need for the menial role of logistics for all actions of a military nature (including training), showing its superior character in relation to the function of the purpose of implementing entities. Taking up this theme author argues descriptive that:

"It is not possible to implement decision-making process in NATO's logistical networks without a thorough analysis of relational systems occurring between decisions entities and regulations to ensure a coordinated function of material flows".

The aim of this publication is to present an inclusive character of selected systems relational place in the coordination of material flows between players of different levels of decision-making with simultaneous visualization of selected "modules" task.

Determinants of supply chains

The term "network" is increasingly used in logistics and areas of the economy associated with the logistics. There are networks of strategic, economic networks, network based, supply chain, logistics networks (including network logistics NATO). Often, these terms are used interchangeably in relation to logistics chains and supply chains. An additional difficulty is still not precise positioning logistics

networks and supply chains in the theory and practice of business (also for those PFS¹). Therefore, the starting point of the debate on supply chains should accept the concept of the network. The network is questioning the hierarchy as a privileged way to regulate events specialization of tasks as the basis for the division of responsibilities and concepts centralization - decentralization as the basis for the design of the organization.

The network approach is characterized by the following features:

- divisibility purposes (also in the international system),
- shared competence (evident from the role of the Specialist State),
- working together (for tasks),
- high level of trust and reciprocity (regardless of culture),
- the lack of clear formal relationship of subordination (not for military entities),
- capacity for innovation and flexibility (in the area of decision),
- informative links based on modern technologies of communication (common language, IT support of logistics, for example: LOGFAS, LOGREP, etc.).

Different types of configurations of entities between which there is no clear relationship of subordination, operate on the principles of exchange of matter and information and mutual trust with a particular strategy for the realization of common objectives.

One of the types of networks are supply network. These networks are considered the most in terms of flows of property and related information. However, as rightly observed by J. Witkowski, tangible flow between companies usually are not linear but occur between many different producers and distributors, who may be links in many supply chains. In the supply chain is distinguished by the following relationship:

- number of suppliers (in local markets and abroad),
- many sub-suppliers (eg. for “decentralized” purchases for NSE),
- multiple recipients (various ethnic nationalities),
- number of consecutive “more” receivers (for individual MU – military Units Executing tasks).

These relationships create a great system including leading actors and centered around the network of suppliers and customers. This is a supply network defined by M. Christopher as “a network of interrelated and interdependent organizations that work on the principle of mutual cooperation jointly control, direct and facilitate the flow property and information from suppliers to end users”.

There is a definite relationship between networks and supply chains. Supply chains are superimposed on the supply network. In the simplest solution to a supply network can be “stretched”, writes M. Ciesielski, only one supply chain. In practice, the specific network supply can be flow that has multiple supply chains. In addition, characterizing the supply network, you must consider the nature and scope of relational

1 PFS – public finance sector.

links. Therefore, the definition of said M. Christopher, often cited in literature in the field of logistics, should be supplemented by additional features. These are:

- multigrade delivery network (depth network),
- multichaine delivery network (the width of the network),
- linking partners in the network,
- geographical distribution network,
- time horizon relational links,
- economic and legal participation (legitimacy, economics activities).

So understood supply network should be considered in terms of product and planning. Another type of network is of strategic logistics networks.

Network structure of supply chains – systems of relation

There are various types of logistics networks. For example, in the classification by H.Ch. Pfohl stands out [9]:

- strategic integrated network – it is a stable system driven by a centrally located entity, eg. production or sales,
- virtual company, which through the use of information technologies contribute to the completion of the transaction incidental,
- integrated network operations, where cooperation is based on an integrated information,
- system allows for the use of spare capacity “working” (regulations) and logistics services partners,
- an integrated regional network, which is characterized by cyclical cooperation of many small businesses usually located in a given region depending on emerging needs and their size.

According to J. Witkowski, it is possible to distinguish between polycentric networks [12]:

- local – based on personal contacts,
- suppliers based on technical ties,
- suppliers based on equity,
- on Virtual based on ties of information and hierarchical networks (the central co-ordinator), where further distinction depends on the nature of the entity coordinator: including logistical or based on broker information.

After considering these proposals for classification it is worth considering how such networks can be seen in the current economic environment. Astonishing observation may be a multitude of actually operating a network of entities with which there is direct contact [7].

The concept of supply chain management which reflect the new perception of the environment in the management of the company appeared for the first time in the work of R. Oliver and M. Webber “Supply chain management: Logistics Catches Up

with Strategy” in 1982. with respect to large international corporations and identify conflicts purposes in different functional areas [8].

After 1985 in publications T. Jones and D. Riley were indicated main tasks of supply chain management among which were [4]:

- meet the needs of the final consumer,
- indication chain operators depending stocks,
- ensure that procedures to ensure the treatment of the supply chain as a single system.

In further studies indicated differences between the concept of supply chain management and traditional management of the flow of materials and related information flow (L. Ellram, M. Cooper). Among the reasons for generating supply chains indicate the increasing importance of globalization, in particular the increased role of transport over long distances as well as the impact of new technologies of communication and the search for common access to resources [11].

Origins of the supply chain, in theory and practice is directly linked to the need of disposal of excess inventory, especially in suppliers. Due to the lack of sufficient flow of information about the size and structure of demand, excessive accumulation of reserves was for companies very costly.

First (in the late fifties and sixties) drew attention to it J. Forrester. On the other hand, W. Aldensen F. Hansman developed a model allocation and inventory control using dynamic programming [6].

According to J. Witkowski logistics chain is a chain of warehouse and transport, which is a combination of technological point of storage and handling, road transport of goods and coordinate organizational and financial operations, procurement processes and inventory policies of all links of the chain [12].

Taking into account the process approach supply chain is a dynamic process, which is the sum of the activities in each of its stages, designed to coordinate the free movement of goods, and with them the information, financial resources, places of obtaining the raw material to the recipient (customer).

The most important risks in the logistics chain can include: noise (turbulences), delays, mistaken forecasts, diversified transportation costs, uncertainty of supply, inadequate size of the transferred assets (inventories), inadequate to the needs of transport, lack of coordination decision-making, low level of cooperation and failure of information systems.

Any agonizing discussions about the essence of supply chain come down to meet the needs of the recipient at the right time, place, according to demanded material goods, in the right quantity, at the right cost. This rule can be extended in any way which does not change the fact that there is a need to maintain adequate coordination in the area of cooperation, competition and control. In the formalized structures in the area of public finances, especially in terms of international coordination being a factor, ie. Transfer (give permission) to management (control) process at the appropriate level. In addition to the centralization of powers in the area of information, it is necessary to agree on the issue of managing the flow of materials in technical areas, such as even codification.

In terms of the international system multilevel being played by forms of relationships linking the various entities. The number of variations in structural terms is very high. Studying literature is observed, presented by R. Hoppe kinds of relationships. He distinguishes: transactional relationships, mutual cooperation and cooperation enforced [3].

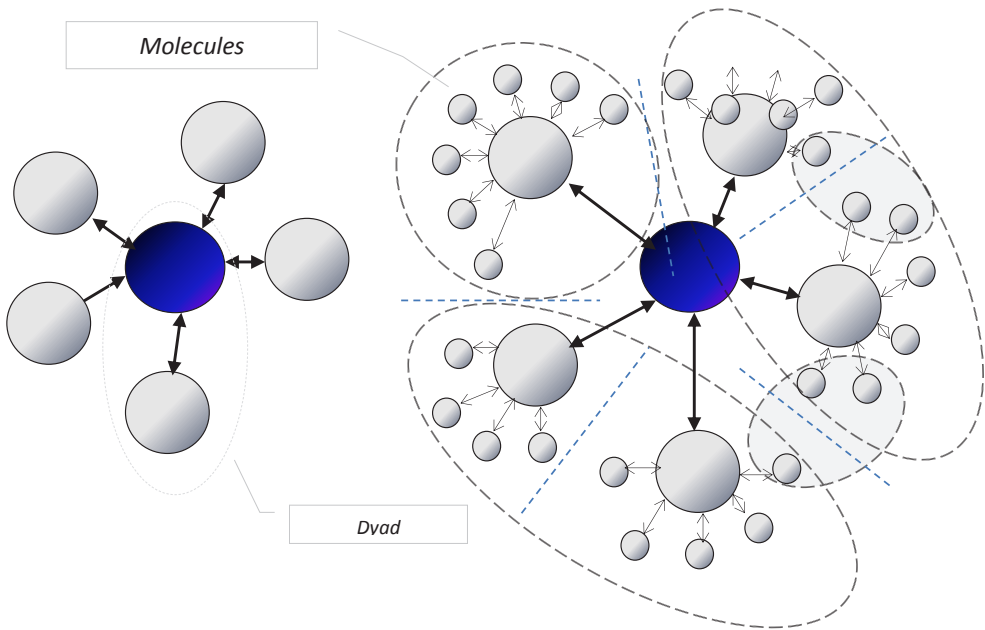
Relationships are the simplest transaction system partnerships just can locate system defined as a set of *dyads related* to the bilateral relations of cooperation. Subsequent systems with the characteristics of the chain are characterized by a significant imbalance of forces, as a result of which we have to deal with the imposition by one of their conditions for cooperation. More complex logistics chains relationships are based on the idea of co-ordination and often are called *3rd party* cooperation, where the system transaction is supported by the third, which can initiate or encourage cooperation [3].

Relational systems in the logistics networks of NATO

Definition of the supply chain in the literature is very much (T. Hopkins, G. Stevens, Ch. Scott, R. Westbrook, M. Christopher, D. Lambert, R. Handfield, D. Bowed, J. Mentzer, J. Witkowski). Many of them relate to the concept of networks, eg. By M. Christopher supply chain is a network of interrelated organizations (parties) involved in the various processes and activities whose purpose is to provide the final consumer a full range of products and services. Concept, the author will use in this study.

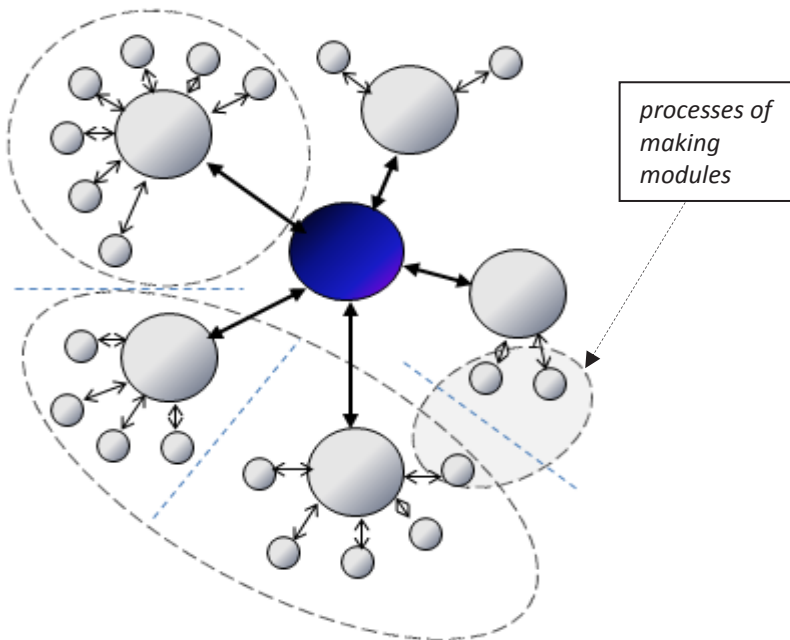
Therefore, the logistics system with unique features, which is the military logistics system has a group of distinctive features (determinants) by attempting to identify distinguished: mobility, flexibility, simplicity and ability to react quickly. This system is so organized to ensure self-sufficiency for the duration of the potential operation, allow the execution of tasks and maintain combat capability of supported modules (troops). Potential logistics provided to the security needs of the level of organization is in the classical system at this particular organizational level. The basic system of relations in military systems is the dyad (figure 1), which is a typical compound of two co-operating with each other entities (regardless) of subordination.

Relational systems very often in the case of entities involved in hierarchical systems (non-business), such as the armed forces of NATO countries are characterized by a superior-subordinate relationship (superior-subordinate) which means that there is a system called academic cooperation under duress. Such systems are usually one-way orientation vector. However, in the era of globalization flows can at most say a certain dominance than the one-way nature of the material flows. It does not change the fact that such relationships are strained. Ancillary role of the entities supplying (feeding) is a characteristic of this type of relationship, which at first glance does not seem so obvious. In military logistics systems focused regionally elements (components) logistics networks are often centric relational systems, also called socket (figure 2).



Source: personal study.

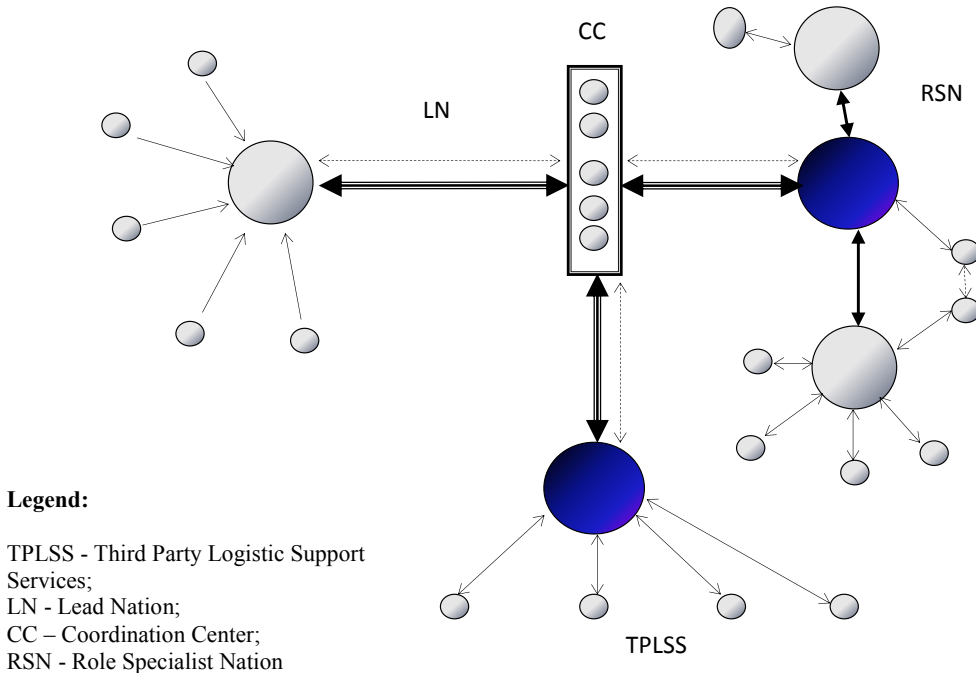
Fig. 1. Dyad relational (the system of dyads) and a complex system of dyads coordination center (control)



Source: personal study.

Fig. 2. Centric (socket) relational systems in the logistic system

The aforementioned system relational 3rd party cooperation is characterized by specially distinguished individuals (or groups) that relational systems with the most international character create a network of material flows (both provided). These systems form the concentric (socket) and centric star-relations systems (figure 3).



Source: own study based on *Doctrine Logistics DD 4(B)*, Bydgoszcz 2014, s. 12–14.

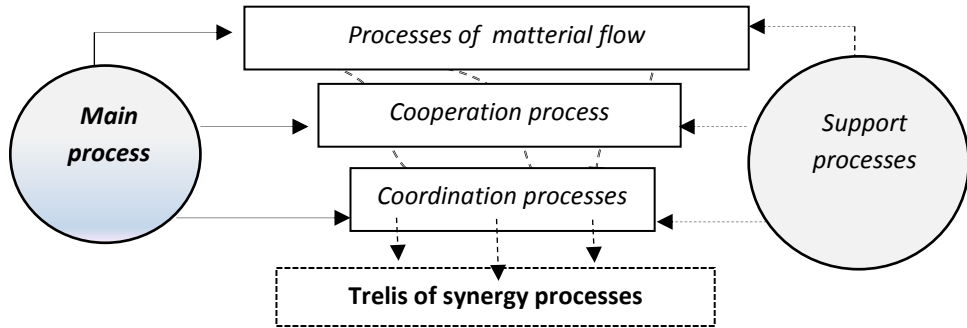
Fig. 3. Centric (socket) and centric-star-relations systems in logistics networks with a separate Third Party Logistic Support Service (TPLSS) and elements of coordination and specialization subjects support

Logistical support is carried out using the military capabilities and civil. Civilian resources should be planned to use when it is justified operationally and economically possible in the existing legal conditions. In the context of logistics multinational, in order to increase the efficiency of participation operation (the mission), the task of partial or complete protection of the logistics can be realized through:

- a) participation in the Multinational Integrated Logistic Units (MILU – Military Integrated Logistics Units);
- b) taking on the role and use of services:
 - the host (HNS – *Host Nation Support*),
 - state-leading (LN – *Lead Nation*),
 - state-specialist (any) field (RSN – *Role Specialist Nation*),
 - third party to contract logistics services (TPLSS – *Third Party Logistic Support Services*).

c) organization of civil – military cooperation, together with the structures of CIMIC (Civil-Military Co-operation).

Relational systems in logistics networks based on relational trellis (flows cooperation – coordination) and its synergistic entrance point (figure 4).



Source: own study.

Fig. 4. Relational systems based on Trellis logistics processes (main and auxiliary)

Cooperation – because of the nature of modern surgery is one of the basic principles of logistic, used both in the national as and multinational.

Cooperation may cover all aspects of logistical support, including funding, contracting and organization of the budget. Procedures for cooperation must be established to optimize the procurement process, consuming resources and eliminate competition in supplementing them.

So, there is a simple conclusion that diagnosed so far in network systems, relational action is not oriented “to effect” causes spontaneous exclusion competitiveness – rivalry (as the principle that we all work for the common good). In the case of coordination being fully the effectiveness of logistical support, which can be raised just by coordinating processes carried out at all levels, which may require the establishment of such. Liaison teams at different organizational levels in order to ensure the flow of information, according to the established priorities and uniform implementation of projects. Sam synergy causes (results in) achieving results through a combination of several principles of logistics at the same time. Multinational logistics support the operation should be targeted to maximize power (resources) logistics countries-participants of operations in order to strive for efficiency of logistics multinational.

Summary conclusions

Because the logistics of public finance sector is different from the logistics evolved in an environment free market many times we have to deal with distinctiveness as to how, relationships, directions of material flows and a completely different treatment efficiency of processes. This includes the lack of the key role of the economic effect,

and the emphasis on economically efficient use of resources for the objectives pursued (tasks) in the system whether it is national or international. The functioning of the host subsystem support is realized on the basis of administrative and legal acts of the central.

International cooperation of entities involved in the framework of NATO is a great field of research and analysis of relational systems, as to their form and competence.

In cooperation and coordination of entities performing common tasks in the framework of the “legitimacy” of the international material flows within individual subsystems logistics cover marks of logistics networks based on (tentatively set by the author in the publication) Trellis process, which is in town, “vector” feature flow of matter, cooperation and coordination of logistics.

In this paper, the author tempted by only articulate certain issues (resulting from years of research and observation) associated with building relationships in logistics networks, and signaled the problem is the only context for further consideration of the complexity of the decision-making environment.

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