

The Development of the Supply Chain – Not at the Same Pace at All Times. Core and Periphery Enterprises in Industrial Network

eng. Katarzyna Grzybowska, Ph.D.

Poznan University of Technology

Faculty of Engineering Management

Strzelecka 11, 60-965 Poznan, Poland

Tel. 0508 053 208

e-mail: katarzyna.grzybowska@put.poznan.pl

Summary: An observation of the increase and development processes of the supply chains indicates that there are areas of these chains, the increasing pace of which are very dynamic. A specific trait of a dynamically developing enterprise (enterprises from the core) is the fact that they attract subsequent sub-contractors and recipients like magnets, they procure subsequent orders and win tenders more effectively in a relatively easier manner. From observation it also follows that they are very capable of creating and implementing innovation, better than other economic organizations, characterized by a smaller growth dynamic.

The publication consists of three parts. The first part discusses the supply chain developmental phases: The creation of relationships and the

enterprise making business contacts in the meta-structure [Grzybowska K., 2010, pp. 319-326]. The second part presents the concept of the growth pole: i.e. of enterprises that possess a higher position (core) in the supply chain and enterprises that are periphery organizations (satellites). The work is of a conceptual nature.

Key words: supply chain, development of the supply chain, core and periphery enterprises.

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1. The supply chain

In 1995, R. Ganeshan, T. P. Harrison and D. Brown, S. Wilson and H. L. Lee, C. Billington defined the supply chain as a network of places [Ganeshan, Harrison, 1995]; [Brown, Wilson, 2005]; [Lee, Billington, 1995].

The term supply chain management (SCM) has risen to prominence over the past ten years [Cooper et al., 1997]. SCM has become such a "hot topic" [Ross, 1998]. La Londe and

Masters proposed that a supply chain is a set of firms that pass materials forward. Normally, several independent firms are involved in manufacturing a product and placing it in the hands of the end user in a supply chain—raw material and component producers, product assemblers, wholesalers, retailer merchants and transportation companies are all members of a supply chain [La Londe, Masters, 1994]. The supply chain is the network of organizations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services delivered to the ultimate consumer [Christopher, 1992]. The supply chain is defined as a set of three or more entities (organizations or individuals) directly involved in the upstream and downstream flows of products, services, finances, and/or information from a source to a customer [Mentzer et al, 2001].

The supply chain meta-structure comprises a network of mutually connected enterprises which are characterized by the above described constitutive elements [Grzybowska, 2010]. Grzybowska presents the typical list of constitutive elements allowing for the identification of the supply chains. They are [Grzybowska, 2010]:

- supply chain size,
- the ascribed roles of supply chain participants,
- status of participants of a supply chain,
- coherence of the supply chain,
- communication in a supply chain,
- interactions within a supply chain.

Stevens [1989] identified four stages of supply chain integration and discussed the planning and operating implications of each stage [Stevens, 1989]:

- Stage 1) Represents the base line case. The supply chain is a function of fragmented operations within the individual company

and is characterized by staged inventories, independent and incompatible control systems and procedures, and functional segregation.

- Stage 2) Begins to focus internal integration, characterized by an emphasis on cost reduction rather than performance improvement, buffer inventory, initial evaluations of internal trade-offs, and reactive customer service.
- Stage 3) Reaches toward internal corporate integration and characterized by full visibility of purchasing through distribution, medium-term planning, tactical rather than strategic focus, emphasis on efficiency, extended use of electronics support for linkages, and a continued reactive approach to customers.
- Stage 4) Achieves supply chain integration by extending the scope of integration outside the company to embrace suppliers and customers.

2. The development of the supply chain

The development of the supply chain takes place in three main stages, in which a total of seven phases may be differentiated (Figure 1):

Stage 1 – Strengthening the contact:

- Phase 1 – Initiation,
- Phase 2 – Verification,
- Phase 3 – Intensification.

Stage 2 – Maintaining the contact:

- Phase 4 – Integration.

Stage 3 – Loosening the contact:

- Phase 5 – Limitation,
- Phase 6 – Impasse,
- Phase 7 – Ending.

A traditional supply chain, all too often, is a sequence of weakly connected activities both within and outside of the organization [Piplani, Fu, 2005].

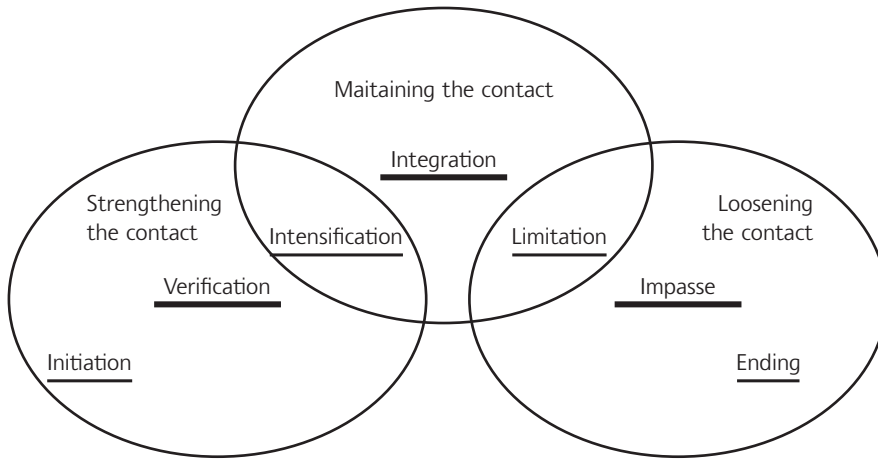


Figure 1. The development of the relationship links and contacts between enterprises in the supply chain

The first step in strengthening an enterprise's business contacts is the *initiation of the contact*. In this phase, the selection of the business partner takes place along with the initial assessment of the possible terms and conditions of cooperation. Coordination mechanisms are also started up. The performance of a supply chain depends critically on how its members coordinate their decisions. Sharing information is the most basic form of coordination in supply chains [Choi, 2010].

Coordination has become a significant factor of the integration of various parts of the organization as well as various organizations of the supply chain. According to the coordination theory, the same problem (establishing the terms and conditions of cooperation between the business partners) can be solved through the implementation of alternative coordination mechanisms. Alternative processes can occur for different mechanisms. The selection of a business partner, an understanding that is a relationship as a manager of the mechanism between the order and the enterprise completing it, and it can flow according to different schemes: (1) the

contracting party may select a contractor on the basis of the first found (first hired principle), (2) the contracting party may select a contractor from a referral (the recommendation of another company), (3) the contracting party may select a contractor through a tender/offer comparison, and (4) the contracting party may select a contractor from his own subcontractor database. The contact initiation phase is short. Depending on the scope of the taken cooperation, it may refer more or less to the detailed establishments made between the enterprises.

If terms and conditions of the cooperation are established between the parties, then the *verification* process exists. This phase in the supply chain may have from a few to several dozen business relations. The enterprises verify their activities: quality, timeliness, the product's functionality / services, etc. They also verify if the partners in fact guarantee the offered level of services or products during the cooperation and also whether they adhere to the established contract terms and conditions. As a result of the verification, they confirm their selection – they take a decision on *intensifying cooperation*. If

the cooperation is fruitful and both organizations win (from a financial or other, i.e. prestigious point of view) the business cooperation is strengthened in the supply chain. The cooperation of the enterprises is based on a large extent on agreements and trust, which follow from experience and the existing cooperation. Involvement in business relations also increases. Enterprises often do favours for each other: they propose preferential terms of cooperation, they simplify cooperation procedures, they open participation to new business projects, etc.

Further positive business relations lead to *integration among enterprises*. To a large extent, this phase is based on the creation of a certain cooperative of interests. The enterprises "play off each other". They strengthen their relations by lowering the level of uncertainty and risk. Through the feeling of large trust and involvement the enterprises may impact the actions of the business partner (i.e. establishing a common policy and strategy, common undertaking of logistics actions, etc.). In the contract maintenance phase – the integration phase – the following may be observed:

- increased communication,
- greater readiness to cooperate,

- an increased plan for the actions of others,
- the more effective achievement of the intended objectives,
- an increased level of satisfaction in cooperation.

In this integrated phase, the enterprises also expect more from each other. The unavoidable tension and conflicts between the enterprises that appear in business practices make the integration phase last under the condition of common actions, entailing the breaking of barriers limiting and calming the conflicts. The integration phase ends if the enterprises do not overcome the crisis periods. The *limiting business contacts* phase begins. The loosening of relations takes place in such conditions. The number and quality of the business contacts is subject to decrease.

The result of the extending limitation of the business relations is the *impasse*. The hitherto common actions become abandoned. The end of business contacts may be the result of the lack of the need (demand on the market) or other expectations and needs of one of the business partners. The reason for ending cooperation may be as follows:

Table 1. The number of messages

Phase	Stage 1 Strengthening the contact			Stage 2 Maintaining the contact	Stage 3 Loosening the con- tact		
	I	II	III	IV	V	VI	VII
Number of messages (e-mail) from enterprise <i>i</i> to enterprise <i>j</i> with the omission of the number of direct contacts	12	24	35	77	43	21	14
Number of messages (e-mail) from enterprise <i>j</i> to enterprise <i>i</i> with the omission of the number of direct contacts	10	20	33	71	33	22	13

- insufficient business cohesion,
- excessive integration in the activities of the business partner,
- unsatisfactory or insufficient traits of the business partner,
- the insufficient fulfillment of tasks by the business partner.

An observation of the fragment of the supply chain (two cooperating enterprises) has shown that in the individual phases of the supply chain development a change in the number of coordinating mechanisms takes place through mutual agreements. Table 1 shows the number of independent messages sent in the individual phases of the supply chain's development.

The results of the list show that the number of messages can become an indicate of the intensity of cooperation in the case of non-routine activeness.

3. The growth poles and satellites in the supply chain

The cooperation of enterprises in the supply chain may not be as beneficial for each enterprises, and the development of

enterprises acting in the supply chain may not occur at the same level. Business entities can be indentified in the created meta-structure – centers, which are capable of producing centripetal force and on which centrifugal force reacts. From the core, enterprises are business organizations with a high level of development and a high level of organization, which follows from the large capability to implement innovative changes. They are also enterprises, which are characterized by a very dynamic increase and domination over the other organizations in the supply chain.

There is a large probability that an enterprise from the core, called a center, participate permanently in the activities of the supply chain (they create the body of the supply chain). The lack of the center has caused the disintegration of the meta-structure. They are strong enough to “attract” other business organizations. They are characterized by production activities on a regional and/or global scale. These enterprise come above the average level of the enterprises participating in the supply chain. They are of a dynamic nature (as they possess a very strong innovative potential) or a propelling one (when they possess a high demand elasticity).

Table 2. Characteristics of the centers and satellites in the supply chain

Centers (the body of the supply chain)	Satellites (cells which link, peripheral organizations)
Controlling strategic resources	The lack of strategic resources
Many internal and external initiatives	Few external initiatives
Important production nodes	Replaceable production node
A high position in the supply chain	A low position in the supply chain
The production of consumer and final goods	The production of raw materials, services
Complicated, innovative production system	Uncomplicated production system
Constituting professional knowledge, a dominating imposition of manners of proceeding on other organizations in the supply chain	Using “imported” procedures, standards, guidelines imposed by the supply chain centers
The creation and dissemination of standards	The acceptance of other standards

One can also observe enterprises which are characterized by a relatively low increase and a subordinated position. These are peripheral organizations. Peripheral organizations change dynamically, i.e. depending on the completed tasks. They constitute the link that connect (satellites), which upon completion of cooperation have become separated from the body of the supply chain, and the cooperation becomes abandoned. This can make connections and dependencies stronger or weaker in such of a meta-structure.

The centers develop dynamically and the satellites are subject to a stagnation process. This is the result of the accumulation and the mutual reactions of the economic as well as cultural reasons. The selected characteristics of the centers and satellites in the supply chain have been included in Table 2.

The creation of the aforementioned cores/centers (growth and profit poles) causes unevenness to occur between enterprises. These discrepancies (Table 3) are an unavoidable effect and also a condition for the increase and development of the supply chain. There is no possibility for everyone to take advantage of cooperation on the same level in the supply chain. For the satellites, cells that link together, to become partners in the development of the supply chain. The richer ones, which have dominated over them, have to exist in the said chain. The creation of the growth poles is equivalent to

the occurrence of the domination phenomenon. Domination is of an economic scope, first and foremost in this situation.

3.1. Obtaining an advantage in the supply chain

Industry plays a key role in the shaping of the growth and profit poles in the supply chain. The majority of the growth and profit poles in the supply chain in regards to production enterprises. They took up production on a larger scale earlier than others. This has resulted in the fact that the concentration of capital has taken place faster and in a greater scope. The division of the tasks or their outsourcing as well as mechanization have impacted the further dynamic development. An additional impulse for the increase and maintenance of domination in the supply chain is also innovative production.

An advantage and domination in the supply chain impact the enterprise's ability to generate, adapt, and transmit innovations on the entire space in which they operate. The fields of development which they create are so large that they can impose a dominating impact on their environment (peripheral enterprises). The advantage and domination also have a tendency to deepen along with the lapse of time. A developmental gap arises between the center and the satellites; It may be subject to change solely as the result of procuring

Table 3. Discrepancies and their main sources

Discrepancies	Centers (the body of the supply chain)	Satellites (cells which link, peripheral organizations)
Informational infrastructure	Highly developed	Poorly developed
Human capital	Highly qualified	Sufficiently qualified in relation to the enterprises in the body of the supply chain
The use of economic networks	Effectively	Weakly
Local/global business links	Effective and comprehensive	Fragmentary

knowledge from the centers. The body of the supply chain are enterprises which are capable of creating and implementing innovation, which are expansive and mobilizing (at times imposing) the development of the satellite enterprises. They are able to attract other economic organizations. The beneficial reactions of the dominating enterprises on the other peripheral organizations cooperating with them takes place through the effects of dissemination, i.e. the diffusion of technological and cultural innovations on the partnership enterprises as well as investments in companies from the core caused by the search for new markets and the will to decrease costs.

Procuring knowledge and the development of satellite enterprises is connected with becoming dependent on the enterprises dominating in the supply chain. Hence, a positive effect entailing the dissemination of modern ideas is possible.

The enterprises dominating in the meta-structure may also regress. The twilight of domination may take place. This is however, the result of the lack of the ability to change and to adjust to the new needs of the market.

3.2. The center – periphery relations

The possession of capital deliveries by the centers of the supply chain in the form of various sources results in the fact that making the satellite enterprises dependent on them, is usually of non-reflexive nature. The greater the possessed real or symbolic source, the greater the obtained domination over the satellite enterprises cooperating in the supply chain (the centers of a great advantage become the subjects of idealization). This allows the dominating enterprises to exert significant pressure on the satellite enterprises not only through the “hard” methods (i.e. through negotiations, purchasing, competencies). They also dominate with the use of the “soft force”

method, which is connected first and foremost with the maintenance (i.e. they indicate the behaviour patterns, plans of action deemed as ideal, standards of conducting business activity). Satellite enterprises remain under the influence of the centers.

4. Conclusion

The article presents the concept of the supply chain with the use of two types of enterprises: motor units, dynamically developing and domination, of a core type, as well as peripheral, satellite type enterprises. The reasons for the occurrence of these two types of enterprises has been explained. It was also indicated why cooperation between enterprises is not as beneficial for all of them as well as why their development does not take place at the same level. The presented concept allows one to explain the occurrence of difference between enterprises in the supply chain.

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