

# Industrial Market's Distribution Networks in the Virtual Environment

Work-in-progress paper

## Objectives

The development of the Information and Communication Technologies has been triggering numerous mutations in the organization of good's distribution. We can observe virtualization of customer-supplier relationships and interaction between parties. This research aims to shed light on the appearance of new type of internet-based distribution networks in virtual environment on the industrial markets. The **research** investigates how distribution network operates in the virtual environment. The research intends to capture various mechanisms, such as coordination, inter-firm cooperation, management and value creation opportunities. This paper offers a typology that distinguishes between two types of distribution organization, namely the traditional focal distribution model and internet based distribution model. The framework draws on the relationship and network concepts of the Industrial Marketing and Purchasing (IMP) group (e.g. Ford et al,1997; Håkansson, and Snehota, 1998;Håkansson, 1987).

Firstly, we analyse the current changes and trends in distribution. Secondly, we describe traditional dynamic distribution networks. Thirdly, we model virtual distribution networks. And finally make comparative analysis of both types and conclusions.

## Research methodology

The present research is based on the industrial network approach, which is about relationships and links that connect actors, activities and resources (Håkansson & Johanson, 1992).

First stage implies **literature review** to understand the current levels of knowledge and research in the correlated areas.

Further we are going to elaborate conceptual model of two types of distribution networks traditional one and network in the virtual environment. **Modeling** of distribution networks is helpful for understanding of interaction mechanism.

**Content analysis** of B2B internet websites would be held in order to objectively and systematically make inferences about the intentions, attitudes, and ongoing processes by identifying specified characteristics in textual messages.

The empirical part of the paper would be based on the **embedded case study** of distribution network, which provides an integrated, detailed examination of a single phenomenon (Yin, 2003). Basing on an exploratory case study design, we would investigate managerial challenges of companies using internet-based distribution of chemicals. Following the methodology (Eisenhardt & Graebner, 2007; Flyvbjerg, 2006), we are going to explore how world leading companies manage distribution using online services.

To verify the results, we would conduct semi-structured interviews with purchasing and sales executives from the leading industrial companies - users of virtual distribution networks. Interviews would give insight into their distribution policy and check external validity of the studied cases.

## Research in distribution

The sophistication of a distribution system is conditioned by various factors. Present-day distribution has become “network-like” due to the industrial changes such as: shift away from mass distribution and standardisation to customisation, shorten of lead time, tight synchronisation and increased interdependency among firm activities, increased level of build-to-order production, specialisation of actors. The internationalization and globalization of markets, the open networks and advances in information/communication technology, the service and customer orientation of B2B and B2C sectors, as well as the emergence of the knowledge society, require new patterns of cooperation between suppliers, trading partners and customers to successfully respond to the e-business demands.

First, we sought to understand the recent trends and changes in the contemporary distribution industry. The term “distribution” was introduced to business organisation theory at the beginning of 20th century by a pioneer of distribution study, Samuel Sparling. He pointed out three general classes of business activities: extraction, manufacturing and distribution (Sparling, 1906). The table below traces additional focus biases in the distribution literature to other aspects.

As can be seen from the table, prior researchers have suggested that there is an increasing need for business research to shift its focus from traditional dyadic relationships to a larger business context of network relationships to better understand firm behaviour and performance (Achrol, 1997; Gulati 1998; Rowley 1997).

*Table 1. Evolutionary trends in the distribution literature*

Time period	Dominant theory	Approach	Focus	Unit of analysis	Major references	Comments
1900 - 1950	Historical School of Economics	Functionalists	Functions and flows	Whole system	Sparling (1906) Shaw (1912) Clark (1923)	<ul style="list-style-type: none"> <li>▪ Distribution arrangement</li> <li>▪ Functions</li> </ul>
1950 - 1970	Neoclassical economics	Functionalists / Managerial	Costs	System/ Company	Alderson (1957) Bucklin (1965,1966)	<ul style="list-style-type: none"> <li>▪ Distribution strategies</li> <li>▪ Postponement-speculation principle</li> <li>▪ Vertical marketing systems</li> </ul>
1970 – present	Social psychology and political science	Managerial	Power and conflict	Dyad	Stern (1969) Stern,Reve (1980) Brown,Day 1981) Gaski (1984) Dant, Schul (1992)	<ul style="list-style-type: none"> <li>▪ Behavioural</li> <li>▪ Channel leader</li> </ul>
	New institutional theory/Transaction cost economics	Managerial	Transactions	Dyad	Heide (1994) Wathne,Heide (2004) Dawyer,Oh (1988) Williamson(1973,1975)	<ul style="list-style-type: none"> <li>▪ Transaction costs</li> <li>▪ Governance structure</li> <li>▪ Satisfaction, fairness, trust</li> </ul>
	New institutional theory/ New economy	Managerial	Relationships	Network	Iacobucci,Hopkins 1992 Achrol (1983, 1991) Ford , Gadde (2008) Alderson (1994)	<ul style="list-style-type: none"> <li>▪ Network environment</li> <li>▪ Relationships</li> <li>▪ Interdependences</li> </ul>
2000-present	New economy / Information economy	Managerial	Virtual network	Virtual environment	Rodríguez-Monroy (2010) Zhao,Shi,Gregory (2001)	<ul style="list-style-type: none"> <li>▪ Virtual interactions</li> <li>▪ Virtual e-chains</li> <li>▪ Globalized distribution networks</li> </ul>

Adapted: Gadde 2008; Gripsrud, 2004; Wilkinson, 2001; Ford.

The evolution of organizations that work in multinational environments has considerably altered their distribution strategies, which includes creation of networks, virtual e-chains and ect. The environment in which enterprises currently work with increasingly globalized markets, company consolidation and strategic alliances is forcing companies to find new forms of collaboration to improve the integration and synchronisation of the various functions and stages of their product value chain (Zhao, Shi & Gregory, 20010).

The recent managerial approach requires that researchers investigate relationships and interactions in a distribution network (Gadde & Hulthén, 2009). Under this approach, distribution processes in the industrial markets are viewed from the perspective of a relationship, which is defined as a mutually oriented interaction between two reciprocally committed parties (Håkansson & Snehota, 1995). From our point of view, the network approach follows a recent trend in which a growing number of network-type distribution chains feature “webs of capabilities embedded in an extended enterprise” (Narus & Anderson 1996). Firms are becoming increasingly dependent on the resources controlled by other actors. Therefore, firms must be “able to combine resources in new ways, gain additional resources, and dispose of superfluous resources”. Such distribution practices allow firms to tailor to individual end-user requirements (Ford, Gadde, Håkansson, & Snehota, 2006).

Internet serves as the most appropriate platform for company’s cooperation. Today the share of Internet based B2B networks increases rapidly. Internet is the most perspective tool for effective distribution organisation. Managing contemporary distribution systems can be extremely complex because of the dynamism of the environment, which inevitably leads to a lack of prediction and control. Today, there is an urgent need for academic researchers who can systematically investigate the various aspects of virtual internet-based distribution network management. Research intends to analyze the causes behind the formation of such networks, their strategy, structure, dynamics and evolution, taking into account areas such as strategic intercompany alliances, synchronization of their value and supply chains, their information systems, the cultural aspects of the organizations in question and, finally, their convergence with another of the more relevant future trends in distribution: mass customization.

Distribution process in industrial markets is seen from a relationship perspective, relationship being defined as mutually oriented interaction between two reciprocally committed parties (Håkansson & Snehota, 1995). From our point of view, the network approach is in line with the main trend of the recent decades manifesting itself in growing number of network-type distribution chains, a kind of “webs of capabilities embedded in an extended enterprise” (Narus & Anderson, 1996). Firms increasingly depend on the resources controlled by other actors and thereby are “able to combine resources in new ways, gain additional resources, and dispose of superfluous resources” (Wilson & Daniel, 2007). Such distribution practice allows tailoring to individual end-user requirements (Gadde & Ford, 2008).

One of the major modifications of distribution is a shift away from mass-distribution towards individualized solutions in relation to particular customers (Wilson & Daniel, 2007) or shift from standardisation to customization (Lampel & Mintzberg, 1996). This is primarily an outcome of evolvments in the resource layer, where the importance of large-scale operations has been reduced. Flexible manufacturing systems have shortened production lead-times in the same way as efficient logistics have made in distribution. Just-in-time delivery is one example of enhanced customization. These arrangements are built on tight synchronization and increased interdependency among activities. Another effect of reduced lead-times and improvements in information exchange is an increased attention to build-to-order production (Gunasekaran & Ngai, 2005). These

arrangements also call for extensive coordination of activities since buffers in terms of inventories will be reduced. Customization calls for variety of distribution solutions, and for suppliers design of 'multi-channels' has become an important strategic issue (Weinberg et al., 2007). Actors involved in these arrangements tend to be specialized in various ways in order to play a particular role in bridging the distribution gap. So, following the ARA model (activities-resources-actors) there are changes in three network layers: increased customization in the resource level, growth of interdependency in the activity level, higher specialization in the actor layer. Present day distribution becomes "network-like".

### **Types of distribution networks**

A principal tenet of organizational theory is that structure is related to environment (Aldrich & Zimmer 1986) and organisations that fit their environments will perform better and are more likely to survive than those that do not (Emery, Trist 1965). Burns and Stalker (1961) point out two types of organisations, a mechanistic form using a routine technology (low task and work flow uncertainty) and operate in a homogenous stable environment and organic, those operating a non routine technology (high task and work flow uncertainty) in a heterogeneous unstable environment should use an organic structure. Network as an organic structure is better suited to complex, rapidly changing, and turbulent environments than hierarchical or mechanistic structure (Burns & Stalker 1961; Mintzberg 1979; Miles & Snow 1986). Similarly, Hage (1965) described the organic organizational model as being characterized by the 'adjustment and continual redefinition of individual tasks' (low formalization) 'a network structure of control, authority and communication' (low centralisation).

In computer science there are two main types of network categories for content distribution which are:

- Server based
- Peer-to-peer

In a server based network, there are computers set up to be primary providers of services such as file service or mail service. The computers providing the service are called servers and the computers that request and use the service are called client computers.

In a peer-to-peer network, various computers on the network can act both as clients and servers. These computers can act both as a client and a server and are also referred to as peers. Many networks are combination peer-to-peer and server based networks. The network operating system uses a network data protocol to communicate on the network to other computers. The network operating system supports the applications on that computer.

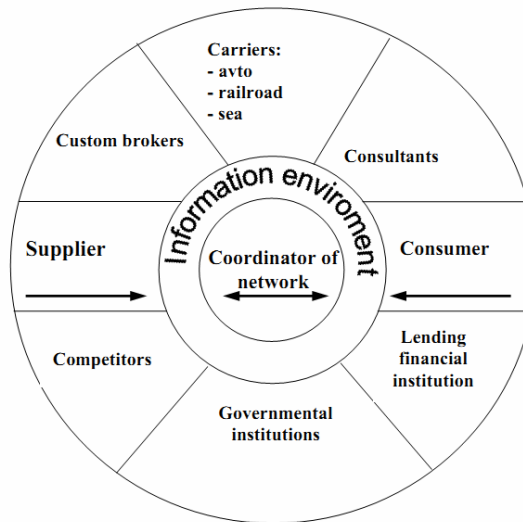
The **traditional focal model of a distribution network** supposes a broker or a coordinator at the centre of a network, when other network participants agglomerate around the leader and implement their functions in accordance with the distributor's arrangements.

The **post-industrial, internet based distribution network** is completely decentralized, they operate in the **virtual environment**. Distribution in the virtual environment becomes popular not only on b2c, and c2c but also on b2b markets.

The framework draws on the relationship and network concepts of the Industrial Marketing and Purchasing (IMP) group (e.g. Ford et al, 1997; Håkansson, and Snehota, 1998; Håkansson, 1987).

## Traditional focal distribution network

Distributor coordinates the network, through combining of complementary resources of network participants and enhancing activity links with supplier, buyer and other supporting actors such as logistic service, and consequently reaching performance related goals. (Ghauri, Lorentz, 2010)



*Picture 1. Focal distribution network model*

In the center of a network there is an network broker or coordinator. Other network participant agglomerates around leader and implement their functions in accordance with distributors arrangements.

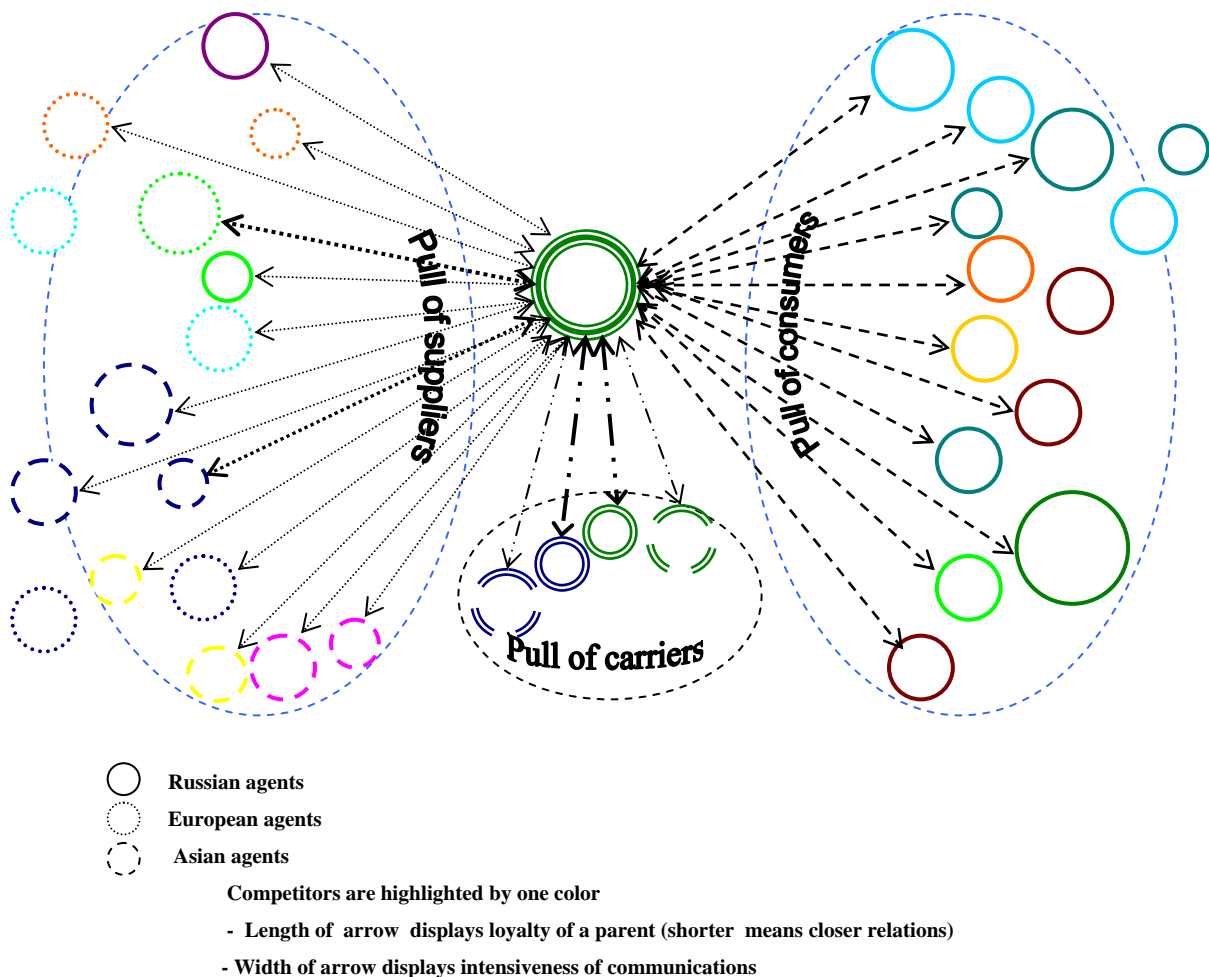
The graph on the picture 2 describes the real distribution network. Data collection was based on case study of a company on Russian market. Case company is the distributor of wide range of chemicals for production (polymers, rubber, paints, inorganic components). The Joint Stock Company started its operations in 2000. For 10 years the distribution network of the company has been expanded to 10 divisions: Moscow, Saint-Petersburg, Tambov, Volgograd, Kazan, Yekaterinburg, Yaroslavl, Ivanovo, Rostov-on-Don, Perm, Minsk (Belarus). The wholesaler has got annual turnover about 50 million USD and more than 100 employees.

The company puts strategic emphasis on provision of a wide range of chemicals for small and medium producers, which are the target market.

Company had established relationships with suppliers from all over the world. Actually, the middleman coordinates three chain types:

- 1) Russian – purchasing of goods from domestic producers.
- 2) European - purchasing of goods from the European suppliers: Belgium, Germany, Italy, Switzerland.
- 3) Asian - purchasing of goods of Asian origin: China, Taiwan, South Korea, India.

More detail information about case and channels could be found in the IMP paper. (Sheresheva & Kolesnik 2010)



Picture 2. Focal distribution network

Each network agent is seen as complimenting rather than competing with the other. For example one supplier can provide high quality at the high price for exacting customer; another can make shipment at the shortest time or at the lowest price. Distributor is aware about different characteristics and peculiarities of agents so he searches for the ways to optimize the network activities. Dynamic networks in many industries operate across national boundaries (Miles & Snow 1986).

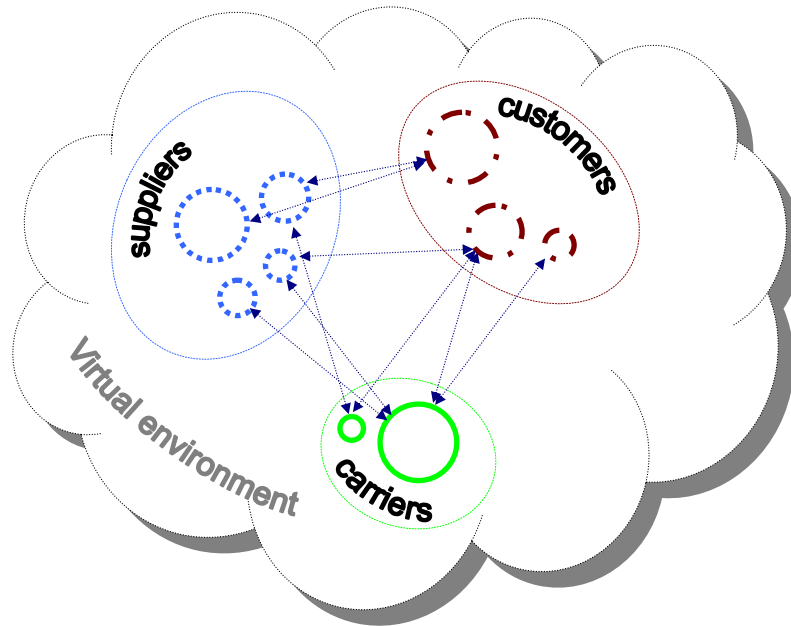
### Virtual distribution networks

Both the management of a distribution in the third millennium must necessarily to consider two phenomena; the products and markets Globalization and the rapid development of the Information and Communication Technologies (ICT). New ICT products pervasive influence on firm's infrastructure, products, markets and consumers. ICT give to the firm many new opportunities related to new emerging business models. One of innovations is virtual distribution network.

The term 'virtualisation' and the verb 'to virtualise' to denote the process of moving an activity (or a set of activities) from a physical, paper-based form to a computerised, internet-based form.

The Internet increases the richness of communications through greater interactivity between the firm and the customer (Watson, Akselsen, & Pitt, 1998). The Internet is viewed by many as an unstructured and chaotic infrastructure. But looking deeper shows an environment with a focused strategic architecture based on rules setting the boundaries of innovation. The Internet for many offers new modes of commercial trade and communications and is a clear advocate of non-linear styles of innovation (Hardaker & Graham, 2000).

In row of industries there is appearance of global production and distribution virtual networks based on a new architecture model with a high development potential to satisfy an increasingly demanding and fragmented market. Picture 2 shows the concept model of virtual distribution network.



Picture 3. Virtual distribution network

Distribution network becomes peer-to-peer (P2P) type, where partitions tasks or workloads are apportioned between peers. Peers are equally privileged, equipotent participants in the application. They are said to form a peer-to-peer network of nodes. Peers make a portion of their resources, such as information or knowledge, directly available to other network participants, without the need for central coordination by servers or focal agent. Network participants interact with each other **directly** without any intermediaries. Such distribution scheme has got **decentralized structure** with equipotent participants. Functions of focal distributor are rearranged between specialized actors of the network. The system gets rid of multi-service distributor

Increased globalisation and access to the financial markets means that companies have a wider choice in selecting their suppliers. Quality of the goods from different producers becomes unified, so the issue of quality becomes less crucial. Today it is possible to contact in real time many economic agents' geographically far, using languages less structured and formal than past. Communication within and across the organization have virtualized. Firm can work with a partner for several years and never meet personally. As a result personal relationships become less valuable. It becomes easier and less costly to change partner.

Further acceleration of the virtualization phenomenon is enhanced by the social computing technology that enables face-to-face like meetings, for example video-conference. Nevertheless the new type of relationships can be pointed out – virtual personal relationships. Such relationships are based on the web attributes such as:

- 1) Website of the company. It is the tool number one as it is the face of partner. The better site is the more sustainable and reliable is a partner - company.
- 2) Electronic mail domain.

So for companies virtual networks web-based strategies (Shapiro and Varian 1999; Porter 2001) becomes outmost important.

Virtual network is a kind of complex self-adaptive system in which order emerges in a bottom up self-organizing way, through the micro interactions taking place (e.g. Arthur et al 1997, Easton et al 1997, Wilkinson et al 2001). The base of strategic management in self-adaptive systems in modern economic conditions is an achievement of sustainable competitive advantage which is supported and developed due to the interaction of independent organizational units. Complex adaptive systems theory has enjoyed much interest in management and organizational issues. Phenomena such as organizational change and transformation (Dooley, 1997; Dooley et al., 1995; Goldstein, 1994; McKelvey, 1997; Poole et al., 1999), innovation (Brown and Eisenhardt, 1998; Cheng and Van de Ven, 1996; Jayanthi and Sinha, 1998), human resource practices (Guastello, 1995; Guastello and Philippe, 1997), strategy (Levy, 1994; Stacey, 1992; Thietart and Forgues, 1995) and supply networks (Choi, Dooley and Rungtusanatham 2000) have been examined using concepts from complex adaptive theory. In this situation network management is about participating, responding and learning about the problems and opportunities that emerge (Axelrod and Cohen 1999). There is a need to develop better theories about how firms do and should behave in such complex adaptive networks in order to co-produce better individual and network performance (Wilkinson 2001).

### **Comparative analysis of distribution network types**

This paragraph is devoted to the analysis of advantages and disadvantages of virtual networks in comparison with traditional focal networks. To make the research useful for managers, special analysis was made which accumulating positive and negative aspects of virtual networks.

The main benefit of virtual online joint interaction experience is a speed increase of innovations. Virtual relationships creates simplify access to the intellectual resources owned and controlled by other market agents. At the same time the risk to loose strategically important information in case of network disintegration and opportunistic behavior of network participants is increasing. Intensiveness of information flow in virtual networks expands new opportunities – access to new markets, new marketing techniques and technologies. On the one hand it can stimulate innovations; on the other hand firm should spend resources for protection of information from opportunistic partners.

Virtual technologies facilitate reduction of operational cost of distribution and production. Informational technologies make the routine procedures easier and less time-consuming. Communications and decision making are less costly in the virtual networks. Also virtual networks relationships supporting and development requests much less money than offline network's relationships.

Internet-based business is highly available for numerous agents, so the possibility of appearance of unconscionable partner is higher. For start of virtual business a person does not need large investments. So the importance of partnerships and networks aimed to anticipate impostures increases. As the matter of fact virtual environmental legislation and legal protection of participants is not rather developed now.

Virtual networks have got weaker influence on the company's freedom; there are fewer limitations of partner's activities. So the possibility to loose independency is lower. Nevertheless in

the future virtual strategic partnerships could substitute challenging, resources-consuming, risking processes of merger and acquisition.

From the microeconomic point of view companies in the traditional networks were highly dependent on their staff and personal relationships (“manager-manager”, “manager-client”). In virtual less personalized networks risks due to the excessive dependence from managers and staff turnover decrease. Per contra lack or absence of interpersonal communication reduces the level of trust and leads to the increase of transaction costs and uncertainty, unpredictability.

From the macroeconomic point of view, virtualization decreases level of monopoly and increase competition on the market. Firstly, due to the fact that internet-based business is available for numerous agents. Secondly, global agents become conveniently accessible for customers from local markets via internet.

Finally virtual network platforms create an easier access to the expert’s opinion. For example **foresight technologies** can be successfully used for industrial consulting of network agents.

## Conclusions

The paper presents the research on distribution in the virtual environment. Contemporary distribution chain is not hieratically structured anymore. Simultaneously it has to be as flexible as possible in order to adapt quickly to the dynamic business environment and sustainable. The present day distribution is characterized by network-like structure.

In the research there were modeled two types of distribution networks. The first type is the traditional network with the focal, who coordinates the activities of actors. The second type is the virtual distribution network, with decentralized structure without central coordination.

There are pluses and minuses of virtual networks are indicated. But the main advantage is that network virtualization allows satisfying “on-demand” needs much easier and faster.

The further work of this study should focus on the following subjects:

- strengthening of the theory by giving more attention to the virtual network theory
- implement deeper content analysis of B2B internet websites
- executing semi-structured interviews with purchasing and sales executives from the leading industrial companies - users of virtual distribution networks.

Results of the research can be used by managers as a puzzle part for the complex view of a distribution process.

**Keywords:** distribution, networks, virtual environment.

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