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VALUE CREATION IN THE INTERNATIONAL SUPPLY CHAINS BY MEANS OF INFORMATION COMMUNICATION TECHNOLOGY

The definition of value creation is given and centers of value creation in the supply chain are identified. High-technology environment has influenced on companies' performance. Efficiency of using information communication technology increases possibility to satisfy stakeholders with their needs. It is concluded with the centers of value creation in the supply chain where stakeholders' participation plays a key role.

Keywords: value, value creation, supply chain, supply chain management, international supply chain, stakeholder, centers of value creation, performance, information communication technology.

Introduction. Nowadays technology plays a key role in the global business environment. Fast outgoing changes have introduced new kinds of challenges and opportunities to the manufacturing companies. The success of the companies in the global environment depends highly on supply chain efficiency and its capabilities to provide value to the customers.

Human behavior's attributes are changing because of adaptation to technologies. Using information communication technologies by companies helps to engage customers and stakeholders in the value creation. As a result centers of the value creation in the supply chain are changing.

Value creation in the supply chain has attracted considerable attention in the literature. It has typically been characterized as being the result of either external or organization spanning, or internal efforts to improve supply chain performance. Few studies have examined the simultaneous effects of internally and externally focused efforts to improve supply chain performance.

The purpose of this paper is to begin identify how information and communication technology influence on the value creation in the supply chain can help companies to improve their supply chain management. Let us look at some of the basic definitions to improve clarity of the discussion.

1. Definitions. Definition "value" is the most widespread; one of the first definitions was given by A. Smith in his book "The Wealth of Nations" (1776). After this term also had attracted considerable attention in the literature. Moreover, there are only few studies and articles that have identified definition of "value creation" (Veltz P. La nouvelle, 2000 ; Ernst & Young, 2003) and "value creation in the supply chain" (J. Jayaram, V. R. Kannanb & K. C. Tanc, 2004;

An international supply chain is conceptualized as a complex, dynamic system in which disruptions interact with long shipping and lead times to generate costs. Supply chain management is applied by companies across the globe due to its demonstrated results such as delivery time reduction, improved financial performance, greater customer satisfaction, building trust among suppliers, and others. According to D'Amours, Ronnqvist, and Weintraub (2008), companies resort to supply chain practices to improve their performance.

It has been widely recognized that due to the globalization process all boundaries are blurred so

international supply chain we would like to consider as supply chain.

Supply chain is a network of organizations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in the form of product and services delivered to the ultimate consumer. In other words, a supply chain consist of multiple firms, both upstream (i.e., supply) and downstream (i.e., distribution), and the ultimate consumer. The notion of supply chain describes as "a longer channel stretching from raw materials to components to final products that are carried to final buyer" (Christopher, 2006).

Table 1 – Definitions of value and value creation

	Definition	Author
Value	Value has two different meanings, and sometimes expresses the utility of some particular object, and sometimes the power of purchasing other goods which the possession of that object conveys.	A. Smith (1776)
Value	Value is the chain of activities for a company that operates in a specific industry.	M. Porter (1985)
Value creation	Value is created through an organization's business model, which takes inputs from the capitals and transforms them through business activities and interactions to produce outputs and outcomes that, over the short, medium and long term, create or destroy value for the organization, its stakeholders, society and the environment.	Ernst & Young (2003)
Value creation	Time spent on work can not be considered as a measure of value. Most important now appears in the ability to coordinate. The core value creation becomes immaterial labor. In principle, immaterial labor is not based on scientific and technical knowledge performers, but rather on their ability to communicate and cooperate with others - skills that apply to everyday culture and is not the subject of study.	Veltz P. La nouvelle, (2000)

A summary of prior definitions with the theme is presented in the Table 1.

For the obtaining the research aim “value creation” definition given by Ernst & Young will be used.

Value creation may be defined simply as when an organization or a process outperforms expectations. Value will be viewed from the perspective of various stakeholders including customers, suppliers, the organization’s associates and shareholders.

Value is an integral indicator of satisfaction parameters which are related to the price of product or service. Value creation in the supply chain is understood as the formation of new activities such as manufacturing, distribution and transportation.

Extent of value creation in supply chains is dependent on the attention placed on key initiating mechanisms: structural mechanisms and relationship building. Put simply, this means that firms with superior capabilities in channeling the structural mechanisms identified as well as in building relationships with key boundary spanning entities are able to develop and sustain higher levels of value.

High levels of value creation are in turn positively associated with superior firm performance.

This has implications for supply chain design and configuration (J. Jayaram, V. R. Kannanb & K. C. Tanc, 2004).

For supply chains to generate maximum value in this dynamic environment, they must synchronize the flows of supply with the flows of value from customers in the form of rapidly shifting tastes, preferences, and demand.

Information communication technology (ICT) is an umbrella term that includes any communication device or application, encompassing: radio, television, cellular phones, computer and network hardware and software, satellite systems and so on, as well as the various services and applications associated with them, such as videoconferencing and distance learning. CT refers to technologies that provide access to information through telecommunications. It is similar to Information technology, but focuses primarily on communication technologies. This includes the Internet, wireless networks, cell phones, and other communication mediums.

2. Research model and hypotheses. According to the identifying of value creation in the supply chain it is important to understand how companies should more effectively manage the supply chain in today’s high-technology environment.

Two themes guide the setting of the research hypotheses. First, participants that can have influence on value creation in the supply chain.

Second, the efficiency of the supply chain depends on the using high-tech capabilities to attract clients in value creation.

These relationships are summarized in Figure 1.

H1: Stakeholders as participants of value creation

The term stakeholder emerged in 1963 from a ground breaking memorandum at the Stanford Research Institute, which argued that managers “needed to understand the concerns of shareholders, employees, lenders and suppliers, in order to develop objectives that stakeholders could support”. (Sinclair, 2010) Stakeholders are further defined as any group within or outside an organization that has a stake in the organization and/or its performance (Daft, Murphy & Willmott, 2007) or affects strategic decision making within an organization (Boselie, 2010).

According to Freeman et al. (2010) stakeholder theory was designed to solve three problems which had arisen throughout the last decades, and aims at improving our understanding of value creation and how it is traded, connecting ethics and capitalism, and help managers deal with these matters (Freeman et al., 1997; Parmar et al., 2010).

One may further differentiate between internal and external stakeholders, or primary and secondary ones. Those stakeholders within a firm, i.e. employees, managers, and owners are depicted internal stakeholders, while those outside of the organization, e.g. suppliers, customers, and the government, are defined as external stakeholders.

Moreover, primary stakeholders are crucial to a business’ survival, while secondary stakeholders have no formal claim on the firm; Firms merely ensure to not do them any harm. (Parmar et al., 2010).

Stakeholders influence on one of the main decisions in the supply chain management is “make-or-buy” decision. Those who take this decision can be managers, employees, customers, shareholders and suppliers.

H2: The efficiency of the supply chain depends on the using high-tech capabilities to attract clients in the process of value creation

In supply chains value of goods and services increases at each stage from contractors to suppliers, and after finally to consumers. The added value created along the chain is distributed between the participants and their employees.

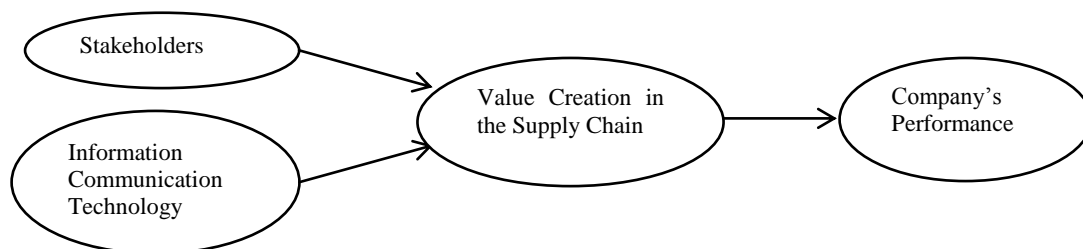


Figure 1 – Proposed research model

Using ICT can help companies to increase customers and clients involvement in the process of value creation. With the help of high-tech capabilities companies can attract stakeholders where they can choose payments options, delivery options etc.

Moreover, company increases its performance through attracting new customers and satisfaction of their needs.

After analyzing the Gartner Supply Chain Top 25 for 2013 which identifies global supply chain leaders and highlighting their best practices for heads of supply chain and strategy organizations we can select sample of manufacturing and equipment companies from Electronic and Electrical equipment, Mechanical engineering and Engines. Composite score is based on the Peer Opinion, Gartner Research Opinion, ROA, Inventory Turns and Revenue Growth. All this evaluations identify companies' performance in the supply chain management.

On the basis of the sample we conduct research how stakeholders influence the value in the supply chain and prove that efficiency of supply chain depends on information technology using by company.

Table 2 represents Gartner Supply Chain Top 25 for 2013 and evaluations of websites, with B2B and B2C evaluation.

H3: The centers of value creation may coincide for one industry/sub-industry operating on the similar business models.

The worldwide electrical, electronic and computers industry is the most flourishing and extremely diversified sector consisting of manufacturers, suppliers, dealers, retailers, electrical engineers, electricians, electronic equipment manufacturers, and trade unions.

Electronics – with semiconductor devices and integrated circuitry – has revolutionized modern manufacturing and information systems. With its continuous stream of technological innovation, electronics has become the cornerstone of products, services, and processes that now pervade virtually every aspect of contemporary life.

The centers of value creation can be identified by comparing supply chains of leading companies within the same industry/sub-industry.

Table 2 – Gartner Supply Chain Top 25 for 2013 and evaluations of websites, B2B and B2C

Rank	Company	Supply Chain Performance (Composite Score)	ICT (websites evaluation)	B2B	B2C
Industry: Electronic and Electrical equipment					
1	Apple	9.51	70	3	3
5	Intel	4.97	53	1	1
7	Cisco Systems	4.67	53	2	0
8	Samsung Electronics	4.35	78	3	3
11	Dell	4.05	80	3	3
20	Lenovo Group	2.75	78	3	3
Industry: Mechanical Engineering, Engines					
18	Caterpillar	2.91	55	2	2
23	Cummins	2.48	68	2	0

3. Research Method

3.1. Empirical Study

During empirical study at first we analyzed services that offered on the websites of listed companies. After analyzing the services we can say that they are aimed at customers of these companies. On the website, users can find information about the product, products performance, contact technical support or ask questions that interesting for them.

Using data evaluation of sites a Pearson product-moment correlation coefficient which measures the strength of the linear association between variables was identified. Basically, a Pearson product-moment correlation attempts to draw a line of best fit through the data of two variables, and the Pearson correlation coefficient, indicates how far away all these data points are to this line of best fit.

The Pearson correlation coefficient, can take a range of values from +1 to -1. A value of 0 indicates that there is no association between the two variables. A value

greater than 0 indicates a positive association; that is, as the value of one variable increases, so does the value of the other variable. A value less than 0 indicates a negative association; that is, as the value of one variable increases, the value of the other variable decreases.

Attracting customers in the process of creating value is determined by evaluating websites of selected companies for the following parameters: Learnability; Innovativeness; Response time; Timeliness; Interactive user support; Contact with social networks; Feedback; Transition to online store; Customization parameters of the products; B2B; B2C. Selected options affect the value using information communication technology and involving stakeholders.

We paid attention on the B2C parameter because of the ability to influence of one of the main stakeholders (i.e. clients) increases. And B2B parameter as a type of commerce transaction depends on the chosen products or services and involves other companies into the business model.

Interval measurement scale was used with extreme negative value of “0”, which means no services on the website, the average value “5” means that the service is present but not in its entirety, and extreme positive value “10” – availability of services. Additionally, choose two rank scale of parameters B2B and B2C. Choosing a value of “0” – no interaction; “1” – no data; “2” – interaction through a distributor; “3” – direct order.

We evaluated company websites in order to determine how information technologies affect the value and determine role played by stakeholders.

Using the software SPSS we obtained such results that variables Transition to online store and B2C have strong correlation ($r=0,887$; correlation is significant at 0.01 level). It means that transition to online store increase the interaction with customers (B2C).

As a conclusion we can say that provided services on the websites of companies facilitate the participation of stakeholders in the value creation (strong correlation between different parameters, determining that there is scope for transition to online store increased interaction with customers (B2C)) and using high-tech IT attract stakeholders in the process of promotion and communication with the company.

It was concluded that the global leaders create a full cycle of the supply chain that they control value in supply chains by them.

Then we defined the correlation between evaluated parameters of ICT implementation for value creation and Gartner composite scores. The high correlation ($r=0,909$; correlation is significant at 0.01 level) have variables Customization parameters of the products and Gartner Composite score. This indicates that there is scope for selecting client of necessary parameters of the product and the company's Gartner ranking has a strong connection. We can also conclude linear dependence between parameters.

During a more detailed analysis of the dependence of parameters for valuation websites of these companies, such as product customization options, have strong communication and linear dependence, it can be said that

IT increases the value as the possibility of creating additional value in supply chains.

After analyzing companies' websites we can look at supply chains of those companies and identify at which points stakeholders can influence on value creation.

3.2. Case Study

The case study method embraces the full set of procedures needed to do case study research, emphasize detailed contextual analysis of a limited number of events or conditions and their relationships. As a sample we used listed companies from Gartner ranking to identify centers of value creation in the supply chain.

The sector of electrical, electronic and computers industry has been growing at a rapid pace with the invention of innovative technologies and an ever-increasing customer inclination towards electronic goods and services. That's why we would like to weed out the group of companies such as Caterpillar and Cummins and only analyze companies from Electronic and Electrical equipment industry.

Companies from Gartner Supply Chain Top 25 for 2013 are global supply chain leaders and the highest place was taken by Apple that have the best supply chain in the world every year from 2010 to 2013. Apple is the world's largest IT company, that's why we can see that in our case Apple has the best supply chain and Apple has the leading business model in the industry, so other company will be compared to Apple for this reason.

Apple Inc. accelerates the new product introduction by acquiring licensing and 3rd party businesses. The whole process looks very similar to that of other industries. Interesting point is that Apple Inc. has to make prepayments to some suppliers to secure strategic raw materials.

In a nutshell, Apple purchases components and materials from various suppliers, then gets them shipped to the assembling plant in China. From there, products are shipped directly to consumers (via UPS/FedEx) who bought from Apple's Online Store.

Figure 2 represents Apple's Supply Chain.

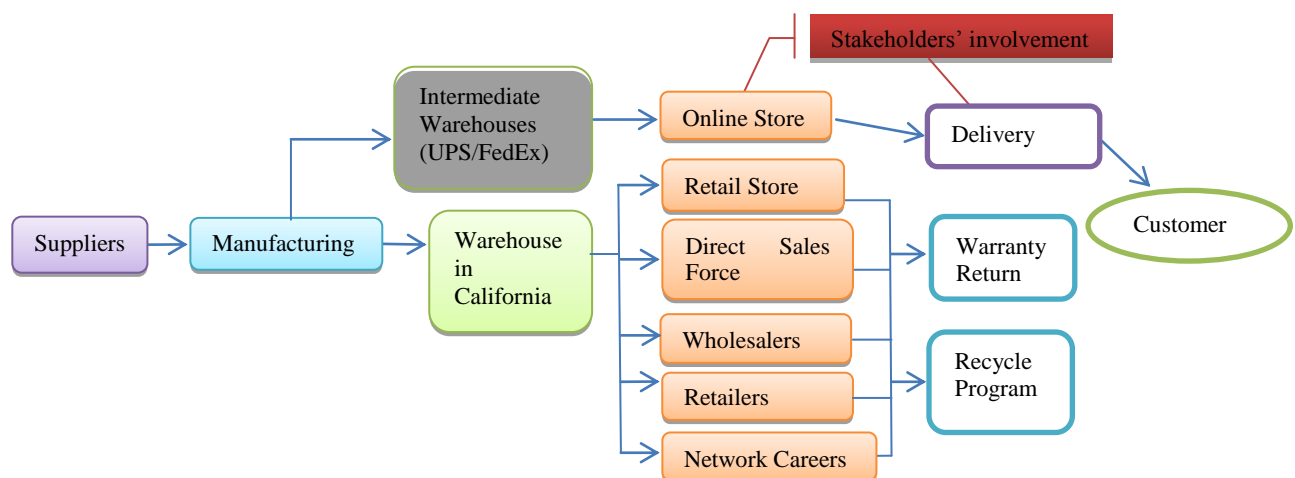


Figure 2 – Apple's Supply Chain

For other distribution channels such as retail stores and other distributors, Apple keeps products at Elk Grove, California (where central warehouse and call center are

located) and ships products from there. At the end of product's life, customer can send products back to nearest Apple Stores or dedicated recycling facilities.

After analyzing supply chains of Intel, Cisco Systems, Samsung Corporation, Dell and Lenovo group we identified the centers of value creation where stakeholders play a key role. On the two stages of supply chain such as Distribution and Delivery stakeholders can change value of product/service through choosing options convenient to them.

The model with the main centers in the international supply chain of the Electronic and Electrical equipment industry at the distribution stage is presented in the Figure 3.

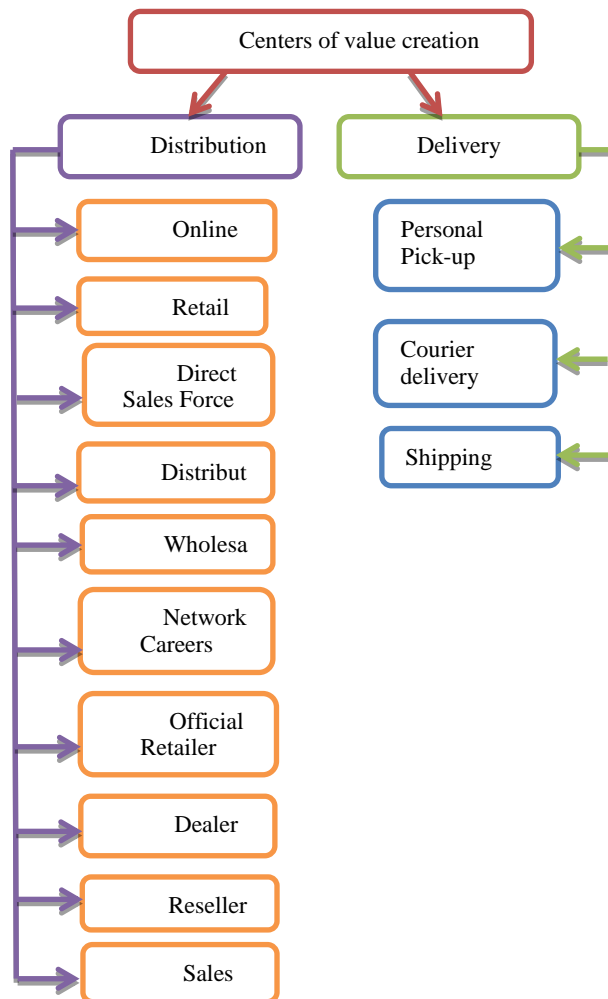


Figure 3 – Centers of value creation

Stakeholders' involvement in the supply chain of the company play a key role of the value creation, exactly on these stages the centers of value creation are appeared.

The centers of value creation can be identified according to the chosen participants of company's supply chain, i.e. distribution channels and delivery and shipment options. Distribution channels can be: Online Store (official), Retailer Store, Direct Sales Force, Distributor, Wholesaler, Official Retailer, Network Careers, Dealer, Reseller and Sales Agent. Delivery options can be: Personal pick-up, Courier delivery, Shipping.

Companies that use ICT and different platforms can perform better, because direct involvement of stakeholders in the supply chain influence on value creation.

Conclusions. The current article aimed at assessing to how ICT has an influence on company's value creation and supply chain management. Our focus has been mainly on research of value creation in the supply chain management. We recognized that papers in information systems, management and other important issues related to supply chain management.

In this paper, we focused on the entire supply chain and showed dependence of the using ICT and performance of the companies. We identified that provided services on the websites of companies facilitate the participation of stakeholders in the value creation and using high-tech IT attract stakeholders in the process of promotion and communication with the company.

As more and more companies begin to integrate their online and traditional operations and share more information over the Internet, real-time supply chain management models on product life-cycle management, dynamic pricing and production coordination, integrated models for supply consortia, and the coordination of Internet (i.e. high-tech capabilities) and traditional channels, are going to become all the more significant.

The analysis of serial supply chains of chosen companies indicate that centers of value creation is created on stages of distribution and delivery, where stakeholders can manage it by their choice.

The results of the given research identify where stakeholders involve into the value creation in the supply chain and suggest that using high-technology can increase company's performance.

Further research will be conducted for outlining of value creation measures in the supply chain. The direction of future research is to examine the performance of centers of value creation in the supply chains.

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