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SUMMARY OF THESES
by
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Types of Supply Chains and Tools for Management – Empirical Analysis

Ph.D. dissertation

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Contents

I. DEFINING RESEARCH AIMS

In my doctoral dissertation, I am dealing with the management issues of supply chains. One of the most cited concepts of the supply chain management literature will be tested empirically, and I am going to make an attempt to add to it.

The *first* research question is if the functional and innovative product types indicated by Fisher (1997) really appear in business practice and are they separable in reality, on the other hand, can they be associated with supply chain types based on their features, such as the physically efficient or market-responsive types – also according to the Fisher-model. The *second* research question concerns the case if there is a mismatch between the product and the supply chain type. My aim is to discover the reasons of this phenomenon.

The *third* research question is if there are functional and innovative products and matching physically effective and market-responsive supply chains, and do these supply chains differ from each other in the management tools applied for managing the distribution side of the supply chain? Are there any specific management tools used within, either physically efficient or market-responsive supply chains, and is there a common basis of management tools adapted in both supply chain types?

During the research, I approach supply chain management from a logistics management perspective. However, the problem is influenced by point of view of several other fields of management science as well (Figure 1).

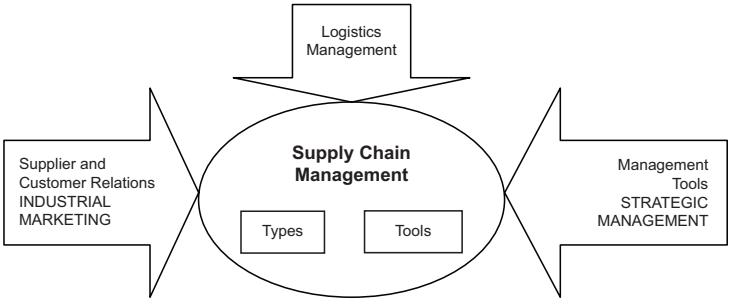

Figure 1: Fields of science concerned in the dissertation

The research primarily approaches supply chain management issues from a logistics management aspect. When talking about supply chains, the value creating processes – production, logistics and services – are realised not only within a company but spanning over firm boundaries. Consequently, relationship management with suppliers and customers are also taken into consideration. The science of industrial marketing deals with the relationship issues between a firm and its suppliers and customers. For my research, mainly the B2B relationships and processes are important.

An additional possibility derives from the research conducted which touches the field of strategic management as well. Supply chain management is a management philosophy which requires a strategic approach on one hand, and on the other hand, I want to describe the current practice of firms operating in Hungary (not only Hungarian-owned!). I analyse the characteristics of industries, which provide the largest part of the research sample (machine, food and other processing industries) and in which supply chain management is traditionally present, according to the literature. I discover how they manage their supply chains, how developed they are and what tools they adapt to smooth the value stream on the distribution side.

The structure of the literature review is shown in Figure 2. The beginning chapters are devoted to reviewing related literature. First, I deal with the notion

of supply chain and supply chain management. Definitions and approaches are grouped and cleared and the focal interpretation applied in the dissertation is also selected. If researchers do not agree with the definition of a supply chain, even less unity exists regarding the concept of supply chain management. Many interpretations and approaches of supply chain management are introduced.

Secondly, I display the model of supply chain management techniques and tools applied to managing the distribution side of supply chains. After introducing the techniques and tools presented in the literature, I organise them into a model. Different management tools are characterised individually in the dissertation, as well, to show their essence and benefits for the supply chains.

In Chapter 3 I deal with the core model of the dissertation. Fisher's model and its critics are introduced in detail. Several experiments to test Fisher's model are also examined, particularly one written by Swedish authors that applied a similar methodology as I but achieved only partial results and another made by Australian researchers using quantitative techniques, but failed to confirm the concept. In the literature, there are some other famous tests to explain the differences between supply chains – such as agile and lean supply chains – so these theories will also be presented and compared to Fisher's model.

Based on the conclusions drawn from the related literature, I derived and formulated hypotheses from research questions in Chapter 4. The first hypothesis concerns the match of product and supply chain types indicated by Fisher. Secondly, those hypotheses are formulated in which I try to explain their mismatch. To do so, I built on the explanations other authors have done in previous tests, however, nobody has tested them systematically before. The third group of hypotheses concern the management tools applied on the distribution side of one or the other of supply chain types. Fisher himself mentions several management tools as well, but does not describe them. My additional aim is to depict the Hungarian practice and which tools companies use to manage the distribution side of their supply chain.

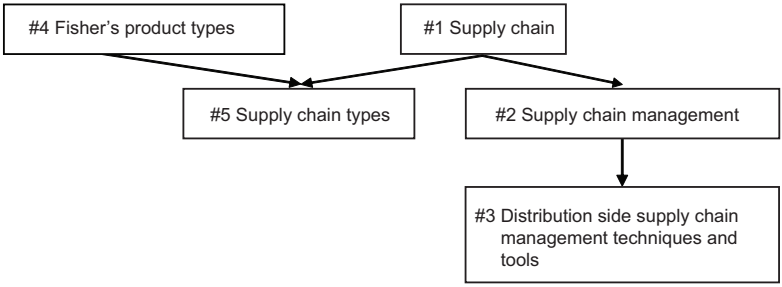

Figure 2: Order and logic of literature review

After summing up the literature and formulating the hypotheses in Chapter 5 the research plan is presented. Both a quantitative (survey) and qualitative (interview) methods were used in the research, which was carried out individually. A questionnaire was published on-line for given addressees, and I gathered 92 responses, of which 79 could be analysed.

A large part of the dissertation is dedicated to present the results. In Chapter 6, I first review the findings of testing Fisher's model, and then those of differentiating the supply chain types along with the tools applied to manage the distribution side of supply chains. I discovered the reasons why Fisher's product and supply chain types do not match each other, first, by quantitative than by qualitative means. I present a description about the supply chain management practice of companies analysed in the sample.

II. LITERATURE REVIEW

When reviewing the literature, I had several tasks to complete. First, to clear the basic notions I am intended to use throughout the dissertation (supply chain, supply chain management, supply chain management tool). Second, to introduce the theoretical model I am testing and trying to add to it. In the following, I summarise the theoretical background of the dissertation.

1. The literature review begins with the **definitions of supply chain**. Supply chain can be interpreted as (GELEI, 2009) a *group of organisations* (e.g. LALONDE and MASTERS, 1994; HARLAND, 1996; LAMBERT et al., 1998; MENTZER et al., 2001), or as a *process* (e.g. DAWANDE et al., 2006; CHIKÁN, 2008; CHRISTOPHER, 1992). Latter approach refers to processes spanning over company boundaries, and differences between researchers' opinion can be found in the emphases. In the dissertation I use the process-based interpretation of the supply chain, based onf Chikán. The reason for it is that to the third research question – that supply chains differ from each other in the tools applied for managing distribution processes – a process-based view fits.

   Supply chain management has a dual interpretation, as well. According to Mentzer et al., it can be interpreted as a *management philosophy* (e.g. COOPER et al., 1997; STEVENS, 1989; ZHENG et al., 2000) or *set of management processes* (e.g. MONCZKA et al., 1998; LALONDE and MASTERS, 1994; SHAPIRO, 2004; JONES and RILEY, 1985). Definitions also call attention that besides strategic decisions, supply chain management requires a high level of process-based view at operational level. Because of the emphasis is laid on supply chain processes, when interpreting supply chain management, the approach chosen is the set of management processes.

2. The dissertation focuses on the analysis of the distribution side of the supply chains. Consequently, I use the terms of *demand chain* and *distribution chain* (Van Goor, 2001) as synonyms to refer to that set of companies, which deliver end product to the market.
3. Distribution side supply chain management tools help managing the operational work in demand chains by harmonising the materials and information flows, and providing feedback about the performance of cooperating partners.

   Demand chain management tools were categorised and separated based on the focus they are having: information sharing, which is an elementary requirement of successful supply chain operation; smoothing materials flow, which is a primary purpose of supply chain management in a narrow interpretation; or assessing the costs and performance of supply chain members in oder to discover the risks and advantages taken by partners. These categories are highly interconnected, both for balancing materials flow and getting data for cost and performance assessment information sharing is essential.

   When collecting supply chain management tools I was focusing on the distribution side. In the last decades several famous supply chain management techniques have evolved for managing distribution processes such as Efficient Customer Response in FMCG sector (Bhutta et al., 2002; Harris and Swatman, 1997), Quick Response in fashion industry (Al-Zubaidi and Tyler, 2003; Birtwistle et al., 2003; Fernie and Azuma, 2004) and CPFR in various industries (Skjøtt-Larsen et al., 2003; Fliedner, 2003). The effect of these on managing sales channel can be compared to lean philosophy in managing supply processes in the automotive industry. The commonality of these demand chain management techniques is that they all aim to harmonise the distribution related processes.

   The internal structure of demand chain management techniques can be broken down into elements, as it is shown in Table 1. It can be seen that techniques are built up from different, but sometimes overlapping tools.

Consequently, during the dissertation I am not dealing with demand chain management techniques as a whole but only with the **tools** building up the techniques.

Table 1: Classical structure of demand chain management techniques

Appearance of technique	**Tools constructing techniques**	**Industry**
QR Mid-80s: USA	Electronic Data Interchange Common planning and forecasting Vendor-Managed Inventory	Fashion industry
ECR End of 80s: USA	Category management Electronic Data Interchange Continuous Replenishment Cross-docking Computer-Aided Ordering Activity-Based Costing	FMCG
CPFR 90s: USA	Common planning and forecasting Continuous Replenishment	Fashion industry General merchandise industry

In the following, I am focusing on **demand chain management tools** as exact solutions, which help *demand chain partners to share information, to harmonise materials flow or to assess costs and performances* realised during the operation. *Techniques* can be interpreted as – e.g. industry-specific – *combinations of different demand chain management tools.*

4. Distribution side supply chain management tools cover three areas in which they aim to harmonise operations.

According to Cigolini et al. (2004), the toolbox of *information sharing* affects the application of all other demand chain management tools. An elementary

part of the information system is the corporate or inter-firm ERP system, which may appear in form of an on-line connection between partners (based on EDI or Internet). Its role is to ease the information and document flow between companies; e.g. in standardised form making the data transfer more effective and decreases the time requirement of (order) processing. Standardised information sharing supports punctuality and better control.

Automatic order transfer solutions (CAO), checks the decreasing inventory level at the customers' point of sales and send notices to central warehouse for replenishment. Product identification systems (barcodes, RFID) help the flow of product information and support tracking and tracing throughout the supply chain. Common operated or shared databases make the information accessible to all members who are necessary to forecast, planning and operating the chain. The more accurate and up-to-date the information is, the more the chain is capable of adapting to demand changes. Distributing the exact demand data of end customers helps to decrease the inventory level in the supply chain and makes a positive impact on bullwhip-effect (DISNEY and TOWILL, 2003). However, it has to be noticed that the information exchange between supply chain partners has to be mutual, selective and valid, but not necessarily symmetric (LAMMING et al., 2001).

In smoothing *materials flow,* many activities of the operations have to be involved. One of the most important areas of materials management is inventory handling in supply chains, because this is a typical source of redundancies and waste.

Many solutions have evolved to handle inventories within the supply chain from vendor-managed inventory *(VMI)* to those systems where suppliers individually and automatically decide about replenishment of their customers' warehouse according to the POS-data shared *(CRP)*. Forwarding materials within the supply chain is important as well. This not only covers the planning and optimisation of costs of transportation, but application of

specialised facilities in which bulk of products can be broken down, a quick order-picking is carried out to match customer orders, and goods can be transmitted quickly in smaller packages *(cross-docking)* (GELEI, 2008).

Cost and performance assessment is interpreted by Cigolini et al. (2004) not only for counting costs and estimating overall performance, but supplier assessment as well, which can also be extended to customer assessment. Assessment systems can be applied both on the supply chain level and on the level of dyadic partnerships within a supply chain. Cost management systems spanning over the supply chain partners make it possible for managers to examine the total supply chain costs as well as the economic performance of individual firms. Before applying such a system it is very important to discover the most of costs related to the supply chain operations and their trade-offs. The most frequently adopted tool for that is Activity-based costing. Supplier and customer assessment tools are necessary to map the logistical and financial performance of supply chain partners.

5. Based on Lee (2000), Varma et al. (2006) and Van Goor (2001) it can be stated that – in general – demand chain management techniques consist of tools for managing information and materials flow, and supporting cost and performance assessment. However, information sharing tools are inevitable and elementary for making both tool-categories operational (Figure 3).
6. Table 2 below summarises the examined demand chain management tools which were collected from the literature and which all aim to manage the distribution side of the supply chains, irrespectively of any industry specification. They are all generally applicable and can support distribution-related processes.

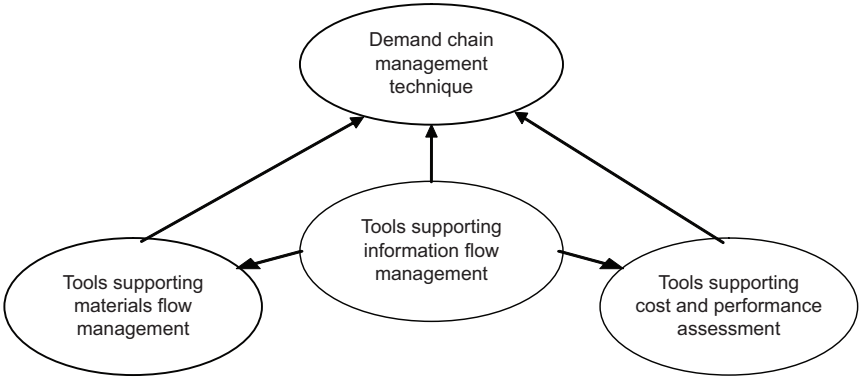

Figure 3: General structure of demand chain management techniques

Table 2: Demand chain management toolset categories

Structure of demand chain management techniques	**General demand chain management tools**
Tools supporting information flow management	EDI (ERP, and other web-applications), CAO, common planning and forecasting, barcode, RFID
Tools supporting materials flow management	VMI, CRP, Cross-docking, postponement
Tools supporting cost and performance assessment	ABC, supplier assessment, customer assessment

7. I have chosen Fisher's model for the focal model of the dissertation because this was the first trial to explore: supply chains do not run in a uniform way, rather they can be differentiated along the operational focus. Distinguishing supply chains by product type they are delivering to the market is an easy and evident need, because the characteristics of a product can substantially determine the operational expectations and circumstances.

Many researchers have been dealing with defining the types of supply chains. However each of them has somehow been based on Fisher's important,

but never verified model. Later many authors have identified other types of supply chains – sometimes on a different basis – but in their roots they derive from Fisher's basic typology and/or are its modulated version.

The third reason for choosing Fisher's model was that despite his fame and large number of citations, I have found only two sources, which have tested the model on a large database (statistical analysis): one examined it amongst Swedish companies (Selldin and Olhager, 2007), and another, which tested it in Australia (Lo and Power, 2010). Several additional tests have been carried out in various industries via case studies [(Wong et al., 2006), (Li and O'Brien, 2001)]. Selldin and Olhager verified the model only partly. Lo and Power did not succeed, and the others were only able to modulate the concept by distinguishing more supply chain types when analysing a single industry.

8. According to Fisher's approach (Fisher, 1997: p. 106) functional products are elementary products, which fulfil everyday needs and which change only a little over time. Consequently, their demand is stable and predictable, and their life cycle is long. The stability, however, attracts many competitors to the market which causes low profit margins.

   Innovative products fulfil fashion or occasional needs, which change quickly during time, consequently, the demand is unpredictable and the product life cycle is short. High risk is awarded by high profit margin so many companies are entering and leaving the market at the same period of time, the club of competitors' changes quickly.

9. Supply chains – according to Fisher – have a dual function: physical and market mediation. The physical function refers to activities such as product manufacturing from raw materials, assembling, and delivery to the right member in the supply chain and then to the final consumer. Aim of market mediation function is to assure that the product delivered to the market meets the real consumer demand.

Each function presents different costs. The costs of physical function are related to production, transportation, inventory holding, warehousing that serve the real market needs, and contain the costs of full-price product sold on the market. Market mediation costs arise because of poor demand forecast, which causes a lack in inventory and lost sales or overproduction, which can be sold only at a discount price. This type of cost embodies the adaptation to a changing and unpredictable demand (FISHER, 1997).

Predictable demand of functional product makes market mediation, adaptation relatively easy because demand can be quite well forecasted. Therefore, companies producing functional products focus on minimising physical costs, which is critical because of the price-sensitivity of the market. The supply chain fits to a functional product Fisher defines as *Physically Effective Supply Chain*.

In the case of innovative products with highly unpredictable demand adaptation can be very costly and uneasy. The high profit margin, the market share position and the market skimming behaviour of first-mover increase the costs of a lack of inventory. At the same time, short product life cycle may raise the risk of too high stock. Consequently, neither lost sales nor high inventory sold at a discount price is favourable. In the case of innovative products market mediation costs dominate the aim of managers to minimise them, even through higher physical costs. The uncertain, unpredictable demand is a characteristic of innovative products. Companies which work in such a market have to fight with uncertainty and operate a *Market-responsive Supply Chain*.

Based on the four characteristics: two product types and two supply chain types, Fisher compiled a matrix (Table 3). Applying this, it can be discovered whether a company uses the right supply chain for its product type, or a mismatch exists.

10. Besides Fisher's product based view, there are some other supply chain typologies, as well, which try to explain the differences between supply chain operations on a different basis. First group of researchers (e.g. NAYLOR et al., 1999; MASON-JONES et al., 2000; CHRISTOPHER and TOWILL, 2001) distinguishes lean, agile and leagile supply chains along order-winning criteria. An other author, Lee (2002) derives efficient, risk-hedging, responsive and agile supply chain types form the uncertainty level of demand and supply.

Table 3: Supply chain types fitting to product types

	Functional product	**Innovative product**
Physically Effective Supply Chain	Match	Mismatch
Market-responsive Supply Chain	Mismatch	Match

Source: Fisher, 1997: p. 109

III. RESEARCH METHODS

During the research, I have carried out both quantitative and qualitative analyses. The research was carried out individually, the survey and the interviews were organised and managed by myself. I was focusing on industries and manufacturing companies in which the application of supply chain management is well known from previous research and literature. I searched for at least mid-size or large companies (based on revenues and number of employees) which are in Hungarian or international ownership and operate primarily in machine, food, light or other processing industries. According to my previous experiences, companies in these firms of that size and in these industries are more likely to be a part (or focal company) of supply chains. International ownership increases the likelihood of being a member of an international supply chain and that firm captures sophisticated supply chain management practices from its parent company.

An on-line survey was edited and its link was distributed among a large number of recipients (577). I have collected 92 responses, of which 79 could be analysed. My approach was to test each research questions with a double methodology. The consistency of data was examined by *correlation analysis* and *Crombach's alpha* test. When testing Fisher's model, I mainly applied *cluster analysis* to group companies first, along product types, then along supply chain types. I then examined the overlap between product and supply chain clusters. For grouping firms along product and supply chain types, I also formulated *indices*.

In further analyses, to distinguish distribution side supply chain management tools in case of the two supply chain types, I used clusters I gained in the first research step. I then compared the demand chain management tools used by supply chain clusters (*ANOVA* and *Levene's F-probe)*. To examine the mismatch of Fisher's product and supply chain types, I used *descriptive statistics* and the

qualitative method. *Interviews* played an important role in understanding the phenomenon. When exploring the demand chain management practice of companies operating in Hungary, *cluster analysis* and *descriptive statistics* were applied.

To complete the research findings of the quantitative research phase, and to analyse the mismatch between Fisher's product and supply chain types deeper, I applied qualitative research methodology and I conducted semi-structured in-depth interviews. Aim of the interviews was to discover the reasons why companies do not fit the supply chain type to their products' type. During the research, first I tested the explanations of different researchers made in the literature. The test was carried out through both quantitative way and the interviews as well. My further aim was to find additional explanations, too, so interviewees were asked to think about possible rationales. Interviewees were mainly (4) logistics managers that have a good overview about the supply chain opeartions. In one case, I interviewed a sales manager that previously led the logistics department at the firm, therefore, he was able to provide relevant information. One additional interview was conducted with a director assistant who worked at a mid-size company – with an unstructured organisation – and who was responsible for export sales and logistics, so he could provide relevant data (Table 4).

Table 4: Data of interviews

Name (nick) of company and industry	**Size of company**	**Position of interviewee**	**Date of interview**
Company A, FMCG	large	Warehousing and distribution manager	13/08/2010
Company B, machine	large	Sales manager	02/09/2010
Company C, machine	large	Logistics manager	08/09/2010
Company D, other processing	large	Regional logistics manager	14/09/2010
Company E, FMCG	medium	Director assistant (responsible for export sales)	17/09/2010
Company F, other processing	medium	Logistics manager	20/09/2010

IV. RESEARCH FINDINGS

As I mentioned before, in my doctoral dissertation, I had four goals. The *first* was to **test a theory** which is widely known in supply chain literature; however, **never has been verified** completely. Fisher's model says that there were two basic types of products on the market (functional and innovative), which behave in a different way (e.g. predictability of demand), and require a supply chain with a different operational focus. My aim was to test this match between product types and supply chain types on a Hungarian sample, and whether it really exists. *Second*, to **complete the theory** with the case that **supply chain types can be distinguished along distribution side supply chain management tools** as well, besides Fisher's characteristics.

Third, I intended to **find a rationale** to the phenomenon **when the product type and the supply chain type do not match** – which also was experienced by earlier researchers – but nobody has examined the question systematically.

My *fourth* goal was to give a general – but not representative – **overview about how companies operating their supply chain in Hungary**; what tools they use on the distribution side, and how developed they are.

Findings of my doctoral research are summarised as follows:

- Fisher's theory about matching product types and supply chain types **cannot be verified**, because almost the same numbers of companies show matching (22) as mismatching behaviours (23).
- Fisher's supply chain types **cannot be differentiated along the demand chain management tools**. However, several sub-hypotheses were supported, which said that the application of some demand chain management tools (inter-firm communication – EDI, customer assessment) had not been dependent on a supply chain type because they had been inevitable in each supply chain.

• Mismatch between Fisher's product and supply chain types was tested by the survey and through interviews as well.

According to the results of the **quantitative** analysis, the main reason of mismatch is the **poor management which cannot identify the product type, or consequently, how it would be the most efficient to operate the supply chain**.

In the **qualitative** phase, the six company experts found that the main reasons of mismatch are that companies are **trying to achieve the best performance by combining the strengths of both supply chain types**, and **companies are not willing to operate different supply chain types at the same time** to support their heterogenic product portfolio, and the **supply chain management practice of Hungarian firms is not so developed.** Consequently, they cannot fit the supply chain to the product characteristics. Interviewees have discovered several additional reasons for mismatch as well, which was indicated by their own experiences or industry specifications. These reasons were summarised in the dissertation as *customer characteristics and SKU rationalisation*. My own explanation is that *Hungarian companies are not developed enough* to match product and supply chain types was supported by them. A reason derived from the literature – *demand uncertainty* – was also refined, modulated.

• In the fourth part of the analysis, I explored the demand chain management practice of firms operating in Hungary. According to the spread of demand chain management tools I differentiated two clusters. The first cluster is called **Companies with Developed demand chain management practice;** the second is called **Companies with Underdeveloped demand chain management practice**.

• I analysed the demand chain management practices along the triple structure of demand chain management tools: information management tools, materials flow management tools and cost and performance assessment tools. In a **Developed company cluster,** I have found that

the most developed is the information sharing practice. On this basis, a mid-developed cost and performance assessment toolset is operated, but materials flow management tools are at a weak middling level. **Underdeveloped company cluster** operates a weak middling level of information sharing methodology, and all the other toolsets are in an embryonic stage.

I could make a **distinction** between the clusters **along supply chain performance** as well. Companies of a Developed company cluster have performed significantly better in dimensions of price, operation costs and responsiveness to customer expectations than an Underdeveloped company cluster.

- The distribution side of supply chain management practice has been analysed in the case of the three largest industries represented in the sample. The **machine industry** companies adopt information management and cost and performance assessment tools at a medium level; however, they apply materials management tools at a weak middling stage. This industry is the closest to the previously identified Developed company cluster. The application of information sharing and cost and performance assessment tools among the **food industry** companies are at a weak middling level, but the adaptation of any materials management tools is very poor. In the case of information and cost and performance management tools the sector exceeds the level of Underdeveloped company cluster but when regarding the materials management tools it represents a similar stage. In **other processing industry,** companies apply the simple cost and performance assessment tools (customer assessment) at a better stage than the other two sectors. Information management tools are at a medium level, but materials management tools are adapted only at a weak middling level. Consequently, other processing industry far exceeds the level of the Underdeveloped company cluster, but lags behind the level of both machine and Developed company cluster.

V. SUMMARY AND CONCLUSIONS

Summing up the results of the dissertation, we can see that although Fisher's theory is a logical explanation of why supply chains differ from each other, in real company practice the model does not appear so clearly, and it is also not true that firms that match the supply chain type with the product type are more effective. I was not able to complete the model by pointing out that supply chains also differ in the demand chain management tools applied based on the different operational focuses the supply chains have in servicing the end consumer.

Analysing the spread of demand chain management tools was edifying. I have found that the Hungarian company practice is still under development in such industries, contrary to international academic literature, which has reported for years that they have very sophisticated supply chain management methods.

The main **theoretical contribution** of the dissertation is that I made a new attempt to test Fisher's model, but I was not satisfied by the result as the model cannot be verified. I then continued the research, and with various research methods, I tried to find reason for a large number of mismatching strategies. I have found certain circumstances, which move companies towards applying mismatch strategy consciously, and their operations can be still regarded effective. To find the reasons, I used a double methodology (quantitative and qualitative), and I succeeded in completing the work of many other researchers that also tested the Fisher-model and failed to verify that. I examined the explanations provided by them, and by using the sample, I managed to find the most likely explanation, as well as I have found new explanations based on the interviews conducted with active company managers.

I also find that a great achievement of the dissertation is that I managed

to verify the internal structure of demand chain management tools. Based on different researchers, I composed the model which can be seen in Figure 3, which highlights that demand chain management tools can be categorised as tools supporting the information flow, tools supporting materials flow and tools of cost and performance assessment. The demand chain management toolset of a company can be a combination of the tools in these categories, which help the firm coordinating the processes on the distribution side of the supply chain. Survey results support the existence of the tool categories and the links between them.

A **managerial application** of the research findings is also available. On one hand, the dissertation drew the attention to a theoretical model, which is well-known in international literature, but whose logic is less known among Hungarian company managers that could find the differentiation of product along demand characteristics, as well as differentiation of supply chains along operational focuses, interesting. The most important finding of the dissertation for managers is that I revealed the current company practice in demand chain management and pointed out the imperfections and showed the way for evolution. Results could draw companies' attention to the importance of conscious supply chain management and to the toolset which is available for improving their distribution operations. To publish the message of the dissertation is even more important, because the application of the demand chain management tools leads to significantly *higher customer service performance*. When looking at the current development stage of the Hungarian companies, improved performance achieved by applying different demand chain management tools, it can be a source of a *competitive advantage*.

Based on the research findings, **future researches** can be formulated. First, the recently discovered explanations to Fisher's product and supply chain type mismatch reflect only the opinions of interviewees; consequently,

it cannot be generalised. The new reasons for mismatch can be tested by further interviews in different industries, or can be verified by quantitative methods.

A **longitudinal study** of demand chain management practices of Hungarian firms could be an additional future research topic. Present analysis discovered that regarding the triple structure of demand chain management tools companies are quite developed in the application of information management tools, but the other two pillars, cost and performance assessment and materials management are at a lower level of evolution. Several years later it would make sense to repeat the survey to discover the changes that have happened with the penetration and development of demand chain management tools.

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VII. MAIN PUBLICATIONS RELATED TO THE DISSERTATION TOPIC

Referred journals (Hungarian):

Gelei, Andrea – Dobos, Imre – Nagy, Judit (2011): Üzleti kapcsolatok beágyazottsága a magyar gazdaságban (Embeddedness of business relationships in Hungarian economy). Vezetéstudomány (42)1 P. 17–30.

Gelei, Andrea – Nagy, Judit (2011): Logisztikai folyamatok informatikai támogatottsága Magyarországon – fókuszban a disztribúciós logisztika. (IT support of logistics processes in Hungary - focusing on distribution) Vezetéstudomány (under publishing, 2011. Q2)

Other journals (Hungarian):

Nagy, Judit (2004): Megrendelők és beszállítók közötti partnerkapcsolatok tipizálása (Typology of buyer-supplier relationships). Logisztikai Híradó, 2004. P. 6–8.

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Book sections (Hungarian):

Nagy, Judit (2010): Disztribúció (Distribution). In. Demeter, K. (eds., 2010): Az értékteremtés folyamatai (Value creating processes). Egyetemi jegyzet. P. 201–223.

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Inland conference papers and presentations:

Nagy, Judit (2008): Az iparági érettség hatása az ellátási lánc teljesítményére (Effect of industry maturity on supply chain perfomance). MTA IX. Ipari és Vállalatgazdasági konferencia, 30–31 October, 2008. Szeged. ISBN 9789635085668, Best PhD student paper award.

Nagy, Judit (2008): Milyen eszközökkel menedzselhetjük ellátási láncunkat a különböző életciklus szakaszokban? (What tools to use for supply chain management in different life cycle stages?) 16th Annual HALPIM Congress, 12–14 November, 2008. Siófok

International conference papers and presentations:

Nagy, Judit (2006): Attitude of Hungarian companies to the concept of supply chain management, Working paper and presentation at 15th Annual IPSERA Conference, April, 2006. Proceedings CD, ISBN 0-9779673-0-1

Nagy, Judit (2010): SCM toolbox of different supply chain types: A research proposal. Working paper at 19th Annual IPSERA Conference, 16–19 May, 2010. Lappeenranta

Nagy, Judit (2010): Role of VMI in managing supply chains. Working paper amd presentation at 16th Biannual International Society of Inventory Research (ISIR) Conference, 23–27 August, 2010. Budapest

Nagy, Judit (2010): Supply chain management tools as activity ties in dyadic partnerships. Working paper and presentation at 26th Annual Industrial Marketing and Purchasing Group (IMP) Conference. 2–4 September, 2010. Budapest

Additional publications (Hungarian):

Nagy, Judit (2008): Ellátási lánc menedzsment technikák (Supply chain management techniques), *Working paper, Corvinus University of Budapest*, # 100.

Nagy, Judit (2009): Types of supply chains and tools for management – Empirical analysis. PhD dissertation-proposal. Corvinus University of Budapest, Doctoral School of Business Administration. November, 2009.

Gelei, Andrea – Nagy, Judit (2010): Logisztikai folyamatok informatikai támogatottsága Magyarországon – fókuszban a disztribúciós logisztika (IT support of logistics processes in Hungary – focusing on distribution). *Working paper, Corvinus University of Budapest*, # 122.