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The role and importance of time in the supply chain

Thesis of Doctoral Dissertation

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I. The aim and timeliness of the dissertations

The phenomenon 'time' is a current and ever present topic for mankind to deal with since its awareness. Heller talks about the obsession of time in connection with European philosophers (Heller, 2000), with whom I felt a significant relationship during the research – I became obsessed with time myself as well to a certain extent. The study started with the examination of a special logistic field, the CEP segment (Courier-Express-Parcel – services), and evolved into a time-examination with regards to the whole supply chain.

Social and economic phenomena are developing according to an exponential trend (Gleick, 2003. p 330), more and more changes are going on within the same time. All these give us a feeling of an accelerating world that we live in and time becomes a scant resource: one unit of time should be used for more and more things. There is a time-sensitive part of the society, and their number is growing bigger and bigger, for them time – as an irreplaceable resource - is becoming more and more valuable (Töröcsik, 2007). Economic competition has also become time-based, so the participants of the supply chain have a time-challenge not only from the buyers, but from the competitors as well (Stalk, 1992). Logistics does not only meet increasing time-demands and time-competition, but it also has to serve the efficient operation of supply chains. The necessity of time-management for business partners appears on the one hand *from the outside /buyers and competitors/* and on the other hand from the inside in order *to ensure a growing productivity and a high level of service.*

While examining the role of the time factor in the supply chain the study makes assumptions concerning the direction of the main logistical expectations and priorities, the difference among business customers based on time, the role of subjective time-approach and the measurement of possible logistical performances.

II. Theoretical background

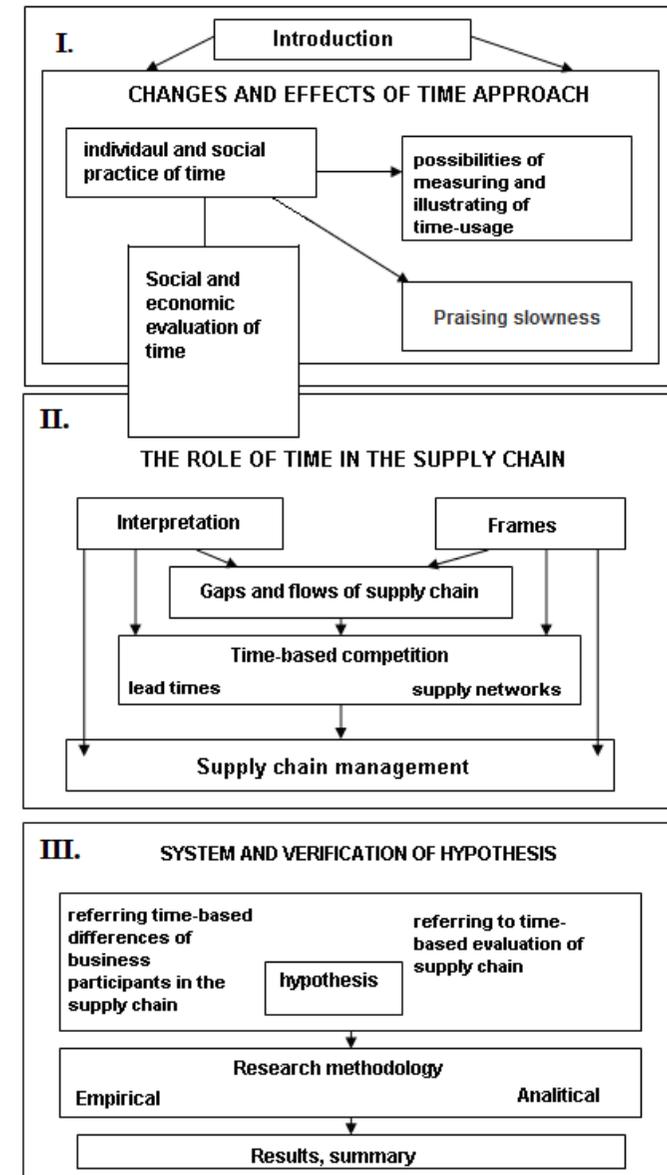
I examined the various notion of time – according to the aims of the dissertation – from several aspects. Since there are just a few profound theoretical works about the relation between time and the supply chain, it was inevitable to define time and then position it in the context of logistics, supply chain and supply network. I materialized time by distinguishing *objective* and *subjective time*, and by introducing a definition, which can describe the most important time-categories of the supply chain, and which can evaluate time-purposes (e.g., rapidity, precision) and time-performances (e.g., the length of lead time). Both the experimental time and other time-dimensions are also perceptible on the level of the individual. I defined time as *the distance between two events*. While studying the subjective time it was necessary to examine fields of other sciences as well, which analysed the different aspects of time.

After reviewing the time factor from the viewpoint of different kinds of sciences I studied the individual and social practice of time, the typical time-trends and their effects on needs, decisions, and behaviour of buyers. I showed the possibilities of measuring, evaluating and illustrating the usage of time with the help of cartography, time-geography, and time-sociology. I presented the role and impact of time-preference in buyers' decisions, and the main conclusions of international and national psychological time-researches concerning the subjective treatment of time. In the chapter "Praising Slowness" I drew attention to the negative consequences of rapidity/acceleration. After reviewing the theories of social and economic evaluation of time I examined the utility of time for an individual and for an organization by using self-developed models of time-utility, while obtaining material needs.

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The system of the dissertation

The research on the importance and role of time in the supply chain was inspired by the fact that we do *not have a general idea* – and even those do have are concerned – about the role of time-dimension in the *life of business participants*. Meanwhile visible needs appear for *express* solutions both on business market and on the individual consumers' market as well. The role of *adaptive* selling and service systems is increasing, while the intensified time-demands for *service* are only partly realized. It is a real need to get to know more about logistical needs, among them those *based on time*, and to know which participants of the supply chain are worth offering time-based services. The new situation requires thinking over the main strategic points, and it also needs the *revision of the measurement of service-performances*. This revision has to be realized in the *change and completion* of the development, planning and control of supply chains. I drew four hypotheses *concerning the business participants* of the supply chain, and one hypothesis about the *measurement of the supply chain's performance*.

H1 The most important logistical expectations of business buyers are connected to the time-factor, that's why the main components of logistical quality are based on time (time-based).

H2 An especially time-sensitive group can be separated among the business participants of the supply chains, which need a different kind of service than the others.

H3a Business participants are characterized by a time-conscious attitude, which appears on the level of opinions and revelations.

H3b The time-conscious behaviour is a characteristic for the time-sensitive segment of business participants, this behaviour can be perceived in measurable parameters of time-management.

VIII. Publications

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- [4] Süle Edit: Gyorsaság pontosság biztonság - az expressz logisztika sajátosságai (Kheops Tudományos Konferencia-CD, Mór, szerk. Dr. Svéhlik Csaba, **2006**. ISBN: 977-963-87553-0-8, pp 459-464)
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- [8] Süle Edit, Vincze Ibolya, Termelőüzemi késztermék raktárak modellezése, Kutatási jelentés, **2006**. pages 23
- [9] Süle Edit: CEP szolgáltatások minőségelemeinek KANO osztályozása (Logisztikai Évkönyv, Magyar Logisztikai Egyesület, szerk. Dr. Szegedi Zoltán, Budapest, **2006**. ISSN: 1218-3849, pp 59-66)
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- [12] Józsa László, Süle Edit, Szegedi Zoltán: The success of co-operation in CEP market (Infusing Research and Knowledge in South-East Europe, Konferencia-CD, Thessaloniki, Greece, **2007**. pp 1-6)
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H4 Effects of the subjective approach to time appear in the time-management of business organisations, these effects divert the acquisition behaviour from a rational one.

H5 Supply chains are not transitive in time, they do not follow the behaviour of supply chains measured in distance, that's why it is not enough to plan and measure based on a static network topology. In order to choose the optimal supply chain it is necessary to review the planning and the performances in a dynamic process.

IV. Research methodology

I created a background for the most important details of *subjective time approach* and time perception in my dissertation with the help of a large collection of non-fiction literature. A special attention was paid to actual *time-trends*, to methods suitable for *measuring and illustrating* the structures of time application on a micro (individual and group-) and on a macro level (social), and to the problem of *evaluation* of time.

I revealed time-attitudes using a sample of 207 participants of the supply chain in a primary inquiry, and I analysed the behavioural characteristics using questions about supply. The quantitative part of the primer research was based on a national sample, based on the internet, with an on-line questionnaire. I evaluated the results with a mathematical-statistical software-package: SPSS 14.0. The empirical research was based on and closed by qualitative research. I analysed the possibilities and consequences of the measurement of the supply-chain-performances in an analytical process using examples.

The questions of the online questionnaire were created in a way that a logistics/acquisition manager of any company should be able to fill it in within 15 minutes without any difficulties. I used mainly closed questions with discreet scales, with both alternative and multiple-choice-questions, applying scales with

several variates, sequential or evaluating scales. I used the 4 grade Likert scale in order to make the respondent tell his/her opinion.

Among the applied scales there were some with lower (nominal and ordinal) and others with higher measurement levels (intervallum- and proportionscales), I used them to create new variates according to the aims of the evaluation. The original database of 133 items at the beginning expanded during the data processing, creating a database consisting of 215 variates.

In the qualitative survey I analysed the appearance of subjective time in focus group-chats in order to judge acquisition- and service-jobs of organisations, I used projective techniques and aimed questions to get the answers. Projective techniques are suited to reveal instinctively used features, skills, personal characteristics in a creative way. Social sciences apply it successfully when they wish to analyse deep, hidden motivations, patterns, and mental background. I used personification, associations and sentences to be completed in order to explore the hidden time-personality, and to determine the effects of group conversation.

V. The thesis

The *attitude* towards time, and the demonstration of *behavioural*-differences connected to time have an important role among the basic hypothesis of the study. There wasn't a significant deviation in opinions among the respondents, as time was considered as an important factor independent from branch, location, size and economic form. Time-sensitive thinking is characteristic in fact for those who were asked. The judgment of time is not always reflected in the practical handling of time. Significant deviations could be manifested here, which are to be described mainly by demographic features, but there are also other considerations in the background that have an influence on the external relations

The research could be extended to the behaviour of markets outside the market-sector and to compare their handling of time with those in the business sector.

Future research could give a chance to make statements for whole structural markets, and this may provide a benefit both for market participants and for supplier-firms/service-firms as well, gaining more information about time-based expectations, behaviour and motivation of organizations, institutions, and firms.

I wish to draw attention to the limits concerning the interpretation and generalization of the results of the research.

My research was mainly an unfolding research with descriptive elements concentrating first of all on market enterprises participating in material processes. There are mainly organizations of the market sector in the sample, and there were only a small number of other organizations, which do not have a significant role in physical processes. Service provider organizations, whose primary resources are not tangible (intellectual capital, connections, other non-tangible goods), state, local government and executive institutions, and civil organizations were not observed.

The conclusions of the research are results measured with help of a good sample and they were already shown in chapter 5.1.2. The importance of the research lies mainly in the fact that I try to point at the devious weight of time within a sample of different firms based on various demographic aspects, I show the appearance and distorting effects of subjective time-perception.

It can be considered as a territorial limit that some regions were not significant enough, to make regional conclusions. Regions with a small number of participants do not constitute an independent research territory, and they cannot be separated for comparison. Conclusions can be stated between Central-Hungary and other regions or between Budapest – and counties.

One direction of the research could be to repeat the survey using a company sample, which could give an opportunity to obtain general conclusions. Further researches may deal with practical solutions of time-management, where the methods of different functional areas (production, human resources, etc.) could represent a separate field.

An examination by sectors (primer, secondary, tertiary, quaternary) would provide an interesting research field and would give a chance for comparisons based on representative samples by sectors.

Typical segments stand out in the behaviour towards time. I proved the existence of the time-sensitive segment among them. I proved that time-conscious behaviour is a characteristic of the time-sensitive segment.

I demonstrated the effect of subjective time-approach to the managing of time. I measured it with surveys based on opinions and revelations, and with projective techniques in focus-group conversations. The research proved the hypothesis saying that among the qualitative parameters of logistics the parameters based on time are the most significant, preceding even expectations of price.

I proved the non-transitivity of the supply chain with the help of relation-theory and by using practical examples.

T1 The most important logistical expectations of business buyers can be connected to the time-factor that is why the main components of logistical quality are based on time (time-based).

T2 An especially time-sensitive group can be separated among the business participants of the supply chains, which need a different kind of service than the others.

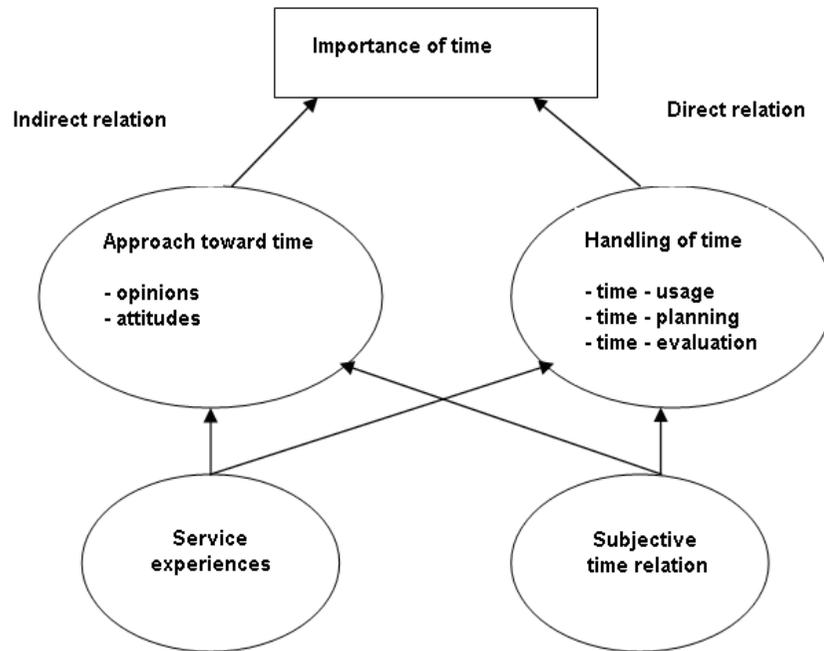
T3a Business participants are characterized by a time-conscious *attitude*, which appears on the level of *opinions and revelations*.

T3b The time-conscious *behaviour* is a characteristic for the time-sensitive segment of business participants, this behaviour can be perceived in measurable parameters of time-management.

T4 Effects of the subjective approach to time appear in the time-management of business organisations, these effects divert the acquisition behaviour from a rational one.

T5 Supply chains are not transitive in time, they do not follow the behaviour of supply chains measured in distance, that's why it is not enough to

plan and measure based on a static network topology. In order to choose the optimal supply chain it is necessary to review the planning and the performances in a dynamic way.



The connections of the primary research

VI. Limitations and possible future further research

The following can be considered as new results in my research:

- The fact that quality expectations in time-based-logistics are significant was well known or at least has been assumed so far as well. The fact that time-parameters are the most important need in supply logistics was proved in Hungary for the first time.
- The possibility of time-based segmentation of the business participants with the separation of the time-sensitive segment can be considered as a new scientific fact.
- No experiment has been done so far in order to survey the attitude and the way of thinking regarding time of the business participants. The determination of *time-conscious thinking* is a new result.
- There are differences in the way companies handle time even if they all consider time as very important. Time-sensitivity in behaviour is typical for large-scale industrial firms.
- The business participants of the supply chain have different kinds of time-awareness concerning *opinions* and *behaviour*. This fact draws attention to a methodological and a practical problem:
 - Conclusions based on researches resting on opinions have to be handled carefully, because the actual behaviour (may) diverge from the one revealed earlier
 - Time is not an exact category for firms, or perhaps it is if we think of a clock and time, so the *subjective time-perception and -handling* influences the firm's behaviour every time, when the degree of freedom of decisions is becoming higher.