



**Doctoral School
of Business
Administration**

SUMMARY OF THESES

Gergely Gecse

Examination of logistics practice of small and medium-sized enterprises

Ph.D. Thesis

Thesis supervisor:

Dr. Erzsébet Halász Sipos
university docent

Budapest, 2012

Institute of Business Economics
Department of Logistics and Supply Chain Management

SUMMARY OF THESES

Gergely Gecse

Examination of logistics practice of small and medium-sized enterprises

Ph.D. dissertation

Thesis supervisor:

Dr. Erzsébet Halász Sipos
university docent

© Gergely Gecse

Contents

I. Defining research aims 4

II. Literature review..... 4

III. Research methods..... 10

IV. Research findings..... 13

V. Main references 18

VI. My publications in the topic of dissertation (till date of submission of theses)..... 22

I. Defining research aims

Because of their significant economic weight, flexibility, innovation and their fast decision-making, small and medium-sized enterprises (hereinafter: SMEs) represent a frequently researched area. Unfortunately, the same is not true of their logistics, about which very few surveys are available. There are many hypotheses commonly accepted by the logistics experts, of which here are two examples:

- “Most small companies had not discovered logistics in any way, either operationally or strategically. You hear the term best practices today; well, we’re talking worst practices” (La Londe, quoted by Harrington [1995] p. 55.).
- “SMEs are frequently of the opinion that logistics may be treated as something of secondary relevance. Transportation, warehousing and materials handling are to be regarded as necessary evil” (Kummer, [1995] p. 10.).

The goal of choosing this topic was to promote the further scientific investigation of the logistics of small and medium-sized enterprises. Furthermore, it is an attempt to show that paying more attention to this area might enhance the performance of the SMEs and expand the market of logistics service providers. I sincerely hope that my studies will contribute to the appearance of the logistics practice of large companies among the small and medium-sized enterprises, to its becoming part of their everyday practice, to “awakening the SMEs from their logistics slumber” (Stabenau, quoted by Kummer [1995] in the preface).

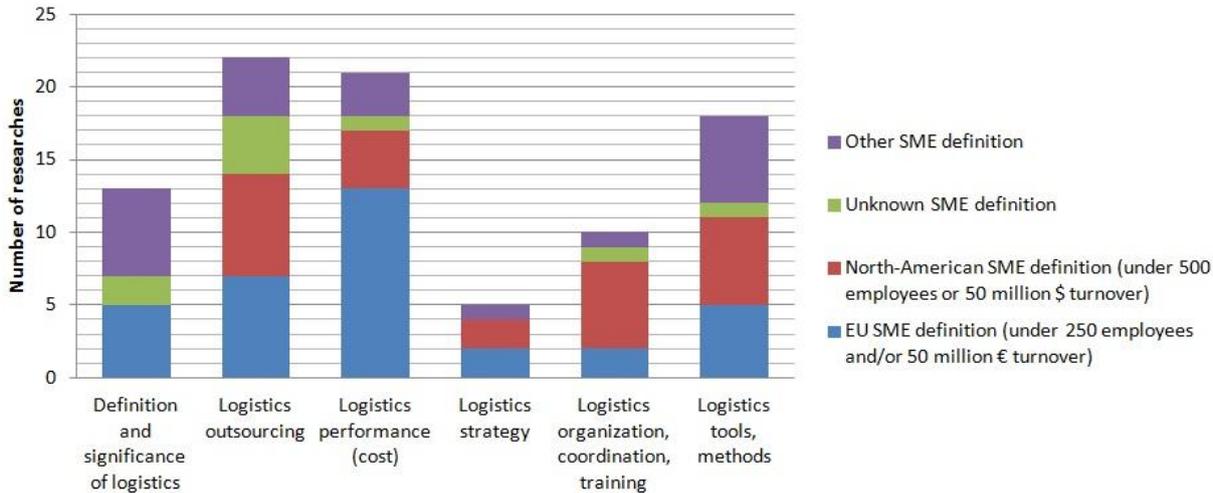
II. Literature review

In-depth research on the logistics practice of small and medium-sized enterprises goes back some 20-25 years, but the number of such researches is still low. The findings, available for the most only in the local language (e.g. in French, German, Finnish, Norwegian) and in the “grey” literature, are often difficult to access and, in some cases, the SMEs concerned forbid to disclose them to the public. The comparison and generalisation of the results of SME logistics research meet with many obstacles due to the very high number of SMEs, the complexity of logistics and the absence of a common interpretation of either the SMEs or of logistics¹. The researches, mostly mutually unknown to, and hence having little effect on one another range from case studies to surveys covering sometimes as many as 2705 enterprises

¹ Flow- and activity-based approaches and logistics concepts regarded as self-evident are equally present.

and, in terms of distribution by branch, they are mostly about manufacture, followed by trade and, due to the bilateral (client, user) analysis of outsourcing, logistics service providers. The investigation of the logistics of agricultural, construction industrial and service provider SMEs is almost totally absent. The most frequent topics of research are the logistics tools, performance and in particular cost levels, and outsourcing (with 22, 21 and 18 researches, respectively), followed by assessments of the significance of logistics and on organisation-coordination-training (13 and 10 surveys, respectively). Logistics strategy has been hardly investigated at all.

Figure 1.: Logistics researches of small- and medium-sized enterprises according to topics and SME definition



Source: Compiled by the Author

Except for the “Finland State of Logistics” project, there are no longitudinal researches and, apart from the Finnish, Quebec and German surveys, there are no systematic ones, due probably to the difficulties of the survey genre (e.g. low response rates, difficulties of representativeness) and the low information content of the results. The decisive majority of researches applied a relatively low-level methodology of mathematical statistics (e.g. descriptive strategies).

Generally, the researches were not associated with specific theories, due partly to the interdisciplinary status and partly to the empirical nature of logistics.

The majority of authors of the logistics literature under study did not investigate the logistics interpretation of SMEs, assuming it was uniform, but some (Kummer [1995]; Szabó [2005];

Vízhányó [2006]) pointed out that it was far from homogenous. The SMEs considered logistics important (Berr et al. [1990]; Kummer [1995]; Szabó [2005]; Vízhányó [2006]; Solakivi et al. [2009]; Vörösmarty et al. [2010]), although some purchasing researches (Quayle [2002a]; Quayle [2002b]) contradicted that. The surveys failed to give a clear specification of the enterprise size limit above which the small and medium-sized enterprises started to treat logistics in a deliberate way (headcount of 20/200; HUF 1.5 billion) (Virum [1994]; Kummer [1995]; Gritsch [2001]; Vízhányó [2006]).

Few general conclusions can be drawn from the research on logistics outsourcing (Solakivi et al. [2011] p. 132.). The majority of articles on outsourcing did not study the relevant theoretical background (Selviaridis and Spring [2007]), or if they did, transaction costs and (core) competencies related to resources theory and, less often, other theories (e.g. agent, game theory) were proposed by way of explanation (Ivanaj and Masson Franzil [2006]). The researches on the interrelationship of transactions costs and logistics outsourcing focused primarily on asset/investment specificity (Ivanaj and Masson Franzil [2006]; Aertsen [1993]; Maltz [1994]; Skjøtt-Larsen [2000]). In the opinion of Kállay and Imreh [2004], the level of outsourced services is low among the SMEs because of the excessive transaction costs due, in turn, to diseconomies of scale. Van den Berg [2009] came to the same conclusion, although in his opinion the traditional outsourcing model based on large volumes is changing with the advance of the ICTs. The level of logistics outsourcing studied under other names (e.g. 3PL, contractual logistics, logistics alliance, subcontracting) has kept increasing in recent years according to the surveys (e.g. “Lieb series”, “Langley series”), and it has shifted from the individual to the more complex services, and it is more frequent in the developed than in the developing regions (Pezzotta et al. [2006]). The SMEs do not always outsource a given logistics sub-activity in its entirety (Bentzen et al. [2000]; Vízhányó [2006]; Futakfalvi [2007]; Tóth [2009]). According to Ivanaj and Masson Franzil [2006], and Hong et al. [2004b], company size is one of the contingency factors of logistics outsourcing, but Bardi et al. [1991] do not consider that obvious. Logistics outsourcing research identified significant differences between large companies and SMEs (Evans et al. [1990]; Murphy et al. [1999]; Gelinas and Bigras [2004]) which, however, disappeared once the entities concerned joined international commerce (Murphy et al. [1995]; Pearson and Semeijn [1999]). The advantages and disadvantages of outsourcing have been investigated almost exclusively in the circle of large companies, and according to Selviaridis and Spring [2007] they are attributable to strategic, financial and operational reasons. SMEs outsourced logistics mainly for tactical

rather than strategic reasons (Chao and Shah [2010]), and the rank order of arguments for and against such decisions was highly varied (Uhlir and Gelinas [1994]; Vízahányó [2006]). According to some case studies (Futakfalvi [2007]; Nagy [2008]; Tóth [2009]), the perspective of cost-trimming may be overridden by other considerations (e.g. personal contacts with clients, service flexibility in terms of time and capacity). A British case study (Holter et al. [2008]), however, demonstrated that with adequate techniques, it is possible to save costs. Unfortunately, the methodology of the investigation of arguments pro and con logistics outsourcing by SMEs fails to go beyond the comparison of occurrence frequencies.

Halley and Guilhon [1997] say that, according to the financial indicators, the logistics performance of small businesses is relatively underdeveloped, but the organisational indicators project the image of a developing proactive activity, integrated from the point of view of value creation. The effect on asset-proportional returns was attributable essentially to the reduction of logistics costs, of time spent on logistics processes, their improvement and the setting of client service targets (Bagchi and Virum [2000]) Research among Norwegian and Greek SMEs revealed the direct influence of logistics on SME performance (Lea et al. [1996]; Orfanos et al. [2010]), although Töyli et al. [2008] and Solakivi et al. [2011] found no statistically observable significant positive relationship between logistics and financial performance. An Italian research came to the conclusion that the logistics response capacity of cluster-member small and medium-sized enterprises intensified significantly, but from the point of innovation, they lagged behind their “independent” peers (Grando and Belvedere [2006]). Among the small businesses of Quebec, logistics performance increased under the effect of co-operation, but the relevant costs rose as well (Désaulniers and Bigras [1998]).

Despite the methodological difficulties (estimation due to lack of information, components based on different concepts/content, different reference bases), cost levels play a priority role in logistics performance measurement. They are often merged, erroneously, with the expense and expenditure levels of logistics. At the theoretical level, the investigation of transportation costs excels from the studies of the partial costs of logistics; this area has been integrated into economics thinking thanks to the works of von Thünen [1826], Samuelson [1952] and Krugman [1991]. Logistics costs are estimated at macro level by econometric models (Rodrigues et al. [2005]; Klaus [2008]; Wilson [2009]; King [2010]) or they are assessed on the basis of corporate statistics (Elger et al. [2008]). The surveys suggest that the logistics costs of SMEs correspond to less than 22% of their sales revenues or total costs (Bagchi and

Virum [2000]; Szabó [2005]; Vízhányó [2006]; Solakivi et al. [2009]; Hovi and Hansen [2010]; Solakivi et al. [2010]; Campos-Garcia et al [2011]). Most SMEs are aware of their logistics cost level to a moderate extent only or not at all (Virum [1994]; Tempel and Meißner [2002]), or they assumed it was zero (Berr et al. [1990]; Campos-Garcia et al. [2011]). According to Solakivi et al. [2010], the rule-of-thumb that the total costs of logistics decreases with the increase of company size is not true for medium-sized enterprises which already incur costs due to growth, but are too small yet to exploit economies of scale. Lea et al. [1996] found that the total costs of logistics increased proportionally with the sales revenue, due to a smaller extent also to the rise in the added value of the inputs, but the acceleration of stock rotation had the contrary effect. The researchers found lower logistics costs at SMEs with a longer export history and higher ones at those struggling with supplier problems (Lea et al. [1996]). At macro level (Harrington [1995]; Naula et al. [2006]; Hovi and Hansen [2010]), the reduction of logistics costs is often set as a goal which appears also at the companies themselves (Vízhányó [2006]), typically those with unintegrated logistics (Halley and Guilhon [1997]). The reduction of the costs of logistics, however, has but limited effects (Kummer [1995]). In the opinion of Fodor [2005], the benefits of the introduction of the logistics information system lies not in cost reduction, but in improved customer service. Solakivi et al. [2011] identified a resembling to inverse U-shape relationship between the logistics outsourcing and logistics costs of Finnish SMEs.

Logistics strategy can be investigated in function of corporate strategy “expressing the guideline of the operation of the company, its objectives and the method for attaining them” (Chikán [2008] p. 187.) which in the opinion of Halley and Guilhon [1997] is weak or non-existent. In the context of planning, the small and medium-sized enterprises considered the competitiveness-enhancing effect of logistics to be the strongest, and they introduced logistics strategies with the idea of acquiring a competitive edge. The SMEs reached professional-level logistics through the stages of pre-logistics, interest in logistics, and the initial level (Kummer [1995]). There are several stages of logistics – proactive, reactive and emerging - based on the attitude of the owner-manager and the firm’s dependence on the environment (Halley and Guilhon [1997]). The authors warn that small firms shall not be forced to include logistics among their strategic concerns, and logistics strategy cannot be assigned to the categories of good or bad.

Research on the appearance and co-ordination of logistics in the organisation unfortunately fails to go beyond the relevant, rather weak, conclusions of contingency theory concerning organisation size, but it provides empirical corroboration for the latter. Logistics usually does not appear at the SMEs in a formalised way, and if it does, it is dispersed (Kummer [1995]; Roy et al. [2002]; Gelinas and Bigras [2004]). SMEs treat the logistics tasks at a low level of the organisational hierarchy (Berr et al. [1990]; Kummer [1995]; Roy et al. [2002]; Paik et al. [2009]) say that the decision-making rules are unclear (Kummer [1995]), partial tasks are co-ordinated informally (Heinrich and Felhofer [1985]). The qualification of SMEs employees who usually fulfil several functions, logistics included; it is usually weak (Evans et al. [1990]; Tempel and Meißner [2002]; Ellegaard [2009]); they have low-level schooling (Presutti [1988]; Berr et al. [1990]; Harrington [1995]; Gelinas and Bigras [2004]), although surveys suggesting the contrary exist as well (Halley and Guilhon [1997]).

According to Klaus [2009] the investigation of the instrumentation of logistics goes back to the work of Babbage and Taylor. Given the high data and computational demands of the logistics activity, the IT instruments have received most attention; they are spreading also among the SMEs, especially their cheaper and simpler versions due to the relevant high investment demand (Halley and Guilhon [1997]; Pearson and Semeijn [1999]; Roy et al. [2002]; Gelinas and Bigras [2004]; Szabó [2005]; Vízhányó [2006]; Solakivi et al. [2009]; Gelei and Nagy [2010]). Kummer [1995] was the only researcher who studied the traditional logistics methods, and he found that route planning, ABC analysis and facility layout planning were the most frequent. Désaulniers and Bigras [1998] identified five key strategies of logistics alliances: economies of scale, access to distribution network, delivery of special transportation, knowledge of the local market and production for the export markets. Other authors also proposed logistics co-operation as a means for coping with the problems due to the small size of the SMEs (Finley [1984]; Hudson and McArthur [1994]; Chikán et al. [2007]), although this did not work out in practice due to the motivations of the owner-managers being different from the rational model based on profit maximisation (Morrisey and Pittaway [2004]; Tóth [2009]). According to the researches, SMEs are active in international purchasing (Scully and Fawcett [1994]; Quayle [2002c]; Overby and Servais [2005]), and the Six Sigma Method can also be applied to them (Nabhani and Shokri [2009]).

III. Research methods

I examined logistics practices of Hungarian small and medium-sized enterprises. . I think that, as with large companies, the exploration and improvement of the logistics of the SMEs might contribute to ameliorating their performance. The goal of my dissertation was to promote further scientific research of the logistics for small and medium-sized enterprises and to go beyond relatively simple mathematical-statistical methods having used by earlier researches.

My research focused on the factors influencing the logistics costs and outsourcing activities of small and medium-sized enterprises; the hidden potential in logistics outsourcing and the reasons underlying judgements on it. Furthermore, I explored the relationship between logistics and company performance, and the opinion of executives on the contribution of logistics to the success of the company overall. I used for this purpose the logistics questions of two surveys:

- “In competition with the world”, carried out for the fourth time in 2009 on a sample of 300 enterprises (85.6% SMEs), and
- Survey of the situation of enterprises”, a representative survey conducted in 2009 by the Ministry for National Development and Economy, covering almost two thousand small and medium-sized enterprises. I elaborated questions of this survey according to „Finland State of Logistics” survey.

I researched logistics practice of Hungarian small- and medium-sized enterprises with altogether 10 hypotheses.

H1a: The rates of partial and total logistics costs, respectively, to the total corporate costs of Hungarian small and medium-sized enterprises are influenced most by company size and branch affiliation.

H1b: The outsourcing rates of logistics sub-activities of Hungarian small and medium-sized enterprises are influenced most by company size and branch affiliation.

H2: The transportation and warehousing demand of Hungarian SMEs implies significant latent demand for the domestic transportation and warehousing service provider enterprises.

H3a: The rate of Hungarian medium-sized enterprises considering their logistics sub-activities their core competences is lower than the corresponding rate of micro and small enterprises,

and in the context of outsourcing, the former are less seldom faced with high transaction costs.

H3b: Hungarian small and medium-sized enterprises outsource logistics activities primarily to reduce costs, to focus on the core competences and to enhance flexibility.

H3c: McIvor's model can be applied to the determination of the outsourcing of individual logistics sub-activities by Hungarian small and medium-sized enterprises.

H4: Hungarian small and medium-sized enterprises judge the performance of their logistics service providers in terms of cost reduction, service quality and problems incurred.

H5a: There is no association between the performance of Hungarian SMEs and the efficiency of their logistics systems.

H5b: There is no association between the performance of Hungarian SMEs and the quality of the third party logistics services they use.

H6: The logistics concept of managers of Hungarian SMEs gives priority to procurement; the significance of procurement, inventory management and logistics falls short of that of the other functional sub-areas.

I used the IBM PASW/SPSS 18.0. computer programme to test the research hypotheses: I defined the SMEs exclusively by headcount, considering those with fewer than 10 employees micro enterprises, those with 10-50 small, and those with 50-250 medium-sized enterprises. I did not exclude from the survey enterprises with no employees, since they have not been studied so far and they might offer results laying the bases of further researches (e.g. logistics practice of the population).

I applied different tests (e.g. Kruskal-Wallis, Mann-Whitney, Paired-sample T and Wilcoxon tests) for examining significant differences, and variety of multivariate statistic methods from analysis of variance (ANOVA) and cross-tables, binary logistic regression to the cluster and factor analyses.

Table 1.: Methods applied by the research

Hypothesis	Databases and variables	Methods
-	<p>“Survey of the situation of enterprises, 2009” Variables related to Questions 5, 13, 30, and to Questions 3, 4, 7, 23, 26-29, 51 on county, settlement type Variables related to Questions 5, 17, 30, and to Questions 3, 4, 7, 23, 26-29, 51 on count, settlement type. „In competition with the world, 2009” research Questions A1, A8, K51d-i. and K52a-c.</p>	<p>Descriptive statistics, factor analysis, variance analysis, Kruskal-Wallis, Mann-Whitney tests</p>
H1a H1b	<p>“Survey of the situation of enterprises, 2009” Variables related to Questions 5, 13, 30, and Questions 3, 4, 7, 23, 26-29, 51 on county, settlement type Variables related to Questions 5, 17, 30, and to Questions 3, 4, 7, 23, 26-29, 51 on county, settlement type</p>	<p>Cross-table analyses</p>
H2	<p>“Survey of the situation of enterprises, 2009” Variables related to Questions 4, 13a-b, 17a-b Corporate Database of the National Tax and Customs Administration – 2009 Net sales revenues, total cost and expenditure data</p>	<p>Descriptive statistics (average calculation)</p>
H3a H3b H3c	<p>“Survey of the situation of enterprises, 2009” Variables related to Questions 18c, 19b, 19g, 30 Variables related to Questions 18, 19 Variables related to Questions 17a, 17b, 17c and 18-19</p>	<p>Cross-table analyses, scaling Binary logistic regression</p>
H4	<p>“In competition with the world, 2009” Variables related to Questions A1, A8, K55, K56</p>	<p>Factor analysis</p>
H5a H5b	<p>“In competition with the world, 2009” Variables related to Questions A1, V14j, V15 Variables related to Questions A1, V15, K52, K54s</p>	<p>Cluster analysis and cross-table analysis</p>
H6	<p>“In competition with the world, 2009” A1 variables and Variables related to Question M1 from all 4 questionnaires addressed to managers</p>	<p>Paired-samples T-test and Wilcoxon test</p>

Source: Compiled by the Author.

IV. Research findings

My research which was based on the most extensive review so far of the scientific literature on the logistics practice of small and medium-sized enterprises focused on logistics costs and outsourcing. Some interesting results were provided already by the descriptive statistical analysis of the “Survey of the situation of enterprises, 2009” covering almost two thousand SMEs:

- I found that 43.86% of Hungarian small and medium-sized enterprises reported zero logistics total costs, and for the logistics sub-activities, the corresponding rate was min. 58.98%. The logistics costs rate of SMEs – in particular those with a higher number of employees – was higher than expected on the basis of the previous domestic and international researches, and it was most akin to the Mexican values. Within the average total logistics cost rate of 18.86% typical of Hungarian SMEs, transportation and warehousing and, unexpectedly, administration costs had the largest shares. Hungarian SMEs acted against the rule of thumb that the bigger the enterprise, the smaller the rate of its logistics costs. However, as expected, the highest average total logistics cost rates were found in the branches of agriculture, manufacture and commerce.
- I came to contradictory conclusions concerning the levels of logistics outsourcing of Hungarian SMEs. According to the “Survey of the situation of enterprises, 2009”, the level of logistics outsourcing was relatively low: 15.03% of Hungarian small and medium-sized enterprises outsourced transportation/cargo handling; 6.69% freight forwarding; 4.68% logistics IT; 4.00% warehousing/storage; 3.07% order management and 1.80% packaging. Third party inventory management was so rare I excluded it from the further investigations. On the basis of the research “In competition with the world, 2009”, however, transportation/freight forwarding was outsourced by 70.91% of respondent SMEs; warehousing by 25.00% and inventory management by 20.12%. The difference may be due to the higher proportion of manufacturing and larger-size SMEs in the latter sample. Based on the sample of the “Survey of the situation of enterprises, 2009”, almost half of Hungarian SMEs subcontracting logistics outsourced several sub-activities simultaneously, most frequently transportation/forwarding (29.35%), transportation/warehousing (7.07%); transportation/warehousing/forwarding (7.07%) and forwarding/logistics IT (4.35%).
- As for the interaction between the respective costs of the logistics sub-activities and of the outsourcing activity, I found medium-level correlation between transportation outsourcing and transportation costs/total costs of logistics; and between the outsourcing and the costs

of warehousing and the outsourcing and costs of packaging, and weak correlation in the rest of the cases.

In connection with Hypotheses H1, I demonstrated by using the “Survey of the situation of enterprises, 2009” database and cross-table analyses that, except for inventory shortage, company size and branch affiliation were the two most important contingency factors, from the point of view of the transportation, warehousing, packaging, inventory carrying, inventory shortage and logistics IT cost levels and their respective rates within the total costs of logistics. As for Hypothesis H1b concerning the outsourcing rates of the six types of logistics sub-activities, the same was true only for transportation and forwarding, whereas for warehousing, the priority role of branch affiliation was taken over by the main sales site; for the outsourcing of packaging and order management by the type of the settlement; and for the outsourcing of logistics IT by the corporate or individual nature of the enterprise. The associations between the contingency factors and the logistics cost ratios on the one hand and the outsourcing levels on the other proved to be weak/mediocre, and their strength decreased even further when I narrowed the scope of the investigation to the agricultural, manufacturing and commercial SMEs, where the dependence relationship actually disappeared in several cases.

In testing Hypotheses H2 I exploited the representative nature of the database of the “Survey of the situation of enterprises, 2009” to demonstrate that corporate small and medium-sized enterprises had a significant transportation and warehousing demand. Currently, the relevant activities of the enterprises themselves correspond to 1.97 times the market of the enterprises focusing on freight forwarding as their core competence, and 3.53 times that of enterprises focusing on warehousing. I demonstrated, moreover, that the demand increment was latent, since at least 7/8 of the enterprises under study expected (could implement) no change in this area in the following years.

The method I applied to test Hypothesis H2 revealed also that the total logistics costs of Hungarian corporate small and medium-sized enterprises attained HUF 6143.734 billion in 2009. This corresponds to a GDP-proportional rate of 22.97%, very high indeed in comparison with the corresponding rates in the Finnish and South African researches, referring to approximately the same dates (8.7% and 14.7%, respectively), especially considering the fact that the first contains neither the values of large companies, nor those of individual enterprises.

To test Hypotheses H3 by investigating the arguments for and against the outsourcing of transportation, warehousing and packaging, respectively, I broke with the frequency analyses applied so far in SME logistics outsourcing researches, and used cross-table analyses and binary logistic regression instead. Based on the database of the “Survey of the situation of enterprises, 2009”:

- a) I demonstrated that the arguments for and against logistics outsourcing were not fully consistent and also that 42.65% of Hungarian manufacturing SMEs, 33.33% of agricultural ones and 24.67% of commercial ones regarded transportation, warehousing and packaging as their core competences. Micro and small enterprises in the said branches tended to regard transportation, warehousing and packaging their core competences to a growing extent with the growth of their size, but for medium-sized enterprises the tendency changed due probably to more marked specialisation and more intensive concentration on the core competence. On the basis of the transaction costs of logistics outsourcing it seemed that even medium-sized enterprises were not big enough to attain the economies of scale limit.
- b) I found weak association, with one exception, between the logistics outsourcing level of SMEs and the arguments against outsourcing, and medium-level association with the arguments in favour of outsourcing. In regard of the outsourcing of transportation, warehousing and packaging by the SMEs, flexible capacity and cost decrease carried the strongest explanatory power, followed by quality improvement and focusing on the core competences. Besides cost decrease, focusing on the core competences and flexible capacity as explanatory factors assumed in Hypothesis H3b, quality improvement appeared as an important new criterion explaining logistics outsourcing. Nevertheless, the four factors in themselves explained the outsourcing of transportation, warehousing and packaging to a small extent only.
- c) The testing of Hypothesis H3c demonstrated that McIvor’s model can only be applied to the outsourcing of the transportation, warehousing and packaging activities of Hungarian manufacturing, agricultural and commercial SMEs in a modified way. The roles of focusing on the core competences and of cost reduction - transaction costs included – were confirmed, but that of dependence was not; instead, flexibility ought to be studied. In terms of explanatory power, the motivating role of cost decrease was strongest, followed by flexibility, hidden costs and the core competences.

As for Hypotheses H4, I demonstrated that Hungarian SMEs judged the performance of their logistics service providers on the basis of problems incurred, service quality, cost reduction/transportation and “other” factors by applying all factor analyses methods available in the SPSS statistical programme package to the data of “In competition with the world, 2009”.

On the basis of the data of “In competition with the world, 2009”, I found no association between the performance and logistics services of small and medium-sized enterprises. Corporate performance and the efficiency/performance of the logistics systems, on the other hand, did correlate, albeit only at a significance level of 5.1%. This association proved to be weak and, what is more, corporate performance had a stronger effect on logistics than vice versa. There was significant association between under-average logistics system efficiency and stagnating/lagging corporate performance on the one hand and above-average logistics system efficiency and leading corporate performance. These results, however, must be interpreted in consideration of the fact that the evaluation was based on the self-evaluation of company managers, not on financial and logistics indicators.

By testing Hypothesis H6 with paired-sample t tests and Wilcoxon tests based on the data of “In competition with the world, 2009” I confirmed that the logistics concepts of the managers of Hungarian SMEs was driven by procurement and, with the exception of micro enterprises, the entities concerned were characterised by the absence of logistics integration. It was demonstrated that company managers rated logistics very low indeed, together with inventory management, in terms of contribution to the success of the company overall, and they gave lower ratings only to R&D and organisational development.

On the basis of the above, the answer to the research question is, unfortunately, that the managers of Hungarian small and medium-sized enterprises consider logistics a secondary function. Nevertheless, the efficiency of the logistics systems of SMEs and their corporate performance correlate, if only weakly, and this gives some hope that this secondary status will change in the future.

I think that future research should pay special attention to agricultural SMEs beside the manufacturing and commercial ones. There are still many virgin areas in the investigation of the logistics practice of SMEs, of which in my opinion the logistics aspects of the

internationalisation of the SMEs, the use of the traditional instruments, and the research of logistics co-operation seem the most promising. Hopefully, other PhD candidates will also find this area full of challenges worthy of research, and we shall not have to wait another twenty years for a thesis on this topic.

V. Main references

- Aertsen, F. [1993]: Contracting-out the physical distribution function: a trade-off between asset specificity and performance measurement. *International Journal of Physical Distribution & Logistics Management*, Vol. 23., No. 1., pp. 23-29.
- Bagchi, P.K., and Virum, H. [2000]: Logistics Competence in Small and Medium-Sized Enterprises: The Norwegian Experience. *Supply Chain Forum*, Vol. 1, No. 1., pp. 46-55.
- Bardi, E.J. and Tracey, M. [1991]: Transportation Outsourcing: A Survey of US Practices. *International Journal of Physical Distribution and Logistics Management*, Vol. 21., No. 3., pp. 15-21.
- Berr, U., Borchert, G. and Feldhahn, K.A. [1990]: *Logistikkonzepte in kleinen und mittleren Unternehmen*; in: *Logistik im Unternehmen* [1990], No. 6, pp. 30-32.
- Bentzen, E., Christiansen, P.E., and Overo, J. [2000]: *Outsourcing in purchasing departments in medium sized Danish manufacturers*. Manuscript, Copenhagen.
- Campos-Garcia, R.M., Garcia-Vidales, M.A. and Gonzales-Gomez, O. [2011]: Relationship between cost and logistic practices in small and medium enterprises: A case study of Queretaro, Mexico. *African Journal of Business Management*, Vol.5., No. 4., pp. 1245-1252.
- Chao, H. and Shah, A.M. [2010]: *Logistic Outsourcing Process in SMEs. Case Studies of Four Taiwanese SMEs*. Linnaeus University, Kalmar.
- Chikán A., Déri A., Kiss P., Némón Z., and Rónai P. [2007]: *Nemzeti Logisztikai Stratégia*. Manuscript, Budapest.
- Chikán, A. [2008]: *Vállalatgazdaságtan*. Aula Kiadó, Budapest.
- Desaulniers, M. and Bigras Y. [1998]: Les alliances logistiques à l'exportation chez les PME manufacturières québécoises : une analyse de cas multiples. Manuscript, Montreal.
- Elger, T., Lundquist, K.J. and Olofolander, L. [2008]: *Svensk makrologistik - Sammansättning och kostnadsutveckling 1997-2005*. VINNOVA – Verket för Innovationssystem, Lund Universitet, Stockholm-Lund.
- Evans, K.R., Feldman, H.D. and Foster, J. [1990]: Purchasing Motor Carrier Service: An Investigation of the Criteria Used by Small Manufacturing Firms. *Journal of Small Business Management*, Vol., 28, No. 1., pp. 39-47.
- Finley, L. [1984]: Can your small company acquire resources as favorably as the large company? *American Journal of Small Business*, Vol. 9., No. 1., pp. 19-25.
- Fodor Z. [2005]: Logisztikai információs rendszerek alkalmazásának hatása a kis- és középvállalkozások versenyképességére. Manuscript, Budapest.
- Futakfalvi, Gy. [2007]: *A vevőkiszolgálás értékelése egy speciális területen (a Biotest Hungaria Kft. példáján)*. Thesis, Budapest.
- Gelei, A., and Nagy J. [2010]: *Logisztikai folyamatok informatikai támogatottsága Magyarországon – fókuszban a disztribúciós logisztika*. Study, Budapest.
- Gelinas, R. and Bigras, Y. [2004]: The Characteristics and Features of SMEs: Favorable or Unfavorable to Logistics Integration? *Journal of Small Business Management*, Vol. 42., No. 3., pp. 263-278.
- Grando, A. and Belvedere, V. [2006]: District's manufacturing performances: A comparison among large, small-to-medium-sized and district enterprises. *International Journal of Production Economics*, 104, pp. 85–99.
- Gritsch, M. [2001]: A logisztikai stratégia szerepe a vállalati versenyképességben: A Magyar vállalatok előtt álló kihívások és lehetőségek. Phd thesis, Budapest.
- Halley, A., and Gulihon, A. [1997]: Logistics behaviour of small enterprises: performance, strategy and definition. *International Journal of Physical Distribution & Logistics Management*, Vol. 27., No. 8. pp. 475-495.

- Harrington, L. [1995]: Small companies: find logistics tools. *Transportation & Distribution*, Vol. 26, No. 3., pp. 56-60.
- Holter, A.R., Grant, D.B., Ritchie, J.M. and Shaw, N. [2008]: A framework for purchasing transport services in small and medium size enterprises. *International Journal of Physical Distribution & Logistics Management*, Vol. 38., No. 1. pp. 21-38.
- Hong, J., Chin, A.T.H. and Liu, B. [2004b]: Firm-Specific Characteristics and Logistics Outsourcing by Chinese Manufacturers. *Asia Pacific Journal of Marketing and Logistics*, Vol. 16., No. 3., pp. 23-36.
- Hovi, I.B. and Hansen, W. [2010]: *Logistikkostnader i norske vareleverende bedrifter. Nøkkeltall og internasjonale sammenlikninger*. TØI Transportøkonomisk institutt Stiftelsen Norsk senter for samferselsforskning, Oslo.
- Ivanaj, V., and Masson Franzil, Y. [2006]: *Outsourcing logistics activities: a transaction cost economics perspective*. XVth Conference International de Management Stratégique, Annecy/Geneve.
- Kállay L. and Imreh Sz. [2004]: *A kis- és középvállalkozás-fejlesztés gazdaságtana*. Aula Kiadó, Budapest.
- King, D. (szerk.) [2010]: *The 6th Annual State of Logistics Survey for South Africa 2009*. CSIR, Pretoria.
- Klaus, P. [2009]: Logistics research: a 50 years' march of ideas. *Logistics Research*, Vol. 1., No. 1., pp. 53-65.
- Krugman, P. [1991]: Increasing Returns and Economic Geography. *The Journal of Political Economy*, Vol. 99, No. 3., pp. 483-499.
- Kummer, S. [1995]: *Logistik für den Mittelstand. Leitfaden für das Logistikmanagement in mittelständischen Unternehmen*. Hussverlag, München.
- Lea, R., Hagen, J.M., Lindjord, J.E., Barlaup T.H. and Boe, K. [1996]: *Eksportlogistikk I sma og mellomstore bedrifter*. Manuscript, Oslo.
- Maltz, A.B. [1994]: Outsourcing the warehousing function: economic and strategic considerations, *Logistics and Transportation Review*, Vo. 30., No. 3., pp. 245-265.
- McIvor R. [2000]: A practical framework for understanding the outsourcing process. *Supply Chain Management: An International Journal*, Vol. 5., No. 1., pp. 22-36.
- Morrissey, B., and Pittaway, L. [2004]: A study of procurement behaviour in small firms. *Journal of Small Business and Enterprise Development*, Vol. 11., No. 2, pp. 254-262.
- Murphy, P.R., Daley, J.M. and Knemeyer, A.M. [1999]: Comparing Logistics Management in Small and Large Firms: An Explanatory Study. *Transportation Journal*, Vol. 38., No. 4, pp. 18-25.
- Murphy, P.R., Daley, J.M. and Dalenberg, D.R. [1995]: Logistics Practices of Smaller Businesses Currently Engaged in International Trade, *Defense Transportation Journal*, June 1995, pp. 10-17.
- Nabhani, F., and Shokri, A. [2009]: Reducing the delivery lead time in a food distribution SME through the implementation of six sigma methodology. *Journal of Manufacturing Technology Management*, Vol. 20., No. 7., pp. 957-974.
- Naula, T., Ojala, L. and Solakivi, T. [2006]: Finland - State of Logistics 2006. Publications of the Ministry of Transport and Communications Finland 45/2006, Edita Publishing, Helsinki.
- Orfanos, V., Mylonakis, J. and Evripiotis, M. [2010]: An Evaluation of Logistics Determinants, Business Relationships and Firms Characteristics of the Greek Small and Medium Enterprise. *International Journal of Marketing Studies*, Vol. 2., No. 2., pp. 21-33.

- Overby, J. W., and Servais, P. [2005]: Small and medium-sized firms' import behaviour: The case of Danish industrial purchasers. *Industrial Marketing Management*, Vol. 34., No. 1, pp. 71-83.
- Paik, S.K., Bagchi, P.K., Skjøtt-Larsen, T. and Adams, J. [2009]: Purchasing Development in Small and Medium-Sized Enterprises (SMEs). *Supply Chain Forum – An International Journal*, Vol. 10., No. 1., pp. 92-107.
- Pearson, J.N., and Semeijn, J. [1999]: Service Priorities in Small and Large Firms Engaged in International Logistics. *International Journal of Physical Distribution and Logistics Management*, Vol. 29., No. 3., pp. 181-192.
- Pezzotta, G., Cavalieri, S., Gaiardelli, P., Legnani, E., Palm, D., Kimmich, J., Morawetz, C., Czinege, I., Ilie-Zudor, E., Pfeiffer, A. and Kóbor, I. [2006]: *Improving Logistics Performance of SMEs in the Automotive Sector. Final Report*. Manuscript, Bergamo.
- Roy, J., Bigras, Y., Filiatrault P. and Martel, A. [2002]: Analyse des besoins de formation en logistique au Québec. Rapport remis à l'Institut de formation en gestion du transport et de la logistique, Centre de recherche en gestion (CRG), UQAM.
- Quayle, M. [2002a]: E-commerce: the challenge for UK SMEs in the twenty-first century. *International Journal of Operations and Production*, Vol. 22., No. 10., pp. 1148-1161.
- Quayle, M. [2002b]: Purchasing in small firms. *European Journal of Purchasing and Supply Chain Management*, Vol. 8., No 3., pp. 151-159.
- Quayle, M. [2002c]: Supplier development and supply chain management in small and medium size enterprises. *International Journal of Technology Management*, Vol. 23. No. 1-3., pp. 172-188.
- Rodrigues, A.M, Bowersox, D.J., and Calantone, R.J. [2005]: Estimation of Global and National Logistics Expenditures: 2002 Data Update. *Journal of Business Logistics*, Vol. 26., No. 2., pp. 1-16.
- Samuelson, P. [1952]: Spatial price equilibrium and linear programming. *American Economic Review*, Vol. 42, pp. 283-303.
- Selviaridis, K. and Spring, M. [2007]: Third party logistics: a literature review and research agenda. *The International Journal of Logistics Management*, Vol. 18., No. 1., pp. 125-150.
- Skjøtt-Larsen, T. [2000]: Third party logistics – from an interorganisational point of view. *International Journal of Physical Distribution & Logistics Management*, Vol. 30., No. 2., pp. 112-127.
- Solakivi, T., Ojala, L., Töyli, J., Hälinen, H.M., Lorentz, H., Rantasila, K. and Naula, T. [2009]: *Finland - State of Logistics 2009*. Ministry of Transport and Communications Finland, Helsinki.
- Solakivi, T., Ojala, L., Töyli, J., Hälinen, H.M., Lorentz, H., Rantasila, K., Huolila K. and Laari S. [2010]: *Logistiikkaselvitys 2010*. Ministry of Transport and Communications Finland, Helsinki.
- Solakivi, T., Töyli, J., Engblom, J. and Ojala, L. [2011]: Logistics outsourcing and company performance of SMEs. *Strategic Outsourcing: an International Journal*. Vol. 4., No. 2., pp. 131-151.
- Szabó, Z. [2005]: Logisztikai hibák tragikus hatása a cég költségeire. Presentation, Budapest. Letöltve: www.mktsz.hu/?action=program&page=eloadas
- Tempel, H. and Meißner D. [2002]: *Beschaffung und Logistik in KMU*. Hochschulverbund Distance Learning, Brandenburg.
- Töyli, J., Hakkinen, L., Ojala, L. and Naula, T. [2008]: Logistics and financial performance. An analysis of 424 Finnish small and medium-sized enterprises. *International Journal of Physical Distribution and Logistics Management*, Vol. 38., No. 1., pp. 57-80.

- Tóth, C. [2009]: *Fuvarozzunk, vagy fuvaroztassunk? – A kiszervezés dilemmái a Coninvest Kft-nél*. Thesis, Budapest.
- Uhlig, T. and Gelinas, R. [1994]: *Les PME et la sous-traitance logistique en Allemagne*. Actes du Congrès CIFPME, Trois Rivières, Tome 2, pp. 725-739.
- van den Berg, E. [2009]: Outsourcing for SMEs. *Credit Management*, pp. 24-25.
- Virum, H [1994]: *Logistikk i sma og mellom – store bedrifter*. Handelshoyskolen BI Research Report, Sandivka.
- von Thünen, J.H. [1826]: *Die Isolirte Staat*. Perhtes, Hamburg.
- Vízhányó, A. [2006]: A logisztikai outsourcing dilemmái a magyarországi kis- és középvállalkozások körében. Thesis, Budapest.
- Vörösmarty, Gy., Tátrai, T. and Havasi, Z. [2010]: Beszerzés helye és szerepe a magyarországi kis- és középvállalatoknál. *Vezetéstudomány*, Vol. 29., No. 12., pp. 36-44.
- Wilson, R. [2009]: *20th Annual State of Logistics Report*. Council of Supply Chain Management Professionals, Washington.

VI. My publications on the topic of dissertation (till date of submission of Theses)

- Gecse, G. [2010a]: Kis- és középvállalkozások logisztikai gyakorlata Magyarországon – kitekintés a nemzetközi helyzetre. in: MLBKT [2010]: *Felfelé a lejtőn – a kilábalás sikertényezői az ellátási láncban. Az MLBKT 18. éves kongresszusa.* MLBKT, Budapest. pp. 126-136.
- Gecse, G. [2010b]: Magyarországi kis- és középvállalkozások logisztikai gyakorlata. *Logisztikai Híradó*, Vol. 20., No. 3., pp. 32-34.
- Gecse, G. [2010c]: Magyarországi kis- és középvállalkozások logisztikai gyakorlata. in. Dr. Bokor Z. szerk. [2010]: *Logisztikai Évkönyv.* Magyar Logisztikai Egyesület, Budapest. pp. 57-61.
- Bokor, Z., and Gecse, G. [2009]: Development of Hungarian logistics market with special regard to EU accession. *UNECE Transport Review*, Vol. 1., No. 2, pp. 93-98.
- Gecse, G. [2008]: Logistics strategy of the Hungarian government. In: EASTLOG konferencia kiadvány.
- Gecse, G. and Nikodémus, A. [2005a]: Logisztika – Európa Terv. *Comitatus*, Vol. 15., No. 1-2, pp. 91-102.
- Gecse, G. [2005b]: *Hungarian budding clusters.* In. OECD [2005]: *Business Clusters. Promoting Enterprise in Central and Eastern Europe.* pp. 155-182.
- Gecse, G. and Nikodémus, A. [2004]: Logisztika kormányzati megközelítésben. *Területi Statisztika*, Vol. 44, No. 4., pp. 315-331.
- Gecse, G. [2003]: *Hungarian SME Policy in the context of industrial restructuring.* “Policy and Regulatory Options for Promoting Industrial Restructuring in ECE Region”. UNECE, Genf.