Analyzing Differences in the Logistics Competence between Small and Medium Enterprises (SMEs) and Large Companies: An Empirical Study

by

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Abstract

The logistical competence level of small and medium enterprises (SMEs) up to 250 employees is largely unknown, as this group is - due to their fragmentation (approx. 99.7% Austrian companies are SMEs) - rarely the object of logistics research. In addition technical terms, such as ABC analysis, kanban or vendor managed inventory, are unknown to SMEs, making it difficult to carry out surveys in this area of interest. Nevertheless, SMEs frequently do implement many of these concepts using different names. The linkage between enterprise size and logistical competence will be examined by means of an empirical analysis done in 17 Austrian companies (7 SMEs, 10 large companies). In this study a questionnaire containing 240 questions based on the process reference model logwin-P, personal interviews with an average of four decision makers per company and an audit in each company were chosen in order to filter out methodical weaknesses of the interview approach. Using a multi-level evaluation scheme all answers are transformed into a percentage based degree of maturity (100 percent being the theoretical optimum). The findings of the empirical investigation and analysis of the data indicates the following: 1) Large Companies achieve a significant higher level of maturity (median: 71 percent; coefficient of variation: 8.2 percent) compared to SMEs (median: 51 percent; coefficient of variation: 19.5 percent); 2) SMEs show widespread deficits in logistics processes, which can especially be attributed to the sections of production logistics and outbound logistics, since intuitive means of "common sense" do not generate sufficient solutions; 3) All large companies have a specialized logistics department, that's also part of the corporate management in 40 percent of all cases, whereas many SMEs don't have a fulltime logistician at all; and 4) Most SMEs (72 percent) have never used a freight tender compared to 80 percent of the large companies executing a freight tenders regularly. By analyzing the outcome of the empirical study, we are able to recommend certain changes to the logistics training courses in professional education focusing on SMEs (more practical approach) as well as to our university-internal courses.

Keywords: Empirical Study, Benchmarking, SME, Logistics Management, Supply Chain Management Development

1. Introduction

In Austria – as well in most economies – small enterprises account for 99.7% of all firms and employ 67.1% of all working persons. Nevertheless the majority of the logistics literature is based on and discussed from the standpoint of large companies (Gelinas and Bigras, 2004; Murphy et al., 1999), even so in 1976 Love and Gilmour elaborated significant differences between small and large companies. The lack of professional trained personal in logistics (Evans et al., 1990; Harrington, 1995), the owner-manager as a key figure in small business operations (Winston and Heiko, 1990) and special stakeholder audiences (Lewis and Massey, 2007), which have to cope with many operational issues aside of their core logistics responsibility, make it hard to do profound research. Besides of more practical issues such as difficult data analysis or lacking fieldwork, the before mentioned factors make research in the SME sector a particular challenge according to Curran and Blackburn (2001), and finally prevent a higher academic status of the small business research. As a result of this there is a lack of research focusing on the logistics management in SMEs and due to different demarcation points between SMEs and large companies, existing studies are not comparable.

Table 1 Number of Enterprises in Millions Within the European Union (European Commission, 2009)

	SMEs	Micro	Small	Medium	Large	Total
No. of enterprises (millions)	19,6	18,04	1,35	0,21	0,04	19,65
employees (millions)	85,0	37,5	26,1	21,3	41,7	126,7

The term benchmarking has been used in various ways by researchers over the last decades, given more than 42 definitions found by one source (Heib and Daneva, 1995), describing internal and external benchmarking, benchmarking of best operations or processes just to mention some (Talluri and Sarkis, 2001). One common, but somewhat philosophically definition is from APQP (1993):

"Benchmarking is the practice of being humble enough to admit that someone else is better at something, and being wise enough to learn how to match them and even surpass them at it."

The definition captures the core elements of measurement, comparison, learning and improvement (Andersen et al., 1999) that are also mentioned by various other authors, e.g. Bagchi (1997), Luczak et. al. (2004).

Benchmarking originated in the Japanese industry and was later developed through companies like Xerox, which made it quite popular as a management tool. Surveys indicate that a majority of larger companies use benchmarking as a general management tool, e.g. 65% of the Fortune 1000 companies (Korpela and Tuominen, 1996) or 50% of the Top 1000 companies in France (Maire et al., 2005). Logistics benchmarking in particular has recently been subject to many studies (Anand and Rambabu, 2008; Keebler and Plank, 2009; Luczak et al., 2004; Wong and Wong, 2008), showing that only 30% of all large companies and just about 20% of the SMEs use benchmarking in the logistics area (Donath et al, 2002, p. 21pp.).

SME benchmarking has distinct characteristics and features, which makes it different from other benchmarking procedures (such as a lack of data or even ERP-systems, process orientation, generalists instead of functional specialists), which requires to adopt the methodology to these characteristics.

Scope	Focus	Value chain	
Internal	Strategic	support processes	structure of firm
			human resource management
			R&D
Competitors			Procurement
Similiar industries	Operational	primary processes	inbound logistics
			operations
Any Company			outbound logistics
			marketing and sales
			service

Figure 1 Overview of Benchmarking Types

Using the dimensions "scope" and "value chain" as discussed by Cook (2005) and "focus" regarding to Camp (1995), we created an overview of benchmarking types (light grey in figure 1), which we developed with several SMEs and two local logistics associations in order to identify those types being of the highest value to logistics managers in SMEs. Doing "applied research" and focusing on at least some practical problems is necessary in order to gain access to SMEs, as noted by Curran and Blackburn (2001). Incorporating potential partners during the design phase who acted as multipliers increased the acceptance and validity of our study. This helped us find other participating SMEs, which is generally the most difficult of all tasks (Anderen et al., 1999).

Dealing with SMEs, we decided to accept "any company", because our local logistics associations are "cross-divisional", nevertheless we hoped to find several participants per sector in order to do an intra-sector comparison. Concentrating on operational processes the SMEs are able to collect the necessary data, even if they do not have an integrated ERP-system or mostly unwritten rules that are difficult to identify (Batley, 1993). Besides, this approach delivers best practices in the field work. Doing logistics research in a less sophisticated environment we included all processes dealing with supply, production, storage, demand and disposal.

The aim of this paper is to describe a research project undertaken to analyze the logistics competence of SMEs compared to larger companies and identifying specific weaknesses and best practices. A null hypothesis statement was used as the basis of this study:

There is no difference between SMEs and large companies in their understanding of the term logistics, their average logistics competence and deployment of best practices. The questions relating to this statement were:

RQ 1: What is the current state of logistics competence in small and large companies?
RQ 2: Is there a difference in process-orientated logistics understanding between small and large companies?
RQ 3: Who's responsible (management level) for logistics management in SMEs and large companies?

RQ 4: What are the enablers and barriers (e.g. IT) creating differences between small and large companies?
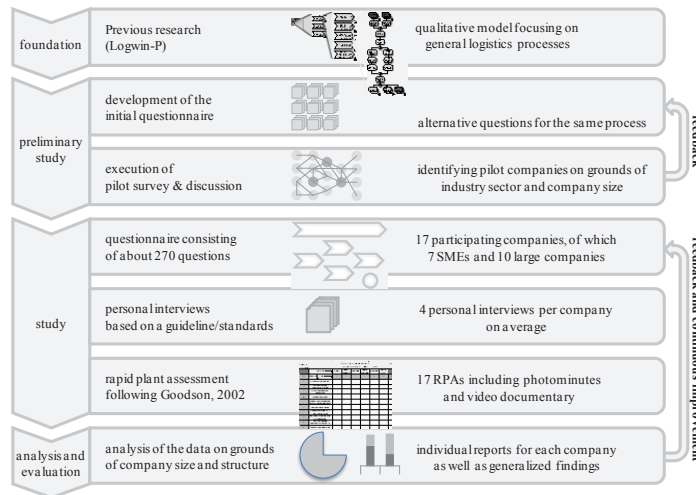
2. Research Methodology

Figure 2 Research Design

Method of Research

The complex research design in this study results from a mixed methods approach, combining both qualitative and quantitative methods of data collection (Bryman, 2006; Mason, 2006). This complexity was necessitated by the lack of information on logistics in SMEs (Luczak et al., 2004), the perception of the researchers that many companies tend to sugarcoat answers in a questionnaire, the need to recheck the logistical key-numbers calculated by the companies and the goal to identify and document best practices on an operational level.

Sample

Using personal-known practitioners and local logistics associations we contacted two-hundred Austrian companies, mostly SMEs and explained our intention and the estimated time needed in order to calculate the key numbers and answer the questionnaire, as well as the financial costs (e.g. travel expenses, audit costs) of the study. 17 companies (7 SMEs and 10 large companies) finally participated in our study. This is a response rate of 8.3%.

Tools and Techniques of Data Collection

Questionnaire

Many logistics managers in the SMEs were not logistics professionals, but workers who were later trained on the job. Therefore the question design is very important as most critical threats regarding the validity arrive from insufficient question clarity and ambiguous meaning to some respondents (Fowler, 1995; Synodinos, 2002). Keeping in mind the background of interviewees a more "hands on" wording was used containing no technical terms, but easy to understand response choices and a clear question sequence.

All contact persons (logistics executive or managing director of their companies) received an information package by email consisting of the questionnaire and some additional information (goals of our study, timeline and contact information, fill-out instructions, template for key data collection) in advance. The complete questionnaire consisted of 270 questions dealing with inbound and production logistics, warehousing, distribution logistics and integrated logistics planning. The number of questions per company varied between 200 – 230 questions out of the total 270 since we eliminated those sector related questions (trading, food and beverage, chemicals and pharmaceuticals, automotive, other manufacturing) which did not apply to the company under regard.

Periodically, we did a follow up in order to ensure that the key data was still recorded. The average company required 3 month of time in order to answer all questions, provide the data and return the questionnaire by mail.

Interview

The filled-in questionnaires were analyzed by the research team in order to identify gaps, discrepancies and irregularities that can arrive when the respondent's understanding of a question doesn't respond with the intended meaning of the researcher (Schwarz et al., 1999). A total of about 60 personal interviews (recommended in lengthier questionnaires (Synodinos, 2002)) were conducted by the research team using a semi-structured interview schedule focusing on the identified issues. Dealing with small companies we used only handwritten notes to record the statements that were transcribed later to a structural form in order to match the structure of the questionnaire. All companies were interviewed by the same research team consisting of two senior researchers.

Audit

"To the trained eye, even a quick plant tour can reveal a lot about a company." (Goodson, 2002).

The audit was performed through a rapid plant assessment (RPA) (Goodson, 2002; Taj, 2005) in logistics based on observational research. RPA is a structural approach in order to analyze a plant within a very short period of time, consisting of 11 categories and 20 questions. Nevertheless, different teams can generally produce varying findings, as the method depends on experience and training. In order to avoid inconsistencies and to guarantee comparability, all of the audits were executed by the same researchers. Many photos and videos of potential best practices and improvement potential were taken.

<u>Procedure of Data Analysis</u>

Initially, the questionnaires submitted by the companies were corrected regarding to the statements in the interviews, by this mainly filling unanswered questions and partly changing answers due to a misunderstanding or failure. Although not intended, some of our contact persons added verbal information to required numerical ratings, which we had to remove from the questionnaire in order to import the data into our database.

Secondly, we compared the audit notes with the questionnaire looking for inconsistencies. In case of identified discrepancies we did a follow up by telephone in order to determine the source of the failure.

In the third step we imported the data into our SPSS database, thereby testing the technical consistency of the data (e.g. only numbers in numerical fields) and processed the data, e.g. structuring regarding to certain criteria.

Aggregating the data regarding to the underlying process reference model logwin-P was part of the fourth step. For each research area (inbound, production, warehouse, outbound, planning) the total score is given as a percentage of positive answers over the total possible (where 100 percent means that all logistics processes have been implemented in the best way). As the questionnaire uses different kinds of questions (yes/no, multiple answers, numeric …) we used a multi-level approach to convert answers into a percentage based logistics competence level. The results of our study are used to compare the logistics competence level of SMEs and large companies on a general level and in detail.

The lack of geographic diversity (only Upper and Lower Austria) due to the fact we had to adopt the language of the questionnaire to the local companies is a possible limitation for our study, but we are confident to be able to reproduce the study in a different environment keeping in mind that wording problems may increase exponentially in multi-country questionnaires (Behling and Law, 2000).

3. Results Analysis

RQ 1: Current state of logistics competence in SMEs and large companies

Based on our study we calculated the average percentage based logistics competence level in SMEs and large companies. Our results show an average level (median) of 51% in SMEs with a coefficient of variation of 19.5% compared to an average level of 71% in large companies with a coefficient of variation of 8.2%. The difference in average of 20 percentage points is highly significant and documents the higher logistics competence in large companies, which can especially be addressed to two logistics areas – production logistics and outbound logistics.

Additionally, large companies show a higher performance in all five areas compared to SMEs, but the difference varies between the different areas. The results of the SMEs (large companies) are 51% (71%) overall, 55% (71%) in integrated logistics planning, 51% (66%) in inbound logistics, 53% (70%) in warehousing, 41% (66%) in production logistics and 59% (83%) in outbound logistics. Many companies, especially SMEs, use common sense in order to create their logistics processes and generate an overall satisfying logistics performance; nevertheless common

sense often creates problems in the downstream processes, which can be demonstrated in production and outbound logistics at the interface between company and customers.

During the process of questionnaire and audit we detected a large discrepancy between actual processes (as personally seen in the audit) and described processes (in the questionnaire) as many logistics managers tended to sugarcoat answers in order to generate a good individual report. This effect was especially strong in large companies leading to a decrease in the measured logistics competence level of 4 percentage points, while only accountable for an increase of 3 percentage points in SMEs. Based on our findings it is most likely that large companies tend to overrate their performance while SMEs tend to underrate theirs. Due to the small number of companies and the fact that 1-2 discrepancies per category are accountable for the decrease/increase, further data is necessary to generate empirically sound findings.

RQ 2: difference in process-orientated logistics understanding between small and large companies

We experienced several differences in the logistics understanding between the participating companies ranging from "logistics is warehouse and transport" to "logistics is everything". The area of activity for the logistics managers spanned widely (e.g. location decision, supplier selection, make-or-buy decision, generation of variants, sales planning, distribution planning, selection of logistics service providers …), which we covered by asking: "What's the responsibility of the logistics manager in the following situations?" A – decision maker, B – part of the decision cycle, C-gather information, D – none

Most SMEs see the logistics manager reliable for the physical storage and distribution, but don't employ their logistics manager for any other purpose, while large companies show mainly an intra-divisional logistics concept that sees logistics as a key-function between the other departments. Consequence of which is a large amount of decisions where the logistics manger is asked to participate in the decision or at least gather the necessary information. In two cases (large stock listed companies) we additionally identified a process orientated logistics understanding using an integrated approach in the supply chain.

On a more detailed level we drilled into transport as all SMEs named this a core competence of the logistics manager and asked "when is the last time you used a freight tender?" Only 28% of the SMEs have ever used a freight tender so far, this means that 72% negotiate prices without evaluating several tenders from logistics service providers. On the other hand 80% of all large companies execute freight tenders regularly (within the last 3 years).

Comparing SMEs and large companies indicates several differences which can be traced back to the fact that SMEs don't have professional trained logisticians and therefore do not see room for improvements or savings potential in the logistics area. As a matter of fact SMEs invest less money and time (average of 0.3 days per employee and year) into advanced training compared to large companies (average of 2.3 days per employee per year).

RQ 3: responsible management level for logistics management in SMEs and large companies

Despite all differences (company size, industrial sector, family owned business versus international company) the hierarchical position of logistics managers in SMEs and large companies is comparable. 29% (40%) of the logistics managers in SMEs (large companies) are members of the management board, 57% (60%) are head of the logistics department and only 14% (0%) of the logistics managers do not have subordinates. The overall hierarchical position of logistics managers has continuously improved for a few years in the questioned companies as logistics became a key

element in many business concepts. We found several examples for an increased organizational power and influence, but none where the role of the logistics professional decreased. Therefore many "professionals" are quite new (working for less than 3 years in this position) in their role as a department leader.

RQ 4: enablers and barriers creating differences between small and large companies

Comparing key numbers like "delivery schedule adherence" or "stock turnover rate" between SMEs and large companies we encountered large differences which we analyzed during the rapid plant assessment in order to identify specific enablers or barriers for superior logistics performance. Many studies (e.g. Bigras et al, 1999; Raymond and Blili, 1992; Van Landeghem and Persoons, 2001) cite an (integrated) IT-system as an important enabler for superior performance, a fact that our study did not confirm. There is no significant difference between companies using an integrated IT-system (62% logistics competence level) and those just using Excel or paper-based documentation (65% logistics competence level). Including additional systems like supplier information systems, B2B-market places and so on also revealed no systematic differences.

All questioned companies use an IT-system that has grown over time and covers a large number of specialties needed in this company; therefore many possible problems leading to a poor performance are effectively suppressed by using tailormade IT support. Large companies often used additional information systems and more integration because they miss the alternative to work "on call" and the flexibility of SMEs to shift priorities on short notice. Although IT did not account for a superior logistics performance of large companies, we are certain that without IT-systems large companies would experience a performance lack, whereas many SMEs can work properly without IT-system.

Changes to Professional Training

Professional education in Austria focuses on theoretical logistics concepts, general logistics management and logistics strategy, a high level education as well as many Austrian university courses. Talking about logistics almost everyone keeps in mind a large multinational company instead of a small SME with 10-50 employees, which is why training offers do not satisfy the demand.

Talking about logistics with SMEs requires a more hands-on approach explaining basics like "how to fill out a delivery order", "how to fasten pallets on trucks properly", "how to control inventory without an ERP-system", "how to prepare a freight tender" or "what to keep in mind when writing the logistics conditions". Training for SMEs with mainly former blue-collar workers must consist of short units (at most 3 hours) in order to be effective and to avoid overburdening the audience. The all-day trainings that are prevalent in Austria are definitely too long for the target group, a criticism that was also expressed when talking about the insufficient use of logistics trainings. Modularizing our training courses into smaller, easy-to-swallow packages will help to provide training for the SMEs.

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