Meeting increased logistical demands
Developing as a small- and medium-sized system supplier

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Abstract

Many subcontractors choose to implement a strategy of “system supply” in order to meet increasing global competition. They are then confronted with increased demands to take a greater overall responsibility in this role. It is important to investigate the implications of these responsibilities before investing in developing the organization, especially for a small- or medium-sized subcontractor with limited resources. The customer’s view of different demands does not necessarily correspond to how the supplier sees and chooses to interpret and meet those demands. A supplier with several customers has to create reasonably uniform routines to meet different demands, in order to cut costs. The customers chosen to serve as well as attitudes and priorities may influence the way different customer demands are met. The purpose of this study is to describe what the widened role of system supply might mean to a small- or medium-sized subcontractor in terms of demands, capabilities and resources.

After going through previous theory about different supplier roles and their characteristics a small exploratory survey comparing demands between a component supplier and a system supplier was carried out. “System supplier” is, in this thesis, defined as a supplier with an overall responsibility for the functionality of a product or a system of assembled components, produced in several process steps, and the resulting liability for purchase of material and services. The focus is on small- or medium-sized suppliers that provide production services and are developing towards system supplying capabilities. The survey, based on existing customer agreements and demands on a relatively small supplier that is developing towards a system supplying role, gives insight to how customers and suppliers look at these demands. The results clearly point out some improvement areas. These are divided into a few “system demands” (such as systematic purchase and logistics work, product development and project management, and increased responsibilities) and more “generic demands” (for example quality and delivery-precision).

A small- or medium-sized subcontractor must acquire some logistics capabilities in order to cope with the system supplying role. In a multiple case study, a comparison of three companies of different sizes with varying degrees of system supplying services is presented. With the resource-based view as a linchpin the interviews point out the importance of the management’s strategic alignment to supply chain management and logistics, with special focus on central sourcing and sourcing from low-cost regions. Other capabilities such as IT and communication systems, cost reduction capability, volume flexibility and breadth of product lines are also identified. The interviews also served the purpose of identifying important resources grouped into three different categories: organizational, competence-base, and tools. The differences between the companies and in what way these different resources influence the formation of different logistics capabilities to support system supply are discussed.

The conclusions drawn from comparing the three companies point out five system capabilities. One is the importance of a clear and distinct organization where the management understands its role and responsibilities, managing its part of a larger system and its inherent processes. Supply chain management is another important system capability, where logistics skills and enhanced understanding and use of IT and other tools are identified as areas to improve for the smaller companies. The importance of managing internal and external relations with extra focus on customer relations is stressed. This also generally requires more overall management of communications, making the best possible use of existing information and communications technology. Finally, a basic and order-qualifying capability of managing the “generic demands” is emphasized.
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1. Introduction

The background and practical implications of this study are described in this chapter, together with the purpose and research questions, and the disposition of the thesis. Some definitions and demarcations are stated. But first, in order to give an idea of the challenges and problems facing a small subcontractor, I will introduce you to some employees of one such supplier and describe some daily tasks, backgrounds, conditions and challenges.

A common day of a small system supplier …

Planning and production

Two skilled and experienced veterans, the sales manager and the prototype manager, go through their notes in the small conference room. In their many years with the company they have seen the business grow and change. Well up to date with what the customers demand and what the company can accomplish, they are now preparing themselves for a telephone conference with the project group of a large and important customer. Effective meetings are essential and web or teleconferences are increasingly used.

The project concerns a new product that will hopefully keep several of the machines running, thus creating effective use of the machines for valuable production time. A few prototypes are to be tested by the customer. The prerequisites and requirements of the production are discussed. The first few numbers of the product often require special attention and manual adjustments. This must be avoided at the next stage, when the machines are programmed for serial production. The drawings are scrutinized to find adjustments that have to be made to accomplish automatized and cost-efficient production. To change a radius somewhat can make the production quicker and safer; knowing which surfaces have high demands on the finish helps so as not to overelaborate. The time schedule is tight, a special material needed will arrive by a special transport during the day and as soon as the products are manufactured they will be forwarded to a subcontractor for required surface treatment.

At the same time the planning officer worries about the production schedules. She has a great deal of experience within the company; she started in the workshop as a machine operator, proceeded to working with order preparation and planning before she went on to the market department as a sales engineer. Although this has given her a valuable overall view of the business, it also means that she now has to cope with her former superiors in a new role. As head planner she is often torn between the necessary task of saying NO to the market manager when there simply is not enough capacity to cope with more jobs, and being understanding of the importance of helping the customer out and getting new projects going. The organization is not quite clear as the company has a successful history of meeting emergencies by taking urgent measures, thus the formal routines may sometimes be overruled. Although acute problems are solved this way, the situation for the planning officer is not made easier! She and her personnel are each in charge of the production planning for a few large customers, and the discussions about priorities are often heated. It has happened that the sales manager or someone else from the market department has ignored all planning and administration and ordered a machine operator to change his or hers production schedule to rush an order through. Naturally this also results in confusion in the workshop – if every customer is a priority, who do you start with? Who is allowed to make the decisions?
The planning officer has to decide which orders to postpone in order to be able to increase the volume in accordance with a new forecast from one of the preferential customers. A prototype causes planning problems in one of the machines and some time is lost due to extra set-ups. The company has a prototype shop, but in many projects prototype articles must be manufactured in the ordinary production machines to ensure quality. The lead-times according to the customer agreements are fixed, and the increased volume is to be met somehow. The capacity is often tight, at least in some production groups, and the bottlenecks are shifting depending on the present order situation.

She discusses the matter with the production manager – is it possible to move some production from the bottleneck machine to an older one? Or do they have to involve a subcontractor for capacity? In that case, which products are safe to farm out, that could still guarantee quality?

**Negotiations with a larger customer**

The company has about ten large customers and strives for updated agreements with each of these. The products with a notable volume are often included in special product agreements, often with fixed and short lead-times. As these lead-times are shorter than the throughput time in production, stock must be built up to meet the customer’s demands. Flexibility towards the customer forecasts is often agreed upon. The possibility for the small supplier to assert itself in the negotiations with a large customer is dependant on sustaining personal relationships.

The sales manager is concerned about the general agreements of one of these large customers. The customer’s standard agreement is in English and the sales manager has had it translated in order not to miss anything important. But even when translated into Swedish the terms are difficult to take in: many of the clauses seem quite impossible to agree to. It would mean too many serious commitments, e.g. heavily increased shares of purchased materials, prolonged payment terms to 90 days, China sourcing with the costs of logistics and risks in exchange exposures, large volume variations with risks of too many goods in stock and obsolescence as a consequence, or risks of being unable to meet customer’s needs and being penalized. The demand for longer terms of credit with such large sales volumes would almost redouble the capital investment needed and, provided the capital can be raised, it would mean raised interest charges and an increased risk. Still more risks lie in the requested flexibility for increasing volumes, with very limited responsibilities for the customer to take any consequences if their forecasts should go wrong.

The recently recruited purchasing and logistics manager has developed a fruitful cooperation with the marketing department and the sales manager. They have simulated some scenarios to be familiar with the terms of the suggested agreements and a lot of time has been spent discussing different solutions and possible consequences within the organization. Together they are well prepared, but their relative strength in these negotiations is not that favourable.

**Adapting to customers…**

The demands are raised: more complex production, faster, more flexibility, cheaper… It is important to the supplier to be able to coordinate the efforts to meet these demands and to establish routines acceptable to all customers – nevertheless, a lot of exceptions burden the administration heavily. Different IT tools and communication systems are often required – from plain excel-sheets to expensive specially designed logistics systems – and the IT manager strives to coordinate the demands and reduce the different user interfaces. The projects span from setting up a VMI-solution for a customer or configuring EDI messages to
adjusting printers for new bar-code labels. The contact with different customer solutions also makes it possible to suggest options to new customers, although it is surprisingly difficult to implement new routines.

As the customers strive to reduce their supplier stock, the subcontractor has “inherited” a rather large amount of new suppliers; and to communicate customer forecasts as well as frequent changes have become an increasingly important task. The proportion of purchased materials and services in the products has risen considerably during the last decade and a constant goal is to shorten lead-times and reduce stock. From a history of seeing purchasing as a relatively simple suborder routine, the importance of purchasing and logistics skills are now in focus for the management and the market department.

The purchases of production materials for the small subcontractor were for many years managed by one purchaser. When the volumes increased some “call off” routines were delegated to the machine operators, but the time and knowledge needed for strategic purchasing was underestimated. The demands were still increasing when the customers wanted to outsource more. The outsourcing of purchasing came in focus. In different assessments from the customers the organization of the subcontractor were questioned; how did the organization support the systematic work concerning quality and sourcing? The experience of supplier development was considered too low. To remedy this a central purchasing and logistics manager for the company group has been recruited.

The focus is very much on price and payment conditions, and efforts are being made to rationalize the administration; e.g. EDI invoicing. The demands for IT support systems are increasing, but still the use of such systems for the suppliers is not as frequent as the use for the customers.

More focus is directed towards the negotiations with customers, where the logistics and purchasing skills of the newly recruited central manager are a great advantage. The whole picture has become clearer – risks and opportunities, costs and gains. This way of working also draws sales and purchasing departments closer together, increasing the possibilities to find new ways to meet customer demands on cost reductions, e.g. better logistics solutions.

**Organizational issues…**
The company is production-oriented, a fact that is emphasized by the double roles of the owner who started the company 30 odd years ago. He holds double positions as CEO and production manager of the company (besides being chairman of the board and CEO of the parent company). Although this ensures short decision-making processes, it can also hamper the same processes. The organization has great confidence in him and as he represents the owner, as well as the CEO and the production manager, there is a risk that all views will not be ventilated.

The overriding goal for the shopfloor workers is productivity, which is broken down to a target value for each production group. Delivery precision is also important, but as this seems to be more difficult for each group to influence, it is often seen as a conflicting goal.

The customer demands are constantly increasing, the quality standards are tougher and the shrinking lead-times add to the pressure on the administration. Increasingly important are the investments in IT knowledge and new communication systems, as well as the efforts to develop solutions that can be used to serve several customers. IT is, however, seen as
specialist knowledge and investments in IT-projects are more difficult to get acceptance for than investments in for example a production machine. IT-projects often also require wide organizational involvement that might present a challenge for the IT-manager to achieve.

To summarize
The above description of everyday life of a small supplier points at increasing customer demands when trying to develop its system supplying abilities:

- To be invited to assist in new product development is seen as an opportunity to deepen customer relations, to prove the cost-cutting ability of the company with regards to production solutions. But this is a demanding process, requiring specific resources and routines within the organization. It also requires a well developed network of suppliers, providing solutions to the customers regarding choices of materials or the offer of processes outside the core business of the company.

- An increasing amount of purchased materials and a declining share of value-adding production time lead to serious commitments, increasing risk levels and more demanding planning processes. Delivering against the customers’ forecasts instead of towards orders augments these difficulties and new logistics skills are now required in different processes. Communication within, as well as between companies, must be more developed, to ensure well functioning suppliers.

- The company inherits suppliers from the customers, including the administration and the development of the supplier base to get effective sourcing. For a small company this means increasing liabilities and requires a range of new skills.

- The widespread internal recruitments result in a very loyal staff and a delicate web of informal networks, but the downside could be that the staff has less formal knowledge, thus run the risk of becoming “self-absorbed”. The formation of strategic goals and the work to rationalize different routines may also be hampered. A small manufacturing company taking on a larger responsibility for sourcing might need a change of view towards the tasks of purchasing and supplier development. Continuous competence development is recognized as very important.

From a practical perspective these examples of problems and possibilities facing this small supplier in its development indicate that this might be an important field to study. This study aims to find out what some of these widened responsibilities as a system supplier implies for a small- or medium-sized subcontractor and how different demands can be met.

1.1 Background and practical implications

Many companies are now rapidly sourcing more and more “simple” volume production from so called “low-cost countries”. The pressure for price reductions on these types of products is considerable. The changes brought about by large enterprises through structural changes and outsourcing also changes the prerequisites for some of the small subcontractors in the Swedish manufacturing industry. They have to either specialize further, meeting the price-pressure by automatizing volume production, or offer “more value for money” and increase the span of their services to include for example the ability to assist by product development or logistics solutions.
The role of small- and medium-sized, locally rooted subcontractors is increasingly important in some regions especially when large multinational companies aim to cut costs. With a stroke of the pen they may decide to outsource or move their manufacturing to low-cost countries. Many small subcontractors aim towards small- or medium-sized volumes, avoiding consumer products much exposed to competition. They also try to balance their customers and different lines of businesses, thereby spreading the risks. This strategy is well in line with the way companies choose to develop in the role as system supplier.

As the resources of a small- or medium-sized subcontractor are limited it is necessary to select a suitable strategy and a plan of action. The production skills are the base value in the offer for the customers, and the market strategy must be aligned with this. But what else is required when entering into a wider supplier role? The organization of a system supplier should, according to customers, be more “complete” with skills and experience within several areas, besides the earlier focused quality- and production organization. Aspects to consider are for example cost, lead-times and flexibility, the supply chain and the increasing overall responsibilities. One very pronounced area is sourcing: purchasing has historically been treated as a simple “call-off function”. As the share of purchased materials increase considerably when the customers require more comprehensive responsibility from the supplier, the importance of giving this function increased attention is noted. The management of the company needs to consider and decide on a number of issues:

- Different customers have different expectations of their suppliers. Which customer segments or customers provide the best match between demands and company capabilities? How may stable and long-term relations be maintained?

- Despite increasingly complex production the demands regarding more competitive prices, quality and logistics are constantly growing. What cost reduction and productivity improvement measures may be taken? How to avoid the increasing uncertainty, following shorter advanced planning and production to forecast, resulting in an increasing amount of capital tied up? Flexibility is a keyword where the recipes prescribe resources in both production equipment and organization. What resources, and how to acquire them, is one main managerial task.

- Developments in relevant areas are expected with regard to customers’ product development projects, as well as IT support systems for communication and information within and between the companies in the supply chain. More cooperation is required, effectively carrying out dialogue and development work with customers as well as suppliers.

- The larger overall responsibility means a considerable obligation to manage and coordinate an increasing number of suppliers as the large customers outsource this function. How should a small- or medium-sized supplier handle not only the basics such as price, quality, and delivery reliability, but also environmental programmes and Code of Conduct? How to streamline the buying processes and make the logistic solutions more effective?

The above questions illustrate a number of important areas for further development of small- and medium-sized subcontractors. Different logistics capabilities seem to be increasingly important to develop and maintain when taking on more overall supplier responsibilities. The possibilities to meet increasing demands, avoid mere price competition and maintain
profitability in a widened supplier role are depending upon how well the companies manage their resources and shape capabilities to handle these areas.

1.2 Purpose and some definitions

Much is written about the relationships between customers and suppliers from different perspectives. The customer’s point of view is, however, over-represented in the literature, while studies from a supplier perspective are rather few (see e.g. Rota et al., 2002; Chung and Kim, 2003; Blomgren, 1997). Furthermore, when the suppliers are in focus, this has often been in studies of large supplier networks as for example within the automotive industry. Different types of suppliers and the demands on these types have been described in the literature from several perspectives, as e.g. competencies, competence development, power and control, trust and reciprocity, collaboration and partnerships etc. The conditions of small suppliers with limited resources are essentially different and it seems important to analyse their situation and development further.

For a small company system supply means a move from regular supplier to a wider role of more demanding tasks and more responsibility. It is defined here as an overall responsibility for the functionality of a product or a system of assembled components, produced in several process steps, and the resulting liability for purchasing material and services. Increasing complexity of logistics systems and demand for customer responsiveness may lead to a need to develop systems and procedures to handle diversity on a routine basis. This also stresses the importance of capabilities, combining and integrating resources.

The purpose of this study is to describe what the widened role of system supply might mean to a small- or medium-sized subcontractor in terms of demands, capabilities and resources. Thus the following research questions are to be answered:

1. What are the demands on the logistics system of a system supplier compared to a component supplier?
2. What logistics related capabilities are considered especially important by a supplier developing system supplying ability?
3. What does this imply for the supplier’s resources – organization, competence-base and tools?

Demands

For many subcontractors, system supply is considered a way to meet the global outsourcing and ever stronger demands for price and lead-time reductions. The fact that a larger overall responsibility follows this role is evident, but what does it really mean? This is a relevant question for a small- or medium-sized subcontractor before investing in developing the organization – may it be production technology and equipment, competence, information technology, or management systems.

What is meant by “demands” here is increasing, new customer demands on the supplier performance in different areas, i.e. the above mentioned price and lead-time reductions as well as for example demands on environmental actions.
Capabilities
System supply implies a greater overall responsibility in the supply chain and more focus on logistics issues. A small- or medium-sized subcontractor must form some logistics capabilities in order to cope with the system supplying role.

Capability is according to Ray and Ramakrishnan (2006, p. 1) “a complex combination of appropriate set of competences towards achieving specific organizational objective(s)”. Grant (1991) sees capabilities as organizational routines, while Abrahamsson et al. (2003) describe them as repeatable patterns of activities to coordinate and use the resources to create, produce and offer products to a market. In this thesis a capability is defined as a combination of resources that can be relied upon on a long-term basis to meet customer demands and achieve company objectives. One important capability in this context is logistics and supply chain management (SCM).

Resources
The resources of a small- or medium-sized company are limited, and it is essential for the management to identify and prioritize which resources to develop or acquire in order to best meet customer demands and achieve the company goals.

Resources are seen as “the tangible and intangible assets of a firm which can be drawn upon by the firm when required to achieve its objective(s)” (Ray and Ramakrishnan, 2006, p. 1) and are identified as the source of a firm’s capabilities (Grant 1991). In this thesis I have chosen to classify the resources into three different categories: organizational, competence-based and, in a wide sense, different kinds of tools for efficiency and improvements.

The term “competence” is handled in many different ways in the literature; a higher abstract level than intended for this study. In this thesis competencies are seen as a base of central resources. What is meant by the resource category “competence-base” is: the skills and knowledge of different persons in the organization that are used to form more sustainable capabilities.

Logistics management and Supply chain management (SCM)
The Council of Supply Chain Management Professionals (CSCMP) elucidates the terminology:

“Logistics management is that part of supply chain management that plans, implements, and controls the efficient, effective forward and reverse flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customers’ requirements.”
(http://cscmp.org/AboutCSCMP/Definitions/Definitions.asp)

“Supply chain management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third party service providers, and customers. In essence, supply chain management integrates supply and demand management within and across companies.”
(http://cscmp.org/AboutCSCMP/Definitions/Definitions.asp)
Small- and medium-sized enterprise (SME)
SMEs are defined differently in different contexts, but it is often related to structural characteristics such as number of employees, and/or performance characteristics such as annual revenues. The Commission of the European Communities (2003) uses staff head-count and financial ceilings to determine enterprise categories, defining small- and medium-sized enterprises as “made up of enterprises which employ fewer than 250 persons and which have an annual turnover not exceeding EUR 50 million, and/or an annual balance sheet total not exceeding EUR 43 million.” Within this a subcategory of small enterprises are defined: with fewer than 50 persons employed, and with an annual turnover and/or annual balance sheet total not exceeding EUR 10 million.

SME is often used as a relative term, referring to firms with fewer resources (e.g. employees, revenue, or assets) than others in its industry (Alvarez and Barney, 2002; Street and Cameron, 2007). Smaller companies are often managed by the owners whose intentions thus constitute important criteria for the development of the company. The definition used by Street and Cameron (2007, p. 240) for small business: “an independently owned and operated enterprise that is not dominant in its field or industry and which has relatively fewer resources than other companies in its market” is also relevant for this thesis.

1.3 Demarcations
The research is from the supplier view, although customer demands have a very large influence on the supplier’s strategic activities. The focus is on three companies, and company groups, as 1st tier suppliers, subcontractors, to mainly large international companies. The organizational units referred to are mostly limited to administrative functions (management, sales, purchasing and planning functions, IT). The issues are mainly limited to logistics or logistics related demands, capabilities and resources.

1.4 Disposition
The differences in demands (research question 1) were investigated in a small exploratory survey, based on existing customer agreements and demands on a relatively small supplier developing towards system delivery capabilities. The respondents were representatives of important customers and managerial staff of two supplier companies.

By means of semi-structured interviews in a multiple case study, research questions 2 and 3 were tackled. One of the companies in the study, Mekanotjänst, was selected because it represents the basis of my research as it is the company where I am employed and work as business developer. The choice of the other two companies in the study, Rimaster and NOTE, was made from two perspectives: they are subcontractors (with no products of their own) and they are larger than Mekanotjänst with an aim and direction towards a widened supplier role.

The three different companies in this study are briefly described in Papers 2 and 3 and their views on their capabilities and resources are compared. Further analyses of differences and similarities, together with references to the theoretical framework are done in Chapter 5. The companies are more comprehensively described in Appendix III – V.
The thesis is a comprehensive summary with the following disposition:

Chapter 1 Introduction and purpose
Chapter 2 Method: Three research questions – three papers
Chapter 3 Theory: frame of reference, more expanded in the respective papers
Chapter 4 Paper 1 / Demands on different supplier types, and related theory
   “Towards System Capability: Identifying logistics and manufacturing demands for small suppliers”.
   European Operations Management Association (EurOMA2007), Ankara (Turkey),
   June 17-20, 2007
   Paper 2 / Capabilities with a logistics bearing, and related theory
   “Logistics capabilities important to small system suppliers”. Submitted to Journal of Small
   Business Management in 2009.
   Paper 3 / Resources with a logistics bearing, and related theory
   “Resources to Form Logistics Capabilities – from the Perspective of a Small- or Medium-
Chapter 5 Short summation of case companies, comprehensive analysis/discussion
Chapter 6 Conclusions, contributions and practical implications
Chapter 7 Suggestions for further research
2. Method

The research design, the reasons for choosing the actual cases and the realization of the study are described, followed by a discussion about the quality of the studies performed.

2.1 Research design and realization of the study

Generally a case study is the preferred method to use when posing research questions involving “how” or “why”, when the control over the studied situation is limited and when focus is on actual development in a social context (Yin, 2007). To choose a case study as a research method was also natural as one unit to analyse was predetermined from my role as an industrial doctoral candidate: the company Mekanotjänst. I have been an employee and a member of the executive group in that company for more than 10 years and my duties include (among other things), business development matters. My role in the company enables me access to relevant data of all kinds, which is a strong point in a case study. My experience from working at Mekanotjänst at management level, taking part in relevant discussions, has given me good insight and understanding of the conditions of a small- or medium-sized manufacturing company. I have my educational background in humanities and economics and I find interpreting different viewpoints and trying to understand the interplay between people and development interesting.

A multiple case study was chosen in order to allow a comparison with other companies. This would also improve the possibilities for generalization. The other units of analysis were selected from their similar line of business (subcontractors without products of their own) and from their different sizes, indicating different development stages towards the more comprehensive role of a system supplier.

The research design was determined by the art of the research questions: to compare differences in demand were considered an explorative issue, and an exploratory survey was chosen as a research method for this question. The questions concerning capabilities and resources require an explanatory and interpretive approach where interviews, individually and in groups, were considered more appropriate.

The research work has been performed in steps:

1. The first step was a literature review, to get a grip on how the supplier role has been described in earlier research – classifications, perspectives, description of specific customer demands from a supplier’s point of view etc. One specific goal was to find a relevant description of the concept “system supplier”.

2. As a second step a small preliminary single case study, an exploratory survey (Appendix I), was used to identify differences in demands placed upon a system supplier compared to those of a component supplier. The focal company here is Mekanotjänst, a relatively small Swedish subcontractor in the process of evolving from a component manufacturer to a system supplier. The survey mainly covers items listed in general purchase agreements and to some extent supplemented with items from supplier evaluations. The relevance of
the items in the survey was also checked with the CEO of Mekanotjänst. The survey was submitted to different employees at eight large customer companies and at two small manufacturing companies (of which one is the focal company) with ambitions to develop as system suppliers. The surveys were mailed out to 35 individual customer respondents, recommended contacts by the marketing manager of Mekanotjänst. Responses were received from seven of the customer companies, though only one from each company (several respondents referred to company policies and explained that only one person was to respond to such inquiries). The responses from the two suppliers comprised the opinions from a total of seven people in leading positions in these companies. This means that in total 14 responses were received – half of them from a customer point of view and the others from a supplier point of view. The theoretical framework, the method and the results of this exploratory survey are presented in Paper 1, chapter 4.1.

3. The analysis of the results from the exploratory survey indicated that three, possibly four, areas were of special interest in order to achieve system supplying capability. The items of the survey that concerned logistics were picked out for a group discussion in a management forum in Mekanotjänst, mainly summarized in the form of a SWOT (strength, weakness, opportunity, threat) analysis. The results were documented (in Word and Excel files) as they were presented and openly viewed by all the participants in order to certify that nothing important would be misinterpreted or omitted. This was done partly to note the results in an effective way, partly to enhance the validity. The results from the exploratory survey, and some input from the group discussions in Mekanotjänst, were used to form guidelines for the interviews.

4. Besides Mekanotjänst two other suppliers, Rimaster and NOTE, were selected for the multiple case study:
   - for their line of business (subcontractors with no articles of their own, supplying different manufacturing services to industrial customers) and also
   - for their roles in different degrees of system supply. Although the companies may not identify themselves as “system suppliers” they all strive to offer their customers more comprehensive solutions. The companies are of different size, but they all consist of company groups, more or less coordinated. The degree of global business varies. The two smaller companies are privately owned, with the founder still working in the business, while the larger of the companies is a public limited company.

Semi-structured interviews, each lasting about 1.5 hours, have been carried out with employees on a managerial level. In Rimaster these were all conducted during a one day company visit and comprised the best part of the management group. In NOTE only one person (though one well up in the company as COO, part-owner and co-founder) was interviewed. The notes were typed out the day after the interviews. The data collected through interviews and from other sources (web pages, annual reports, internal documents etc) have then been checked with company representatives. In Mekanotjänst two of the managers were interviewed according to the interview guide, while other information has been collected and documented in management group discussions.
5. The data from step four have been compared to the conclusions from the survey. The results reflect the view of the managers interviewed: what capabilities are considered important to develop in a wider supplier role, and what resources do they think will be required. This is not an investigation intended to show to what degree the companies fulfil these views and requests, although some comparisons have been made to identify diversities and conformities between the companies.

Logistics capabilities – and relations/resources that help form these - of the studied companies have been pointed out, and differences and similarities among the three companies have been described in Papers 2 and 3, chapters 4.2 and 4.3 below.

6. Finally there is an analysis and discussion of the results with reference to the theoretical framework, as well as a summary pointing out the conclusions.
Figure 2-1. The licentiate thesis
2.2 Validity and reliability

Internal validity refer to if the results of a study are concordant with the reality; if they really catch what is out there and if the researcher is really studying what he or she thinks is the issue. Merriam (1994) sees the reality as holistic, multidimensional and constantly changing. He means that validity must be judged through interpretations of the researcher’s experience and that qualitative research is more concerned with perspective than “absolute truth”. Although I agree that my previous experiences and understandings are important to evaluate the internal validity of my research my ambition is to try to describe the reality as objectively as possible. While Merriam (1994) finds it important to show the complexity of human behaviour in a contextual frame of reference and to present a holistic interpretation of what is happening, Yin (2007) is more concerned with measuring how well the conclusions of the researcher reflects the reality. He is of the opinion that the internal validity is only relevant for causal or explanatory investigations, where a causal relation is claimed to exist between x and y, and a third factor – z – could have caused x or y. This logic cannot be used for a descriptive or explorative study such as this as no causal relations are assumed. However, as both these researchers advocate, I have tried to take an overall cautious attitude, continually questioning and re-evaluating the findings. As my research is largely built on interviews it relies on the ability of the respondents to see, describe and explain their reality. The internal validity is improved by letting several respondents in each case study give their view of the same matters, as in Mekanotjänst and Rimaster. In NOTE only one respondent was available for an interview, but as this is a public company other available information has been used for validation.

Construct validity refers to: if the study has been organized or drawn up and carried out in a correct way, and that it measures what is intended to be measured (Brewer and Hunter, 2006). The study involved two dimensions: an explorative survey to find out if and how demands might differ between two types of suppliers. As the terms component- and system supplier are not always evident, these were defined in the questionnaire to reduce the risk of misunderstandings. As the questions were collected from existing customer agreements or supplier evaluations the questions are, in my opinion, theoretically and practically relevant. The result of the survey was then discussed at a management meeting of Mekanotjänst. It was also presented at a meeting with some of the company’s customers and at an international conference involving a peer review, before the interview guide was drawn up for the interviews.

My many years’ of experience from working at Mekanotjänst at management level, the fact that I often take part in relevant discussions and that I know many of the respondents well in their professional capacity, have given me good insight into the questions I investigated from the company’s point of view. This also helped facilitate interpretations and follow-up discussions and interviews if something needed clarifying. The information collected through the interviews and from other sources (web pages, annual reports, internal documents etc) has been checked with the companies’ representatives in order to enhance the validity of the study.

External validity concerns generalization: how transferable the results are to other companies or situations than the ones actually studied. The choice of a multiple case study enhances the possibility of generalization, compared to a single case study. The selection of cases was made from a number of criteria in order to study the same phenomenon. The similar role as subcontractor offering production services was chosen to study similarities between the cases,
while different sizes of the companies were chosen to try to identify differences. This is in accordance with replication logic – selecting a case to either predict similar results (direct or literal replication) or to predict different results but from foreseeable reasons (theoretical replication). External validity may thus be enhanced if the findings of the study are concordant with existing theory. As this is a very limited study it is not possible to make any comprehensive deductions from the results. In order to get a more generally applicable result these studies must be done in a much larger scale, as the preconditions are very varying for small- and medium-sized suppliers. The line of business could possibly also involve different scenarios.

Reliability refers to the possibility to repeat the investigation and come to the same conclusions. As a guideline for the research, Yin (2007) recommends to carry out a case study in a controlled and well documented way, using case study protocol and a well organized database so that an examiner of the research can, by follow the same lines of action, come to the same conclusions. The documents forming the basis for the survey in my study, as well as the survey data, the follow-up group discussions and interviews, and some vital lines of thought to follow the analysis, have been well documented step by step. The survey and the interview guides are enclosed at the end of this thesis (Appendixes 1-2). Reliability is also further improved as the companies have accepted the publishing of their names. However, the research covers a developing area and the people involved are facing ever changing demands; prerequisites that make it difficult to repeat this research exactly with similar conclusions.
3. Theoretical frame of reference

Setting out from the resource-based view this theoretical frame of reference deals with resources, capabilities and competitive advantages. Some different supplier typologies are outlined and a system supplier role is defined in relation to other supplier roles. The demands on such a supplier are further discussed, as well as strategies to increase coordination in the supply chain to meet some of these demands. At the end of the chapter a model is used to describe how demands, resources and capabilities, based on company strategies, interact and are connected.

3.1 The resource-based view

The resource-based perspective as a strategy perceives the corporation as “a portfolio of resources rather than products” (Möller et al., 2003, p. 370). It is the special blend of resources that constitutes a company’s competitive advantage. Möller et al. (2003) describes the background of the resource-based view and mention that the terminology used to designate these resources ranges from core competence (Prahalad and Hamel, 1990), resources (Nelson and Winter, 1982), dynamic capabilities (Teece et al., 1997), and distinctive competencies (Snow and Hrebiniak, 1980), to merely capabilities (Stalk et al., 1992).

Two effects of the resource-based view are specifically pointed out:

“First of all, it shifts the focus away from goods and services and towards a knowledge-based perspective which takes insight learning and its effects on the relationship between buyer and supplier into account. Second, it advances the time frame from short-term transactions (profit maximising) to long-term relationships (competence maximising).” Möller et al. (2003, p. 371)

The authors claim that the products constitute the basis of short-term competition, and that expertise and resources provide the prerequisites in the long run.

Birger Wernerfelt (1984) takes a resource-based view of the firm, seeing resources and products as two sides of the same coin. By specifying a resource profile for a firm he claims that it is possible to find the optimal product-market activities. He defines a firm’s resources at a given time as “those (tangible and intangible) assets which are tied semipermanently to the firm” (ibid., p. 172). Strengths and weaknesses of the firm constitute its resource position. In comparison to entry barriers, he introduces the concept resource position barriers; this means that if someone already has a specific resource it could be more costly or less profitable for those who later acquire that resource. It is possible to identify classes of resources for which resource position barriers can be built up, for example customer loyalty. The author also points out the possibility to use special resources as stepping stones for further expansion, using related skills to enter into a new or kindred industry. Wernerfelt (1984) calls to attention the fact that growth strategy involves balancing the exploitation of existing resources and the development of new ones; thoughts that Prahalad and Hamel (1990) elaborate on in their concept of core competencies.
To make efficient use of available resources are important in all enterprises. In a small company with limited resources, the choice of skills and know-how to nurture or acquire is extra important in order to be competitive. To specify the resource profile and build resource position barriers (Wernerfelt, 1984) ought to be especially interesting for a small subcontractor whose business is often dependent on rather few customers. The resource-based view might be useful to identify the strategically important strengths and weaknesses of the company in relation to what the customers require in the long run. Developing its resources concurrently with the demands of its customers would then seem to be the essential issue. For a small subcontractor with relatively few customers from different branches of industry, it could be interesting to identify and extend the use of related skills, consolidating the use of a special resource throughout the organization for one customer, thus getting references for further use.

3.1.1 Resources and capabilities

For a small- or medium-sized enterprise with limited resources it is necessary to identify the different kinds of resources in order to make the best use of them. While physical assets are easily recognizable it seems that the definition and recognition of other resources may be a bit blurred.

Ray and Ramakrishnan (2006) react to the lack of clarity in the definitions and attempt to elucidate the terms by the following definitions:

- **Resources** are “*the tangible and intangible assets of a firm which can be drawn upon by the firm when required to achieve its objective(s)*”

- **Competence** is “*a combination of firm-specific resources, each of the resources being under the state of sufficiency, towards achieving specific organizational objective(s)*”

- **Capability** is “*a complex combination of appropriate set of competences towards achieving specific organizational objective(s)*”. (Ibid., p. 1)

The term “competence” is in this sense highly abstract and compared with the term “capability” the difference is vague. In this thesis competencies are seen as a base of central resources, while capabilities are the “trimming” of what a firm can do “*as a result of teams of resources working together*”, much in accordance with the view of Grant (1991, p. 120). In order to build a capability, competence is one part of the necessary resources. Capabilities concern both deployment of and development of competencies and other resources of the firm.

Day (1994, p. 38) defines capabilities as “*complex bundles of skills and accumulated knowledge, exercised through organizational processes, that enable firms to coordinate activities and make use of their assets*” and groups the knowledge into four dimensions:

1. employee knowledge and skills (from technical knowledge, training, and long experience with the process)

2. embedded in technical systems (e.g. formal procedures and routines, information in linked databases, and the computer systems themselves)
3. management systems (“the formal and informal ways of creating and controlling knowledge”)

4. values and norms (dictate collection, importance, access, and use of information)

Capabilities are related to performance and profitability. Day (1994) points to a situation where a competitor offers higher quality, more responsive service, or more innovative products, forcing a parity business to lower its prices to offset the lack of benefits. This is the strategy of development for a small subcontractor aiming at system supply, and it is a demanding one. Narasimhan et al (2001) compared assessed supplier capabilities with assessed supplier performance in a classification matrix of four categories: high/low performance and efficiency/inefficiency. Six categories of supplier capabilities were used as input (quality management practices and systems, documentation and self-audit, process/manufacturing capability, management of the firm, design and development capabilities, and cost reduction capability) and five performance categories (quality, price, delivery, cost reduction performance and other) as output. They argue that efficiency and a sustainable and high level of capabilities are likely to accompany each other.

Sarkar and Mohapatra (2006) point out that while most performance factors are quantitative and easily measurable, the capability factors are often qualitative and present measurement problems. They mention e.g. reputation for integrity/believability and honesty, existence of IT standards/communication system, communication openness, breadth of product line/ability of a supplier to supply a number of items, and production facilities and capacity. As development often includes measurement and as small- and medium-sized companies in general have few resources to identify and measure such capabilities it is likely that the focus on developmental activities is directed towards the more quantitative performance factors. If not identified and nurtured, important qualitative capabilities may fade away instead of being used to deepen the customer relationships.

3.1.2 The VRIO framework and competitive advantage

Day (1994) emphasizes the capabilities approach to strategic management and especially points out two capabilities as distinctive features of an organization aiming for close customer relations: mastering the market sensing and customer linking. He acknowledges that the industry structure and the needs of the target customer segments must be understood. This understanding, the environmental trends and the positional advantages sought by the firm, must guide strategic choices about which capabilities to nurture or invest in for development in order to meet or out-perform the competition. Distinctive capabilities support a valuable market position and are difficult to match; Day (1994) describes the attributes:

- they contribute disproportionately to the provision of superior customer value or provide this value in a considerably more cost-effective way;
- they are difficult to develop and resist imitation by competitors;
- they are robust and can be used to adapt to environmental change.

Barney (1996) states that the resource-based view of the firm were used to understand the empirical implications of how a firm’s resources and capabilities can affect its performance. He introduced the VRIO framework, identifying competencies or success factors that are
Valuable, Rare, Inimitable (or very costly to imitate), or for which the firm is Organized to leverage (Barney, 1986), this latter factor later replaced (Barney, 1991) by Substitutability (no existing strategically equivalent valuable resources that are themselves neither rare nor imitable). When a firm has implemented a value creating strategy prior to its competitors, a competitive advantage exists which is seen as sustainable when the competitors cannot copy the benefits of it (Barney, 1991). The development of a small- or medium-sized enterprise is influenced by many occasional events and incidents resulting in a number of valuable resources that are often tightly connected to the people employed and their unique knowledge. From this perspective the importance of knowledge-based assets is relevant, being hard to imitate because of firm-specificity, social complexity, and causal ambiguity (Coff, 1999).

Grant (1991) points out the distinction between resources and capabilities, and discusses how these relate to competitive advantage. A firm’s resources are identified as the source of its capabilities, which in turn ends up as the main source of the firm’s competitive advantage. Grant (1991) sees capabilities as “organizational routines” and the organization itself as a huge network of routines. A key ingredient, he points out, is the ability of an organization to achieve cooperation and coordination within teams, depending on its style, values, traditions and leadership. A small company may have an advantage here compared to large companies, in the sheer size of the company. Fewer employees mean, by necessity, that more of the personnel are involved in each routine. Routines, however, mean a trade-off between efficiency and flexibility – a limited repertoire of routines may be performed highly efficiently with near-perfect coordination, as long as the situations do not vary too much. Routines are developed and sustained through practice and experience and fast learning of new routines may be essential in industries with rapid technological changes. Small companies are often proud of its reactive ability; if something unexpected happens, e.g. in the order flow, they are able to find ways to manage this. But their proactive ability, adopting new routines, may be hampered by lack of knowledge or insight. Another very important factor regarding capabilities is their complexity and the interaction between routines which require the cooperation of many different resources. Grant (1991) concludes that understanding the relationships between resources, capabilities, competitive advantage, and profitability is a prerequisite to understanding the mechanisms through which competitive advantage can be sustained and exploited over time. Continuous learning is seen as important, it is even suggested to be the only way to achieve sustainable competitive advantage (Day, 1994; Olavarrieta and Ellinger, 1997). Newbert (2007) mentions the importance of looking at a firm’s organizational approach towards its resources and capabilities, suggesting that a management strategy or orientation may be ineffective at exploiting resource-specific capabilities, compared to more standardized resources. Möller et al (2003, p. 369) sum it up well:

“The resource-based perspective concludes that it is the special blend in a corporation’s pool of resources which constitutes its competitive advantage.”

Despite the growing consensus of logistics distinctive capability as a source of sustainable competitive advantage the strategic role of logistics is undeveloped in most firms (Olavarrieta and Ellinger, 1997). The logistics function is still often seen as a firm specific cost centre with distinct activities. In order to create distinctive capabilities an intricate web of physical assets, organizational routines, skills and knowledge of the employees must be created, requiring strategic foresight to choose the right patterns and times to develop and integrate. Although it is frequently claimed that a small company is easier to redirect, due to more rapid decision-making processes compared to a large company, it is also commonly known that the time (and
sometimes the skills and experience) for strategic management is scarce. The logistics issues have a higher focus; logistics possibilities might be recognized but are difficult to develop. Collaboration and external relationships with other parties of the supply chain are also frequently required.

### 3.1.3 Dynamic capabilities

It is obviously important to improve and increase the use of certain capabilities and adapt to changing demands in order to develop and be more competitive as a system supplier. Teece et al. (1997) elaborate on the dynamic capabilities framework, where they see the competitive advantage of firms as

> “resting on distinctive processes (ways of coordinating and combining), shaped by the firm’s (specific) asset positions (such as the firm’s portfolio of difficult-to-trade knowledge assets and complementary assets), and the evolution path(s) it has adopted or inherited” (ibid., p. 509).

The term 'dynamic' refers to the capacity of renewal to align with changing demands, while the term 'capabilities' emphasizes the ability of the strategic management to adapt, integrate and reconfigure the available organizational skills and resources accordingly.

Logistics learning capability, leveraging logistics, is according to Esper et al. (2007) one way of achieving customer satisfaction and a competitive advantage. To sustain this logistics competitive advantage firms must continuously develop and adapt to changing customer needs. Esper et al. (2007, p. 60) emphasize the “capability of effectively learning new strategic approaches to logistics operations” and point to logistics as a key area of learning to be exploited by firms, due to its externally oriented nature and its span over functional and firm boundaries. Logistics learning capability is defined as

> “the ability of a logistics organization to 1) effectively maintain and manage learning organization characteristics and 2) convert learning outcomes to new logistics management strategies, tactics and operations in support of further developing other logistics capabilities.” (ibid., p. 63).

Four components are noted as essential in order to achieve logistics learning capability: culture (open-mindedness, shared vision, commitment to learning), structure (supporting a learning culture through internal systems, processes and incentives), relations (relationships with supply chain exchange partners seen as a source of learning) and the temporal component (rapid learning, and institutionalizing it in the organization). This implies that the logistics leadership is very important, emphasizing a participative environment to maintain the orientation of learning of the organization (Grant, 1996). The creating of competitive advantages is to a great extent dependent on the acquisition of skills and know-how (Möller et al., 2003). This is also emphasized by Olavarrieta and Ellinger (1997), arguing that the capabilities of a firm is storage of its knowledge, and that logistics managers must understand and facilitate learning processes. Although there are limitations as to what is possible for a smaller supplier, there should also be considerable possibilities to take on a more adaptive view towards logistics learning and invest in developing the organization as well as the relationships with customers and suppliers accordingly.

### 3.1.4 The time perspective

The sustainability of capabilities over time are obviously considered central for the competitive advantage of a firm. Duration of relationships is another important issue. Sobrero
and Roberts (2002) distinguish between short-term expectations of the supplier – concerning time, costs and quality level – and more long-range expectations of learning in the relationship. They claim that expectations of a commodity supplier are mainly about lower prices and differ from the expectations of a strategic supplier. From the customer point of view the consistency in the supplier performance is essential and Sarkar and Mohapatra (2006) advocate a capability-performance matrix to establish this. They see performance as “the demonstrated ability of a supplier to meet a buyer’s short-term requirements in terms of cost, quality, service and other short-term criteria” (ibid., p. 152).

Capability is defined as “the supplier’s potential that can be leveraged to the buyer’s advantages in the long term” (ibid., p. 152).

Long-term relationships require suppliers that are both highly capable and high performers. In a study Kalwani and Narayandas (1995) found that long-term relationships with selected customers made it possible for the suppliers to reduce costs and reach higher profitability. Furthermore, they claimed it is necessary for suppliers to focus on existing customers in long-term relationships, as manufacturers reduce their supplier base and focus on selected suppliers. The conditions of the relationships will, however, change over time as a result of, for example, technological development, strategic events, or reorganizations in either of the companies.

This is of course a challenge to many small- or medium-sized subcontractors. The time perspective would be especially interesting to look into from the view of small subcontractors with limited resources who often concentrate on serving rather few customers. This focus on a limited number of customers would require a considerable investment of time and resources in order to understand and relate to each customer, its organization and business strategies, as well as its demands regarding performance, technology and ways of communication. To elaborate and develop supportive capabilities and standardize more processes in order to shorten the “entrance” to collaboration, would improve the earnings of this investment.

3.2 Defining system supplier

There are many different forms of collaboration between supplier and customer, resulting in a wide variety of supplier types. Original Equipment Manufacturers (OEMs) often use suppliers that can manage comprehensive responsibilities, offering more complex parts or modules. Collaboration with suppliers have been influenced and inspired by the Japanese manner, where research among others concern the automotive industry and the lean concept (Lamming, 1993; Kamath & Liker, 1994; Ellegaard et al, 2003). Supplier involvement within product development has been identified as one important issue, often considered from the buyer’s perspective, with the supplier managed by the customer (Wynstra & ten Pierick, 2000; Wagner & Boutellier, 2002; Ellegaard et al., 2003). Different supplier management portfolios are described – from Kraljic (1983) setting out from the kind of product delivered, to Wynstra and ten Pierick (2000) who mean that supplier involvement is situation specific.

From the customer point of view one set of resources of a corporation is the supplier base and the kind of relations established. To define what is required by a system supplier turns out to be complex and varying. A review of a few different supplier typologies (e.g. Kaufman et al., 1996; Halley & Nollet, 2002; Möller et al., 2003; Wynstra & ten Pierick, 2000; Ellegaard et
al., 2003) creates a picture of different supplier types, stressing different characteristics depending on the basis of the classification.

After describing some of these different typologies an attempt is made to synthesize the different supplier roles based on different customer demands. When striving to develop in a more comprehensive role, a subcontractor may have different customer relationships, requiring the company to simultaneously act in different supplier roles. What is important is, however, to identify the requirements of the respective role in order to manage the customers accordingly. It is important to understand the scope and value of extended services in a more demanding role. Otherwise, the risk for a small supplier is that they tie up resources for supplying these services without being able to get the revenue.

3.2.1 Supplier typology based on collaboration and technology
Kaufman et al., (1996) compare prerequisites for different collaboration and technology levels and identify a matrix with four supplier types:

- **Commodity supplier** - a spot market supplier competing with low cost and little differentiation (low collaboration, low technology)

- **Collaboration specialist** delivering detail-controlled parts, using a closed network in each industry (high collaboration, low technology)

- **Problem-solving supplier** - where cost is less important, but high differentiation and flexibility are vital characteristics (high collaboration, high technology)

- **Technology specialist** – a proprietary parts supplier, competing with innovations in product technology and design capabilities (low collaboration, high technology)

Halley and Nollet (2002) use a similar evaluation to identify three different types of supplier where the differentiation was made from five characteristics: nature of the agreement, type of subcontracting, supplier’s expertise, order-giver’s objectives and supplier development and motivation.

- **A regular supplier** is used for capacity in short-term agreements where the objectives of the customer is to get specifications met at the lowest price. The supplier development and motivation is based on the degree of competition, and the supplier’s expertise is evaluated on meeting specifications and expectations.

- **A tactical partner or specialized supplier** is used to reduce the number of suppliers in medium-term agreements, where the supplier’s technical competencies and adequate quality system are vital. The objectives of the customer are: to develop a joint quality system, to constantly reduce prices, to shorten lead-times and reduce lot sizes. Supplier expertise in product design, processes, and systems are valued. The supplier development and motivation is based on possible larger order quantities and additional profits.

- **A strategic partner or preferred supplier** is used for intelligence in long-term agreements where continuous improvement, flexibility, added value, and profit is the focus. The objectives for the customer are: to constantly reduce costs and lead-times, increase delivery frequency, reduce lot sizes, and follow-up orders monitored in real time. The
supplier is expected to handle JIT, TQM, process and systems design, flow management, and to have major control over cycles and time. Supplier development and motivation is based on certification programs, acknowledgements, site visits, formal and informal evaluations.

Ellegaard et al (2003) refer to features of “the lean company”, describing how the tiers of the Toyota supply base was set up in order to facilitate management and communication, and the persistent work of continuous improvement. A set of first level suppliers, such as system integrators, manage the second tiers of component suppliers in a supply network.

3.2.2 Supplier typology based on competence development

Kraljics’ (1983) purchasing portfolio model, based on logistical risks and financial importance – has inspired further development. Möller et al. (2003) relate it for resource allocation among different types of suppliers, changing the perspective from purchasing and operations, towards a more strategic supply management (see Figure 3-1). The authors address the competence and knowledge flows between buyers and suppliers – not the flow of components and materials. Their starting-point is know-how and knowledge contribution from supplier and buyer respectively, and they arrive at a matrix of four types of inter-organizational competence development: purchased competence, transferred competence (from buyer to supplier), supplied competence (or injected competence) and cross competence.

Four types of inter-organizational competence development

<table>
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<tr>
<th>Supplier’s knowledge contribution</th>
<th>Cross competence</th>
<th>Low</th>
<th>High</th>
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<tbody>
<tr>
<td>Low</td>
<td>Purchased competence</td>
<td></td>
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<tr>
<td>High</td>
<td>Supplied competence</td>
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Figure 3-1. Four types of inter-organizational competence development.  

The authors describe these different competencies and translate the criteria into four different supplier types from the customer view, signified by for example the following features:

- **Standard supplier** (purchased competence) – with production and flexibility competencies, no shared resources, little or no exchange of information, short-term transactions;

- **Capacity supplier** (transferred competence) – with flexibility and expertise transfer competencies, few shared resources, exchange of information limited to actual needs, medium-term to long-term time frame;

- **Technology supplier** (supplied competence) – with technology and absorption competencies, several shared resources and specific investments, extensive exchange of information, long-term partnership accompanied by shared planning.
- **Specialized supplier** (cross competence) – with partnership competencies and shared developmental competencies, extensive investments and tasks/activities which pool resources, extensive exchange of expertise and information (open book), long-term strategic partnership with a joint strategy.

### 3.2.3 Supplier typology based on product development

Another development from the regular purchasing portfolio of Kraljic (1983) was noted by Wynstra and ten Pierick (2000). In their Supplier Involvement Portfolio (Figure 3-2) they introduced another criterion – development risk. This supports prioritizing supplier involvement in new product development projects in order to optimize both management capacity (time and money spent on communication, co-ordination, etc) and the use of suppliers’ expertise. Wynstra and ten Pierick identify four types of supplier involvement on the basis of two variables: the degree of responsibility for product development that is contracted out to the supplier and the development risk. The four supplier types range from **Routine development**, **Arm’s-length development**, **Strategic development** to **Critical development**.

![Figure 3-2. The Supplier Involvement Portfolio. Source: Wynstra & ten Pierick (2000)](image)

Another similar supplier classification from the product complexity and the stages of supplier involvement in product development has been presented by Kamath and Liker (1994):

- **A contractual** supplier handles simple parts where the customer has the complete design responsibility. The supplier has low technological capabilities and is involved in a prototyping stage with minor component-testing responsibility.

- **A child** supplier handles simple assembly. Joint design responsibility is based on detailed specifications with some supplier influence. The supplier has medium technological capabilities and is involved in a post-concept stage with moderate component-testing responsibility.

- **A mature** supplier handles complex assembly where the supplier has design responsibility based on critical specifications. The supplier has high technological capabilities and is involved in a concept stage with major component-testing responsibility.

- **A partner** supplies entire subsystems. The supplier has the complete design responsibility based on conceptual specifications, and the complete component-testing responsibility. The supplier’s technological capabilities are autonomous.
3.2.4 Different customer demands reflect different supplier roles

Most of these classifications include components such as technical capability or expertise, price or cost reduction, collaboration at product development, and communication and information exchange to typify the suppliers. The descriptions are made mainly from the customer point of view. When trying to compare and sum up some of the different authors’ arguments with a more comprehensive view of different kinds of supplier, it is evident that the complexity of demands increases with increasing degrees of customer integration. Basic demands, such as required quality and delivery precision, are of course important to all types of suppliers. But when a supplier takes on more complex tasks aside from the production, e.g. collaboration in product development, streamlining the logistics, or handling an increasing number of subcontractors, the need for more and different capabilities apart from production skills is obvious.

An attempt to illustrate this is shown in Table 3-1 below, where a few important customer demands have been used to compare the different classifications. In the compilation of the different supplier models I have, however, chosen to exclude the Technology specialists of Kaufman et al., (1996) as well as the “Arm’s-length development” of Wynstra and ten Pierick (2000). The reason for this is that these types of suppliers are of a special kind – with high technology, proprietary parts, and relatively low collaboration with customers.
Table 3-1. Different customer demands met by different supplier roles

Customer demands and their importance to different suppliers depending on the role in the value chain (setting out from degree of integration in the value chain)

<table>
<thead>
<tr>
<th>Customer demands</th>
<th>Degree of importance to different types of suppliers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Price</strong></td>
<td>High: Main competitive factor</td>
</tr>
<tr>
<td></td>
<td>High: Main competitive factor</td>
</tr>
<tr>
<td></td>
<td>Medium: Increased importance – cost reduction in continuous rationalization</td>
</tr>
<tr>
<td></td>
<td>Medium: Increased importance – cost reduction in development phase</td>
</tr>
<tr>
<td></td>
<td>Low: Cost reduction in development phase</td>
</tr>
<tr>
<td><strong>Technology capabilities (aside from required production competencies)</strong></td>
<td>Low: Meets demands and expectations</td>
</tr>
<tr>
<td></td>
<td>Low: Meets demands and expectations</td>
</tr>
<tr>
<td></td>
<td>Medium: Expertise in product design, processes and systems</td>
</tr>
<tr>
<td></td>
<td>High: JIT, TQM, Process &amp; system design, flow management</td>
</tr>
<tr>
<td></td>
<td>High: supplements customer competence</td>
</tr>
<tr>
<td><strong>Collaboration at product development and construction</strong></td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Low: receives full technical specification</td>
</tr>
<tr>
<td></td>
<td>Medium: receives detailed design specification</td>
</tr>
<tr>
<td></td>
<td>High: receives overall design specification</td>
</tr>
<tr>
<td></td>
<td>Very high: receives concept, functional specification</td>
</tr>
<tr>
<td><strong>Communication &amp; information</strong></td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>High</td>
</tr>
<tr>
<td><strong>Flexibility</strong></td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>High: increased delivery frequency, smaller lot sizes</td>
</tr>
<tr>
<td></td>
<td>High: small runs, high process and labour flexibility</td>
</tr>
<tr>
<td><strong>Liability for development of subcontractors</strong></td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>High: increasing number of subcontractors</td>
</tr>
<tr>
<td></td>
<td>High: Many &quot;heavy&quot; subcontractors</td>
</tr>
<tr>
<td></td>
<td>High: autonomous subcontractors</td>
</tr>
</tbody>
</table>

Halley & Nollet (2002) | Regular | Tactical/ Specialised | Strategic / Preferred |
Kamath & Liker (1994) | Contractual | Child | Mature | Partner |
Möller et al. (2000) | Standard | Capacity | Technology | Specialised |
Wynstra & ten Pierick (2000) | Routine development | Critical development | Strategic development |
Ellegaard et al. (2003) | | | System integrator |

Suppliers’ role in value chain (increasing degree of customer integration)

My synthesis of supplier roles in this thesis:
- Technical & component supplier
- Capacity supplier
- Collaboration specialist
- System supplier
- System integrator

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3.3 Demands

What is then required from a supplier who strives to develop in a more integrated role with its customers? Commonly accepted basic demands in order to be approved as a “preferred supplier” are:

- certificates of quality and environmental management systems
- enough financial resources and satisfactory economic growth
- sufficient production capacity
- adequate information systems
- sufficient technological development

In the study of Stjernström & Bengtsson (2004) all suppliers claim they provide
- efficient manufacturing and delivering processes.

This, for manufacturing suppliers, could be regarded as an order-qualifying criterion.

Demands are constantly increasing. Monczka and Morgan (2000) have analysed the impact of environmental factors on procurement operations and how these factors may influence the forthcoming conditions. Based on this analysis these authors identify six areas, “the critical six” of utmost strategic importance for the future: increasing efficiency requirements, making use of information technology, integration and consolidation, strategic cost management, insourcing and outsourcing, and ‘network’ management.

The increasing efficiency requirements and the need for rationalization and different prerequisites for cooperation are frequently mentioned in literature. For a subcontractor taking on a more comprehensive role towards its customers the purchasing processes come into focus. According to Monczka and Morgan (2000) the organizations will need to carefully link the output of their purchasing, sourcing and supply chain strategy to the financial plan of the business. Gadde & Håkansson (2001) point out the importance of rationalization and the possible cost reductions in all of the numerous day-to-day activities in purchasing, including changes in the technical specifications or in the way the solution is produced and delivered. They conclude that there are three main types of rationalization roles:

1) Discovering what needs to be purchased – make or buy decisions as well as specifying the products, components and systems to be purchased. By knowing what different suppliers have to offer and by cooperating with internal functions such as design, development and production purchasing may contribute to increasing the effectiveness of these processes.

2) Rationalization of logistics – e.g. just-in-time deliveries or smart transportation solutions

3) Rationalization of administrative routines – developing procurement routines that secure long-term efficiency. Gadde & Håkansson (2001) claim that this is a neglected area in many firms as each purchase in itself is relatively marginal in financial terms. Taking a more comprehensive view may reduce the supplier base and considerably reduce the administrative burden.
Another important area of rationalization is lead-time reduction, in order to reduce tied up capital and to simplify planning routines. The effect may also be quicker information feedback and more flexible production, closer to the customer. To make use of information technology as an enabler is essential. Open and mutual information exchange about such things as orders and stocks is seen as a prerequisite for cooperation and development (Rota et al., 2002). High supplier development responsibility necessitates flexible communication solutions in order to minimize management capacity (time and resources) and still optimize the use of the suppliers’ expertise. According to Wynstra and ten Pierick (2000) different supplier development responsibilities demands different sorts of communication between supplier and manufacturer.

Integration and consolidation represents the “ability of firms to globalize purchasing, sourcing, and supply management” (Monczka and Morgan, 2000, p. 52). To integrate the sourcing strategy with product/service/design and manufacturing on a global basis is challenging; aside from specific market knowledge and experience, it requires an e-business capability.

Gadde & Håkansson (2001) conclude that the role of suppliers will probably be strengthened when buying firms try to make use of the rationalization and development roles of purchasing with higher focus on increased efficiency requirements and strategic cost management by taking a total system/value/supply chain view of costs (Monczka & Morgan, 2000). This, in turn, implies that insourcing-outsourcing decisions will become increasingly important and that more thought will be given to supplier development and continuous improvement efforts in cost, quality, responsiveness and more. Blomgren (1997) comments on the debate of the changing distribution of work in the production chain where the subcontractors handle an increasing part of the manufacturing and ever so often also take part in new product development. Developmental capability may be about manufacturing, for example producing prototypes (Blomgren, 1997). The significance for manufacturers to take such a role in their customers’ product design process is recognised. According to the buying companies this procedure enables the subcontractors to achieve large scale production and make it possible to lower the prices. Supplier proactiveness, supplier’s cooperativeness, supplier initiated suggestions for improvement and openness to new ideas are seen as prerequisites for cooperation and development (Stjernström and Bengtsson, 2004). But Stjernström (2006) also points out the difficulties for the supplier to adapt to different demands of several customers, for example on the use of their quality systems or CAD-systems and EDI technology.

From a customer point of view unique non-commodity items make up the competitive edge of the business and strategic alliances with suppliers of these items provide sustainability and information sharing. To manage this network of suppliers will require a great deal of information transparency.

A subcontractor developing system supplying abilities is aiming at broadening the offer for the customer, taking on a wider role. Relationship Marketing (RM) is one of the different theoretical approaches applied when studying the distribution of work between companies. Trust is particularly mentioned as a complement to economic factors in governing exchange relationships (Ellegaard et al., 2003). RM researchers see the exchange as a continuous interactive process, instead of discrete transactions. The buyer-supplier relationship is a dynamic entity, developing by interactive processes. Human interaction is especially important in building up relational norms which act as governance mechanisms. The
The importance of having well-functioning personal relationships with the customer is an established fact for a small supplier.

It takes two to co-operate and several studies indicate that the supplier’s involvement also assumes an active customer in order to achieve more learning in the relationship and a more fruitful co-operation (Stjernström & Bengtsson, 2004). The study done by Häkansson et al., (1999, p. 443) e.g. indicates that “the extent to which learning takes place seems to be highly related to the existence of connections between the relationships”. The relative strengths between a small- or medium-sized subcontractor and its customer are often very unequal. The customer is, in most cases, seen as being in control – managing the relations. In order to develop the relationship a certain amount of interest and assistance from the customer is required – e.g. investing time to get to know the capabilities of the supplier and to help identify necessary improvement areas. The supplier perspective on the relationships, being managed by its customers, would thus seem to be especially important to small- or medium-sized suppliers with a limited number of large industrial customers. A demanding customer, with a cooperative and supportive attitude, would be a great asset for a diligent and pushy supplier.

Ellegaard et al. (2003) present their “customer attractiveness concept” in which they drive the theory that if the customer is perceived as an attractive business partner to the supplier, then commitment to the relationship will be present with this supplier and the customer will influence the supplier to act according to customer wishes. They claim that attractiveness means recognizing and understanding the specifics of the buyer-supplier relationship and acting according to these specifics in a growing degree of integration toward inter-organizational competencies. A balance of certain attractiveness levels on both sides seems to be needed for the synergies to work in a dynamic concept where

“the attractiveness towards a certain supplier needs to be changed and adapted according to changes in the conditions the relation works under.” (Ellegaard et al., 2003, p. 353)

Most processes of buyer-supplier exchange (logistics, planning, IT, and technology, as well as human exchange) are dyadic and constitute the center of the attractiveness approach, supplemented by influences from supplier’s suppliers, customers, and others (Ellegaard et al., 2003).

According to Kamath & Liker (1994) it is the integration of the technology of the supplier that is the basis of the long-term relationship. But they claim that suppliers too must be selective.

“Smart suppliers scan their major customers constantly to determine which are worthy of being partners.” (Ibid., p. 158).

They claim that successful partnerships depend on the right balance among a supplier’s technological capabilities, a customer’s willingness to share information, and both companies’ strategic requirements.
3.4 Logistics and Supply Chain Management

To meet the increasing demands for efficiency and continuous cost reduction in a more demanding role as system supplier it is especially important to coordinate the logistics activities of different parties in the supply chain. The Council of Supply Chain Management Professionals (CSCMP, a well-known association for individuals involved in supply chain management) define some logistics concepts at their web-site (http://cscmp.org/AboutCSCMP/Definitions/Definitions.asp):

“Supply chain management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third party service providers, and customers. In essence, supply chain management integrates supply and demand management within and across companies.”

“Logistics management is that part of supply chain management that plans, implements, and controls the efficient, effective forward and reverse flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customers’ requirements.”

Supply chain management is, according to CSCMP, an integrating function with the primary responsibility of linking major business functions and business processes within and across companies into a cohesive and high-performing business model. It includes all of the logistics management activities noted above, as well as manufacturing operations, and it drives coordination of processes and activities with and across marketing, sales, product design, finance, and information technology.

Supply chain management strives to find solutions to improve service at a reduced cost. This requires standardised logistics processes in order to be flexible to changes in the market or changes in demands, lead-times or availability (Abrahamsson et al., 2003). Logistics assumes a flow and it is important to coordinate and adapt functions and processes to this flow. Commitment to customer demand and centralized control are other characteristics of logistically skilled organizations (Christopher, 1998).

3.4.1 Supply chain strategies

Logistics capabilities are thus increasingly important and can provide a sustainable competitive advantage if they provide additional customer value compared to most competitors and if they are not easily imitable. Resources must be developed in accordance with the chosen strategies.

Morash (2001) presents best practice research concerning supply chain strategies, capabilities and performance and differentiates between demand-side and supply-side capabilities. Supply chain strategies focusing on customer closeness (e.g. customized and segmental logistics, agility) are connected to demand-side capabilities such as responsiveness, value-added customer services, innovative solutions and flexibility, while important performance measures relate to customer service and proactive quality. On the other hand strategies that focus on operational excellence (e.g. JIT, lean supply chains) require supply-side capabilities such as low logistics costs, availability, coverage, standardization, dependability and speed. Cost and productivity are the first priorities for performance.
A minimum of both demand-side and supply-side capabilities must be developed by a supplier in order to be order qualified, e.g. on-time delivery and the absence of customer returns. However, Morash (2001) concludes that best practice shows a value congruency between supply chain strategies, capabilities, and performance. Having reached minimum performance levels, a supplier should concentrate on developing those capabilities and performance metrics that support their chosen value focus. For excellent firms he finds that demand-side capabilities can be reconfigured, recombined, and resequenced to meet changing demands of specific customers or market segments thus forming competitive advantages that are easier to attain, more difficult to imitate and more sustainable than supply-side capabilities.

Morash (2001) also comments on “mass customization” strategies which he sees as a hybrid of operational excellence and customer closeness strategies, where the most important capabilities are flexibility and using information technology as an enabler.

Blomgren (1997) discusses the distribution of work within and between companies. There are different types of requirements which, for instance, the purchasing department in contrast to the construction department can contribute. He also points out the influence of the group executive board to different kinds of contributions. He sees the difference between external and internal organizational boundaries as more of a difference in degree than a difference in kind. Gadde & Håkansson (2001) claim that as a link between the engineering functions and suppliers the purchasers’ educational background and competence matter, along with the organizational design of the purchasing company. They also conclude that in a small company top management often prefers to keep purchasing, production and marketing issues together. But Gadde & Håkansson acknowledge that there are considerable differences between companies, owing to their sizes and also to their extents of vertical integration. Spekman et al. (2002) discuss supply chain competencies and see learning as a key component. They identify three challenges affecting supply chain learning: 1) the dilemma of cooperation versus competition in supply chain partnerships, 2) ensuring that learning happens throughout the supply chain and at different levels for maximum value, and 3) improving learning by a flexible structure, with pervious boundaries permitting information flows into the firm.

3.4.2 Logistics Platform

Blomgren (1997) states that the development of the subcontractors is not only about what a company is, but also about what they want. The bases are the present capabilities and resources, but development is about what the company strives to achieve in a longer perspective. To develop a logistics platform is one way for a supplier to take a comprehensive view of what role in the supply chain the company wants to fulfil.

Stig-Arne Mattsson (2002, p. 195) defines a logistics platform as

“the part of the total logistics system that the company can influence enough to carry out changes in processes and flows in order to make a supply chain more effective”

(translated from Swedish by the author).

He claims that apart from vertically integrated companies (i.e. supply chains formed by a group of completely or partly owned companies) the logistics platform, in this respect the interesting range of a supply chain, often does not reach further upstream than to the nearest suppliers and downstream to the nearest customers.
Abrahamsson et al. (2003) have a somewhat wider view on the advantages of a well managed logistics platform. They see a logistics platform as a resource base for market development and expansion strategies and define it as

“*a homogenous part of the logistics system, which a logistics organisation centrally manages and controls, and has the power to design in a way that it is a resource base for new market positions. The logistics platform includes concepts for logistics operations, a physical structure, processes and its activities as well as the information systems needed for design, operations and reporting.*” (Ibid., p. 104).

They use the term platform to stress that it is *one* system, structured to support all customers and claim that

“*the focus has shifted from the flexibility to handle rush orders or respond to unique customer demands on deliveries, to a strategic flexibility and the ability to support repositioning in the market. With such a built in strategic flexibility, i.e. from variable capacity rather than a cost minimisation approach, a company can act faster than competitors and at the same time keep profitability up in expansion as well as in recession.*” (Ibid., p. 89)

Integration and standardisation are vital concepts in forming a logistics platform, and a central responsibility is needed to achieve these. Abrahamsson et al. (2003) claim that strategic flexibility should be aimed at, based on integrated production, marketing and logistics activities and processes. The integration of logistics tasks and activities within the firm as well as across the supply chain will, if co-ordinated, lead to centralisation or standardisation (Chow et al., 1995). Pfohl & Buse (2000) discuss inter-firm logistics networks and the importance of relational capabilities to combine and integrate resources. Abrahamsson et al. (2003, p. 95) refer to their thoughts and summarize it as:

“*the complexity of logistics systems and the demand for customer responsiveness further lead to a need to develop systems and procedures to handle diversity on a routine basis. Standardisation of logistics processes, interfaces (technical and organisational) and services, as contrasted to reinforcing rigidity, create the potential for strategic flexibility and interaction between, for example, marketing and logistics.*”

### 3.5 Descriptive model

Business strategy, demands, resources and capabilities are decisive issues in the development of a company. The following model is used to describe how these are connected and interact.

The business strategy is influenced by demands from different interested parties, primarily customers and owners/boards of directors. The purchase and logistics strategy should be aligned to the overall business strategy but also coordinated with marketing strategy and production strategy. It is especially influenced by the customers and also by the supplier base. The owners and management add their views in the formulation of the objectives.

The resources – organization, competence-base, and tools (e.g. IT, working models) – are used to form desired long-term logistics capabilities in order to meet customer demands and achieve the company objectives. The competence-based resources are seen as central; both a result of and the base of the organization, and they influence and are influenced by the tools used.
Capabilities are used in the design of processes, and have a large impact on the company performance. When a strategy is well founded, resting upon reasonable prerequisites inside and outside the organization, the chances are that the result further strengthens that strategy. If some prerequisites are not met, or there is a lack of resources, the imbalance will be felt and will put pressure on the company to revise the purchase and logistics strategy and/or the business strategy.

**Descriptive model**

![Descriptive model](image)

**Definitions used:**

- **System supplier:** a supplier with an overall responsibility for the functionality of a product or a system of assembled components, produced in several process steps, and the resulting liability for purchase of material and services.

- **Resources:** “the tangible and intangible assets of a firm which can be drawn upon by the firm when required to achieve its objective(s)” (Ray and Ramakrishnan, 2006, p. 1)

- **Capability:** A combination of resources that can be relied upon on a long-term basis to meet customer demands and achieve company objectives
4. Papers

The research questions are connected to the concepts demands, capabilities and resources:

1. What are the demands on the logistics system of a system supplier compared to a component supplier?
2. What logistics related capabilities are considered especially important by a supplier developing system supplying ability?
3. What does this imply for the suppliers resources – organization, competence-base and tools?

These three research questions are dealt with in three different papers, presented in full below.

4.1 Paper 1 – comparing demands on a component and a system supplier

(Linguistically adjusted version of paper for EurOMA conference in 2007)

TOWARDS SYSTEM CAPABILITY: IDENTIFYING LOGISTICS AND MANUFACTURING DEMANDS FOR SMALL SUPPLIERS

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ABSTRACT

Many subcontractors react to global outsourcing and ever stronger demands for price and lead-time reductions by striving to become more of a system supplier. The fact that a larger overall responsibility follows this role is evident, but what does it really mean? This is an especially relevant question for small- or medium-sized subcontractors with limited resources who are about to invest in developing the organization, may it be production technology and equipment, competence, information technology, or management systems. The literature reveals extensive customer demands from different perspectives on system suppliers, and also show some vagueness about what constitutes such a supplier. An exploratory survey, based upon existing customer agreements and demands on a relatively small supplier developing towards system delivery capabilities, gives insight as to how customers and suppliers look at these demands. The results clearly point out some fields that need to be improved as firms develop system delivery capability.

Keywords: system supplier, subcontractors, logistics
INTRODUCTION
Western companies are rapidly sourcing more and more high-volume production from low-cost regions in order to reduce prices and stay competitive. The structural changes and outsourcing brought about mainly by large enterprises also change the prerequisites for many small subcontractors in the Swedish manufacturing industry. The ever-shortening time for planning and the necessity to produce to forecast means great uncertainties for the supplier, often resulting in increasing amounts of capital tied up. One supplier development strategy to meet the strong demands for price reductions and still be able to offer high quality and flexible manufacturing is, to take increasingly larger overall responsibility for the delivery, i.e. to become more of a system supplier. This is also in line with the interest of larger companies to reduce the number of first tier suppliers.

A lot of logistics research has been carried out concerning large international companies, but comparatively little covers the situation and the conditions from the perspective of a small supplier (Rota, Thierry & Bel, 2002) in the above described situation. The purpose of this paper is to identify the logistics demands and challenges facing a small supplier when evolving to a system supplier to large international companies. The study is based on an exploratory survey, and forms the basis for further multiple case and large scale survey studies.

The research question explores how the logistics demands on a system supplier with increasing numbers of subcontractors and overall responsibilities for system deliveries with high value added, differ from those of a manufacturer of components. The result shows that some demands are equally important, while some are clearly pointed out as being more important to a system supplier. This paper thus adds to previous logistics studies by focusing on small suppliers evolving towards system supplier capability. Furthermore, it complements studies on the effects of partnerships in new product developments (Swink & Mabert, 2000; Chung & Kim, 2003; Wynstra & ten Pierick, 2000) and on participation of small manufacturing companies in networks (Chaston & Mangles, 2000).

The terminology regarding different types of suppliers is full of nuances, and a literature review examining different views on suppliers, and the demands they are facing in different contexts, is called for in order to deal with this subject.

DIFFERENT DEMANDS AND SUPPLIER ROLES – LITERATURE REVIEW
There are many different forms of collaboration between supplier and customer, resulting in a wide variety of supplier types. The Japanese manner has influenced and inspired the development and comprehensive research concern the automotive industry and the lean concept (Lamming, 1993; Kamath & Liker, 1994; Ellegaard et al, 2003).

Original Equipment Manufacturers (OEMs) often use so called system suppliers that can manage comprehensive responsibilities, offering more complex parts or modules. Karlsson et al. (1998) propose a framework of the constituents of a system supplier, emanating from a study of suppliers to a European auto manufacturer. They identify four categories of reasons for which a supplier considers itself a system supplier: extent of product range, product development responsibility, just-in-time delivery, and experience in the industry.

The research regarding supplier-buyer relations emphasizes a range of other perspectives: Collaboration (e.g. Kaufman et al, 1996) forms a part of most perspectives in this context. Supplier involvement within product development have been identified as one important
issue, often considered from the buyer’s perspective, with the supplier managed by the customer (e.g. Kamath and Liker, 1994; Karlsson et al, 1998; Wynstra & ten Pierick, 2000; Wagner & Boutellier, 2002; Ellegaard et al, 2003; Mikkola, 2003). A related area – knowledge and know-how contributions from supplier and buyer respectively – have been dealt with by e.g. Möller et al., (2003). Contractual time aspects and duration of the relationship are other key factors for different supplier roles (e.g. Kalwani and Narayandas, 1995; Sobrero and Roberts, 2002).

The various demands emanate from the different perspectives and this is illustrated for example in numerous supplier management portfolios – where some of the most well-known are the model by Kraljic (1983) setting out from the kind of product delivered, and the model by Wynstra and ten Pierick (2000) who state that supplier involvement is situation specific.

Supplier roles

Halley and Nollet, (2002) differentiate supplier relationships with regards to five characteristics: nature of the agreement, type of subcontracting, supplier’s expertise, order-giver’s objectives and supplier development and motivation. This resulted in a general and rather wide identification of three different types of suppliers, a subdivision that could also be seen as a description of the requirements on a subcontractor, developing from a very price-focused production to become a more “complete” supplier.

1. The regular supplier, a capacity subcontractor characterized by short-term agreements and where the order-giver’s objectives are lowest price / meet specifications.
2. The tactical partner (or specialized supplier) is characterized by medium-term agreements where the order-giver’s objectives are to develop a joint quality system, constantly reduce prices, increase delivery frequency and reduce lot sizes.
3. The strategic partner (or preferred supplier) with long-term agreements with its customers, is based on continuous improvement, flexibility, added value, and profit. The type of subcontracting is intelligence, where the customer generally has no more than two suppliers per part or module. The supplier masters techniques such as JIT, TQM and flow management as well as process and systems design, and has high control over cycles and time. The order-giver’s objectives are to constantly reduce cost and lead-times, increase delivery frequency and reduce lot sizes, along with tight order follow-up which is monitored in real time.

The supplier role entailing the least complex customer demands is described by a range of different names – regular supplier as above by Halley and Nollet, (2002), commodity supplier (Kaufman et al., 1996), contractual supplier (Kamath and Liker, 1994; Karlsson et al., 1998), supplier of detail-controlled parts (Clark, 1989; Mikkola, 2003), standard or capacity supplier (Möller et al., 2003). The different perspectives obviously emphasize different demands but to summarize, they imply a supplier characterized by low collaboration and low technology levels which supplies standard parts or parts developed by the customer and built by the supplier to the exact specification.

As Karlsson et al. (1998) emphasize the meaning of the term “system supplier” is somewhat more nuanced. There are a lot of names for suppliers in this kind of collaborative role towards the customer: besides strategic partner or preferred supplier as used by Halley and Nollet, (2002), other examples are problem-solving supplier or Black Box supplier (Kaufman et al., 1996), mature and partner (Kamath and Liker, 1994; Karlsson et al., 1998), Black Box parts supplier (Clark, 1989; Mikkola, 2003), technology supplier (Möller et al., 2003). These names encompass wider, more complex roles but some common features indicate a supplier
characterized by high collaboration and technology levels, actively cooperating in and sharing some risks of product development with the customer in a long-term relationship. A supplier of this calibre actively works with continuous improvements within different areas – product technology, logistics, competence management etc.

**Demands on suppliers**

As can be concluded by the above classifications of suppliers, the demands on some types of suppliers are substantial, and increasing. Some basic demands are commonly accepted in order to be approved as a “preferred supplier”:

- Certificates of quality and environmental management systems (e.g. standards ISO 9001:2000, ISO 14001:2004)
- Sufficient financial resources and satisfactory economic growth
- Sufficient production capacity
- Adequate information systems. Open and mutual information exchange about such things as orders and stocks (Rota et al., 2002) is essential to manage shorter lead-times and cost reductions.
- Sufficient technological development. Kaufman et al., (1996) concentrate on strategies for small- and medium-suppliers’ to collaborate with their customers and manage appropriate technologies. High collaboration and technology levels characterize a problem-solving supplier or Black Box supplier.
- Efficiency. In the study of Stjernström & Bengtsson (2004) all suppliers claim they provide “efficient manufacturing and delivering processes”. This, for manufacturing suppliers, could be regarded as an order-qualifying criterion.

Product development is clearly pointed out as one distinguishing area. Kamath and Liker (1994) identify some critical dimensions: design responsibility, product complexity, specifications provided, supplier’s influence on specifications, stage of involvement, component-testing responsibility, and supplier’s technological capabilities. Emanating from these they identify different supplier roles in product development. Among these are the mature supplier, who waits for critical specifications from the OEM and may have to provide customization for all subsequent carry-overs, and the partner, who works on a single function, collaborates with the customer and is responsible for the product development. Karlsson et al. (1998) also refer to these roles and use the term system supplier for this latter supplier role. Clark (1989) speaks of Black-box parts, characterized by shared development, where functional specification is done by the assemblers while detailed engineering is carried out by parts suppliers (co-developed parts). But as Blomgren (1997) observes, developmental capability may also be about manufacturing, for example producing prototypes. The significance for manufacturers to take such a role in their customers’ product design process is recognized.

High supplier development responsibility necessitates flexible communication solutions in order to minimize management capacity (time and resources) and still optimize the use of the suppliers’ expertise. According to Wynstra and ten Pierick (2000) different supplier development responsibilities demand different sorts of communication between supplier and manufacturer.

Competence is another prerequisite. Möller et al., (2003) relates to Kraljic’s (1983) portfolio model for resource allocation among different types of suppliers, which the authors claim “advocates a departure from a purchasing and operations perspective towards supply management with a strategic perspective”. They describe know-how and knowledge
contribution from supplier and buyer as types of inter-organizational competence development, indicating significance from several different angles: knowledge dependency, switching costs, resources, types of competencies involved, exchange of information, interaction approach, time frame, learning process/roles and typical sourcing. The different stages or steps in the development towards system supply are characterized by enhanced exchange of information, increasing investments and an increasing amount of shared resources. The borders between intra- and interorganizational competencies are beginning to be blurred. A study made by Häkansson et al., (1999) concludes e.g. that “the more relationships companies have to others in a business network, the more the companies seem to learn.” Chaston and Mangles (2000) discuss the significance, and the difficulties, for small- and medium-size enterprises to form networks in order to acquire the required knowledge to survive in rapidly changing and/or highly competitive markets.

Other aspects of supplier roles and supplier development

The importance of supplier proactiveness, supplier’s co-operativeness, supplier-initiated suggestions for improvement, and openness to new ideas are often stressed. Worth noting in connection to this is that several studies indicate that the supplier’s involvement also assumes an active customer (Bessant et al., 2003, Stjernström & Bengtsson, 2004).

The risk aspect of product development has been investigated by Wynstra and ten Pierick (2000) who introduced development risk as a criterion in their Supplier Involvement Portfolio (developed from Kraljic, 1983). Their findings, as well as Mikkolas (2003), supports prioritizing supplier involvement in new product development projects in order to optimize both management capacity (time and money spent on communication, co-ordination, etc) and the use of suppliers’ expertise. Mikkola (2003) focuses on inter-firm learning and supplier-buyer interdependencies and her ideas are partly very similar to those of Kaufman et al., (1996), comparing prerequisites for different collaboration and technology levels, although from another angle. She sees three alternatives for a system producer to manage the development of new components: in-house sourcing, outsourcing, or co-development. She claims that one main purpose of outsourcing is “to have the supplier assume certain classes of investments and risks, such as demand variability.” This can be achieved through modular product design. Decomposing complex systems into more manageable parts is one way to create flexibility and achieve cost savings through economies of scale.

The duration of the relationship is another key factor in the development of a supplier. Sobrero and Roberts (2002) say that the expectations of a commodity supplier are mainly about lower prices and differ from the more long-range expectations of learning in relation to a strategic supplier. In a study Kalwani and Narayandas (1995) found that long-term relationships with selected customers made it possible for the suppliers to reduce costs and reach higher profitability.

Different supplier companies fulfil their role in different ways. Karlsson et al. (1998) claim that systems correspond to “a function that needs to be satisfied”. A system supplier may thus supply sub-systems or possibly an object. It is the customer who creates the opportunities for a supplier to develop into a more customer integrated role and different customers make it necessary for the supplier to act in several supplier roles simultaneously. The way to reach a more integrated role in the value chain may also be a bit “crooked” depending on where a supplier initially starts – competencies, special interests and intentions of the management decide how to proceed. One important task though, is to clarify the customer demands on
different supplier roles in order to make it possible for the supplier to form a strategy and see what gaps to fill in.

The literature review indicates a number of relevant customer demands to understand the demands on different types of suppliers. Delivery precision with ever shorter lead-times, management systems for quality and environmental work, and high process and labour flexibility to handle small runs, are frequently mentioned. Price is important, and cost reduction is often discussed in connection with suppliers’ participation in product development. Purchasing and logistics, as well as communication and information, are stated to be of various importance to different types of suppliers. Increasing collaboration also raise questions about responsibilities and liabilities.

The aim to increase competitiveness and reduce the importance of the price factor compels many companies to try to develop into the role as system supplier. As the brief theory review indicates, the picture of what demands must be fulfilled is not very clear. Different purposes emphasize different demands.

In order to specify the demands and get a notion of how companies interpret these demands on different supplier roles and how they comprehend this development, a survey/questionnaire was sent out. Despite a warning from Karlsson et al. (1998) to use the term system supplier with caution, I will use the denominations “component supplier” and “system supplier” to indicate the scope of the supplier roles, although this obviously is a gross simplification.

METHOD
This paper is based on a single case study in which an exploratory survey and a number of existing customer agreements are used to identify differences in demands upon a system supplier compared to those of a component supplier.

The following definitions were used in the survey:

- A component supplier refers to a supplier that delivers a well-defined component or service, produced in one or few process steps.
- A system supplier refers to a supplier with an overall responsibility for the functionality of a product or a system of assembled components, produced in several process steps, and the resulting liability for purchasing material and services.

The survey covers 46 items. These are mainly based on explicit demands in existing general purchase agreements with large, Swedish-based but internationally active industrial customers; to some extent they are supplemented with items from customers’ supplier evaluations. The demands listed in the survey are grouped under eight headings: delivery precision (5 items), quality & environment (8 items), purchase & logistics (7 items), price (3 items), flexibility (4 items), development (4 items), communication & information (5 items), and liability (10 items). The value 1 on a 7 point scale indicates a “totally unimportant demand” while 7 indicates an “absolutely decisive demand”. The respondents were also asked, in their own words, to point out the most important differences between a component supplier and a system supplier.

The choice of companies for this survey was based on their relation to a relatively small Swedish subcontractor (slightly more than 100 employees) that is in progress of evolving from a component manufacturer to a system supplier. This company describes itself as a
complete supplier of mechanics whose strength lies in becoming involved as a design and production partner in the production chain at various levels. It claims to have expertise in the fields of design, logistics, industrial engineering, quality, high-speed machining, and laser technology.

The survey was submitted to eight large customer companies and, as a complement, to two relatively small manufacturing companies (of which one is the above mentioned company) with ambitions to develop as system suppliers. One response each was received from purchasing managers of seven of the large customers, and a total of seven responses (from executives in leading positions within management, sales, purchase and quality departments) were received from the two suppliers.

The outcome of the survey and the analysis of the customer agreements have been used to identify the steps necessary for a small supplier to consider in order to meet demands in a more customer integrated role.

FINDINGS
The study shows that a number of demands are similar for different types of suppliers. Such basic requirements concern, for instance, delivery precision. At the same time the results clearly point out some fields that need to be improved as firms develop system delivery capability. It mainly concerns changes in purchasing and supply management, product design and development capability, project management competence, and increased overall liability. A system supplier should e.g. manage spare parts liability as well as systematic work with supplier assessments.

![Diagram 1. View of customer demands on different types of suppliers](image)

The pattern showing higher importance for the demands on system suppliers is very clear. Only two statements received any other rating: two customer companies evaluated short lead-times or safety stock as more important for a component supplier, and one customer company
noted slightly more importance for a component supplier to draw up correct measurement protocols.

An interesting finding is that the customers consistently show much smaller differences than the suppliers regarding the importance between demands on these two supplier roles (see Diagram 1). The overall degree of importance of the demands, especially on a component supplier, is also considerably higher in the customers’ responses. Only one field shows a clear divergence here – the importance of Purchase & logistics to a system supplier is emphasized more by the suppliers in the survey. One probable reason could be that the suppliers are focused on the differences rather than on the levels, as they are in the middle of the process of developing system delivery capabilities.

Differences emphasized in the survey responses

**Delivery precision:** A larger importance for the system supplier to be responsible for stock-replenishment based on forecast or consumption was shown in the replies. Regarding demands for right-time delivery, short lead-times, correct documentation and packaging the differences were small.

**Quality & environment:** Here the most emphasized demand on a system supplier, compared to a component supplier, was to have subcontractors fulfilling the same quality and environmental demands as the supplier itself. Higher rated were also the demands for quality and environmental certificates and for working proactively with quality improvements. Differences in the other demands regarding quality issues were quite small.

**Purchase & logistics:** This area showed the most marked differences, with considerably higher rates on a system supplier for all seven statements: systematic work with supplier assessments and development, work to render the buying processes and the logistic solutions more effectively, low-cost sourcing, effective material replenishment systems and competence in the logistics organization. The demand for low-cost sourcing was, in this context the one considered most alike for the two supplier types.

The suppliers commented that the demands on purchasing and logistics are considerably higher on system suppliers, being more dependent on broad competences and a wide contact net in order to take on larger complex assignments. Logistics competence is emphasized, as well as buying and production competence. One of the customers (who also defines itself as a system supplier) explains that system deliveries consist of more cooperation, where logistics and purchase are very important ingredients to make it work. Component deliveries are more based upon that the internal production competence is very high. A system supplier must be more complete than a component supplier, with the ability to actively handle their subcontractors. One customer states: “In my experience the most difficult task for many companies is to guide their subcontractors; this probably applies for both purchases and quality. To secure quality and delivery precision with the subcontractors is a challenge, especially for smaller companies who take an overall responsibility for a product. The difficulty is probably due to the fact that the companies have not understood the scope of the task and ‘taken height’ for it. The more complex a product is, the more steps are required – how do you direct a subcontractor’s subcontractor if you are not organized for it? That’s quite another thing than keeping a check on what’s produced in your own plant.”

**Price:** The demand for “open book” calculation was assessed as being considerably more important to a system supplier. The other demands, activities to increase productivity and
reduce cost, and total cost responsibility, were much more alike for both supplier types – highly and equally important.

The total cost is emphasized and one of the customers elucidates: “This is not only a question of price, but quality, delivery precision, flexibility, etc affects the picture.” They also point out the importance of productivity - that a system supplier simply must be more aggressive in things affecting the final customer.

**Flexibility:** In this area the greatest differences were focused on the production equipment to manage rapid product changes, and, to a slightly less degree, on an organization to manage changes in customer demands. The demands for competence in production engineering and for managing rapid volume changes showed very small differences.

**Development and project management competence:** This area showed very marked differences. A system supplier is expected, to a much higher degree than a component supplier, to have access to competent project leaders and project teams. This is in fact the most pronounced difference in the whole survey. A system supplier is also more distinctly required to collaborate in design and product development, contribute with competence with regard to material choices, technical solutions etc. The demand for development of tools and production processes were more alike.

Customers stress that a system supplier should “understand” the complete product and be able to suggest improvements to optimize the final result regarding function, cost, lead-time, etc. It concerns complex products and quality as well as production questions. A system supplier should be able to analyze technical problems and report conclusions as well as search out new subcontractors to solve questions within new problem areas.

**Communication & information:** Demands about order confirmations, rapid response at technical changes as well as “early warnings” when problems arise were considered almost equally important for both types of suppliers. A more significant demand level was shown on the system supplier regarding the ability to handle electronic information via EDI or the like; as well as the demand for information to the customer before changing a production process or supplier.

**Liability:** Under this heading a wide group consisting of ten different demands was stated. Here the demands rated considerably more important to a system supplier concerning spare parts responsibility, responsibility for subcontractors’ production (quality, environment, Code of Conduct etc), product liability insurance, ability to handle patents and registered designs, and explicit routines for contingency planning. In addition demands for secure IT-systems and product guarantees showed a higher rating for the system supplier, while the demands for directory of tools and fixtures, reliable document handling and responsible management of secrecy were more alike. The suppliers stress the overall view – system supply requires systematic work to secure the line of supply through the entire supply chain. Two of the customers (one also in the role as a system supplier) emphasize the responsibility – with deliveries of a larger part of a finished product follows a greater responsibility and a broader range of liabilities.

**Other comments:** The suppliers point out that the organization of a system supplier should be “complete” with competence within several areas, e.g. IT-systems and their applications, quality- and measurement organization and production organization, with more diversification.
as a system supplier. One of the customers stress the focus on core competences, meaning that it is better to buy systems from a supplier that is competent in assemblies, modular constructions and price reductions than from a component supplier that wants to broaden itself.

CONCLUSIONS AND DISCUSSION
As summarized in the literature review, the empirical findings confirm that the customer requirements of a system supplier may be met by both basic (generic) requirements and what could be denoted as system competences.

System competences: areas with most differences between demands on a component and a system supplier
1. Purchasing and logistics: systematic work with purchasing processes and supplier development, along with a clear and competent logistics organization are considered more important to a system supplier.
2. Development and project management competence: collaboration in construction and development work, and, above all, to have competent project leaders / teams are considered more important to a system supplier. The conclusions by both Wynstra and ten Pierick (2000) and Mikkola (2003) support prioritizing supplier involvement in new product development projects in order to optimize both management capacity (time and money spent on communication, co-ordination, etc) and the use of supplier’s expertise. This implies competent project management by the supplier. The supplier assumes some level of design responsibility and therefore needs to be involved in project discussions early in the development process. Co-developed components involve co-specialized investments which increase mutual interdependence and serve as an economic rationale for cooperative, long-term relationships.
3. Liability: when production of an article has come to an end spare parts liability is stressed for the system supplier, along with the responsibility for the subcontractors’ production (quality, environment, Code of Conduct, etc) and product liability insurance. The survey also indicates that the ability to manage patents and registered designs makes a substantial difference towards a component supplier.

In addition to these two specific questions, being able to handle electronic communications via EDI or the like, and open book calculation, with separately stated material price is pointed out as being important for the system supplier.

Generic competences: areas with little or no differences
1. Delivery precision and short lead-times are seen as equally important to both types.
2. Quality and environment: here also the demands seem to be quite alike.
3. Price: activities to increase productivity in order to obtain cost savings and reduce prices, and total cost responsibility are marked as highly and equally important to both supplier roles.
4. Flexibility: production equipment capacity for rapid product and volume changes, high production engineering competence, and an organization able to manage rapid changes in customer demands, are important matters to both types of production suppliers.
5. Communication and information: rapid order confirmation and response to technical changes, information before change of production process or supplier, and early warnings as problems arise, are also pointed out as important to both types of suppliers.
A core matter for many subcontractors aiming to maintain their competitiveness in the future is to learn how to manage in a more demanding role as system supplier. The study shows that this role is not homogenous – it depends on how customer and supplier interpret the mission. It is, however, essential to cope with the increasing complexity in production and to cooperate with customers and subcontractors to suggest the best production solutions and continuously work on cost reduction and productivity improvement measures. Effective logistic solutions form an essential part of the picture.

The greater overall responsibility means a considerable obligation to manage and coordinate an increasing number of suppliers – handling matters concerning their quality and delivery reliability as well as conveying demands on their environmental action programme and Code of Conduct. This requires more cooperation within networks and effectively managing the supply chain. Competence management and communication patterns are (besides thorough competencies regarding production technology and a well developed network of competent suppliers) brought out as important ingredients to achieve the important enhanced supplier involvement in product development. Multiple competencies are required for carrying out dialogue and development work with customers as well as suppliers.

Further research
In order to clarify how a small supplier looks at and may live up to increasing logistic demands in a more integrated supplier role deeper studies of the focal company will be carried out. Measures taken to meet customer demands will be analysed, as well as the reasoning behind these measures.

In order to get a more generally applicable result these studies must be done in a much larger scale, as the preconditions are very varying for small- and medium-sized suppliers. The line of business could possibly also involve different scenarios.

REFERENCES


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4.2  Paper 2 – about logistics related capabilities important for system suppliers

(Logistics capabilities important to small system suppliers)

Inga-Lill Carlsson

Abstract
One way for a small subcontractor to meet the increasing global competition is to develop system supplying ability. This implies that there is a greater overall responsibility in the supply chain and more focus on logistics issues. The purpose of this paper is to elaborate on what logistics capabilities a small- or medium-sized subcontractor must form in order to cope with the system supplying role. A comparison of three companies, with different degrees of system supplying services, is presented. It points out the importance of the management’s strategic alignment to supply chain management and logistics, with special focus on centralized and global sourcing. Other capabilities such as information and communication standards, and managing relations and generic demands well are also identified.

Introduction and purpose
Western companies are rapidly sourcing more and more high-volume production from low-cost regions in order to reduce cost and stay competitive. One development strategy for small subcontractors to meet the strong demands for price reductions and still be able to offer high quality and flexible manufacturing, is to take increasingly greater overall responsibility for delivery and become more of a system supplier. What is meant by system supply here is an overall responsibility for the functionality of a product or a system of assembled components, produced in several process steps, and the resulting liability for purchase of material and services. This is also in line with the interest of larger companies who look to reduce the number of first tier suppliers.

Supplier capabilities have been frequently studied (e.g. Day, 1994; Grant, 1996; Narasimhan, Talluri and Mendez, 2001; Sarkar and Mohapatra, 2006), but less is written about system supplier capabilities. The perspective is often the customers’ and the research is about large companies. Articles concerning the logistic issues and capabilities of small- and medium-sized enterprises (SMEs) are scarce (Rota, Thierry and Bel, 2002; Gélinas and Bigras, 2004).

The purpose of this study is to identify important capabilities for a small- or medium-sized supplier; capabilities with a logistics bearing and supporting system supply.
The study is based on previous theory and the findings of an exploratory survey concerning customer demands on system suppliers (Carlsson, 2007), where a few distinct demands on system suppliers were indicated:

- **Purchasing and logistics**: systematic work with purchasing processes and supplier development, together with a clear and competent logistics organization.
- **Development and project management**: collaboration in construction and development work and experienced project leaders / teams.
- **Liabilities**: larger overall responsibilities such as spare parts liability, responsibility for the subcontractors’ production (quality, environment, Code of Conduct, etc) and product liability insurance.

What is also important for the system supplier is to handle electronic communications, via EDI (electronic data interchange) or the like, and open book calculation, separately stating the materials prices.

In contrast, to meet the demands of delivery precision and short lead-times, quality and environment, competitive prices and price-reducing activities are required by all kinds of suppliers. Flexibility, and certain order related communication and information exchange is also essential to different types of suppliers.

A short literature review gives the background for a number of supplier capabilities that are in some way related to these logistics demands, followed by a brief description of the method and the three cases. A comparison of the company capabilities is presented in Table 2, further expounded in the discussion. Conclusions and propositions for further research conclude the article.

**Defining logistic capabilities – literature review**

A resource-based view has been applied in order to find out what increased demands could mean to a small supplier in terms of resources and capabilities.

Resources are seen as inputs into the production process (e.g. capital equipment, skills of individual employees, patents, brand names, finance and more) and are identified as the source of a firm’s capabilities, which in turn ends up as the main source of its competitive advantage. Capabilities are complex and Grant (1991) sees them as “organizational routines” that perform tasks or activities; and the organization itself is a huge network of routines, requiring the cooperation of many different resources. Routines are developed and sustained through practice and experience, and the fast learning of new routines may be essential in industries with rapid technological changes. To repeatedly perform a productive task which directly or indirectly helps to add value through the transformation of inputs to products or services is identified as an organizational capability (Grant, 1996).

Teece, Pisano and Shuen (1997) elaborate on the dynamic capabilities framework, where the chosen ways of coordinating and combining knowledge and other resources in company distinctive processes may form a competitive advantage. By dynamic capability they refer to the capacity of a firm to renew competencies to align with changing demands and the ability of the strategic management to adapt, integrate and reconfigure the available organizational skills and resources accordingly.

Capabilities are related to performance. Comparing assessed supplier capabilities with assessed supplier performance (quality, price, delivery, cost reduction performance and other) Narasimhan, Talluri and Mendez (2001) showed that efficiency and a sustainable and high
level of capabilities are likely to accompany each other. They identified six categories of supplier capabilities as input:

- Quality management practices and systems
- Documentation and self-audit
- Process/manufacturing capability
- Management of the firm
- Design and development capabilities
- Cost reduction capability

A capability-performance matrix is also used by Sarkar and Mohapatra (2006) to establish the consistency in the supplier performance. They see performance as “the demonstrated ability of a supplier to meet a buyer’s short-term requirements in terms of cost, quality, service and other short-term criteria” and capability as “the supplier’s potential that can be leveraged to the buyer’s advantages in the long term” (p. 152). Long-term relationships require suppliers that are both highly capable and high performers. Apart from the supplier capabilities mentioned above, they also mention:

- Financial capability and profitability
- Reputation for integrity/believability and honesty
- Existence of IT standards/communication system
- Communication openness
- Performance awards/performance history
- Business volume/amount of past business
- Bidding procedural compliance
- Breadth of product line/ability of a supplier to supply a number of items
- Production facilities and capacity
- Supplier’s proximity/geographic location

One could argue that some of these so-called capabilities could rather be classified as resources; for example the existence of a communication system, though a communication standard may be a capability. Production facilities and capacity, as well as geographic location are other examples, while supplier’s proximity, in a more figurative sense, can be an important capability.

Apart from the time perspective, Sarkar and Mohapatra (2006) also point out another difference: while most performance factors are quantitative and easily measurable, the capability factors are often qualitative and present measurement problems. Despite the fact that these more subjective criteria have been found to have a greater impact on the long-term performance, supply managers tend to prefer hard, measurable, objective criteria (Kannan and Tan, 2003). To develop long-term customer relationships require considerable effort and represent valuable resources.

The resources of a small supplier are limited. Linking the questions about what resources are required to enhance system supplying services and collaboration with customers, the companies’ views of their capabilities are essential.

In this study capabilities are seen as a combination of resources or “organizational routines” that can be relied upon on a long-term basis to meet customer demands and achieve company objectives. They are enabled through the cooperation of many different resources and aim to create value by transforming inputs into outputs (Grant 1991, 1996). They are also dynamic in so far as they concern both deployment of and development of the firm’s resources.
What capabilities are seen as important for small system suppliers and which demands do they support? Some of the above supplier capabilities relate to the logistics demands. To understand the logistics emphasis on the process/manufacturing capability clearly, this is split into two: SCM and volume flexibility. A closer look is taken at the following capabilities:

- **Management of the firm:** the attitude towards different demands, and drive to develop the organization. Trustworthiness and reliability, as well as agility and pro-activity, are seen as prerequisites.

- **SCM**, including central and global sourcing: purchasing and logistics organization and processes, supplier development, and

- **IT and communication standards**, focusing on the use of, for example, EDI.

- **Supplier’s proximity:** keeping up frequent personal relationships between customer and supplier personnel

- **Communication openness:** the degree of insight into the enterprise and its routines, e.g. “open-book-calculation”, “early warnings” as problems arise, response to technical changes and information before changing production process or supplier.

- **Cost reduction capability:** increasing productivity, reducing total costs.

- **Volume flexibility:** production facilities and capacity for rapid changes of products and volumes, high production engineering competence and ability to manage changing customer demands.

- **Breadth of product line:** ability of a supplier to supply a number of items or services.

In Table 1 the logistics demands initially mentioned and these eight supplier capabilities are combined, indicating which capabilities should be important in order to fulfil the demands. Brief explanations of the demands are given in the right column.

The management of the firm and SCM are setting aims and directions essential for all the demands. IT/Communication standards that enable and facilitate activities are almost as important, only less so for demands concerning liabilities. As a system supplier with large numbers of various manufactured and purchased articles, capabilities to handle volume flexibility and breadth of product lines are required to uphold almost all of the logistics demands, possibly with the exception of liabilities. Open communication to handle liabilities and electronic communication would be of importance in purchase and logistics. It would also improve lead-times and delivery precision, in supporting communication and information exchange. Cost reduction capability is tightly connected to the demands for purchase and logistics, for efficient IT systems, and, of course, for the price and cost saving demands. Finally, a supplier’s proximity, would mainly seem to be important with regards to short lead-times, and facilitating communication and information with regular meetings.
Method

For this multiple case study three suppliers were selected from their line of business (subcontractors, no products of their own) and also from their roles in varying degrees of a system supply. The similar role of subcontractor, offering production services, was chosen to study similarities between the cases, while different sizes of the companies were chosen to try to identify differences. Although they may not all identify themselves as “system suppliers” they all strive to offer their customers a more comprehensive solution. Based upon previous theory and the findings of an exploratory survey concerning demands on system supplier, guided interviews with management personnel have been carried out. Questions concerned the customer demands, what resources they value and what distinctive capabilities they see important to defend or develop.

Internal validity concerns how well the results of a study reflect the reality (Yin, 2007). This research is largely built on interviews and relies on the ability of the respondents to see, describe and explain their reality. Letting several respondents in each case study give their view of the same matters enhances the validity. In Mekanojärjestä and Rimaster respondents from the management groups covered functions such as CEO, marketing, purchase, quality, production planning, while in NOTE only one person, though one well up in the company as COO, part-owner and co-founder, was interviewed. As this is a public company other available information has been used for validation. The data collected through interviews and from other sources (web pages, annual reports, internal documents etc) have then been checked with representatives from each company in order to enhance the validity of the study.
The choice of a multiple case study enhances the external validity, the possibility of generalization, compared to a single case study (Yin, 2007). From the results of this very limited study it is, however, not possible to make any comprehensive deductions. In order to get a more generally applicable result these studies must be done on a much larger scale, as the preconditions are quite varying for small- and medium-sized suppliers. The line of business could possibly also produce different scenarios.

Reliability concerns the possibility to repeat the investigation and come to the same conclusions (Yin, 2007). This is improved as the companies have accepted the publishing of their names. However, the research covers an evolving phenomenon and the people involved are facing ever changing demands, prerequisites that make it difficult to exactly repeat this research with similar conclusions.

Setting out from capabilities with a bearing on logistics used in earlier research (assessing supplier performance), the three companies have been compared, focusing particularly on the capabilities which respond to demands related to system competences. In this study most of the issues concerning development and project management have been omitted, no matter how important these may be to a system supplier, as the direct connection to logistics is rather vague.

**Case studies**

*Mekanotjänst i Järvsö AB*

Mekanotjänst (about 120 employees, founded in 1976) is one out of four collaborating mechanical subcontractors in an industrial group that is still owned and run by the founder. The company describes itself as a complete supplier of mechanics and strives to be included as a production partner from a relatively early stage of product development process; a goal already achieved for some customers. The cooperation within the group enables the company to widen its offer, an important means evolving in a system supplying role. The targeted business sectors are telecom, medical technology, electronics/instruments and engineering industry. The circle of customers is quite narrow, consisting of mainly large, internationally active companies with manufacturing units in Sweden, e.g. Ericsson, ABB, Maquet.

The focus is still very much on the “generic demands” of all suppliers: delivery precision, short lead-times, price, and quality, as well as flexibility and information. More and more of the production is based on forecasts, and fixed lead-times are stipulated in customer agreements. One problem is the low rate of accuracy in some customer’s forecasts, disturbing the planning process and, with long lead-times from the suppliers, resulting in much capital tied up in stock. The importance of competence development, e.g. logistics, systematic work and IT-support is pointed out. As the order processes become more complex the focus on logistics in production planning has increased. Over the last years the share of purchased material has increased considerably, implying greater responsibilities: planning capacities, effective purchasing and production effectively in order to meet customer demands, and handling an increased number of suppliers thus creating increased responsibility for them. Mekanotjänst stress that customers now require sourcing in low-cost regions.

The respondents consider the overall solution and breadth regarding mechanics to be a capability. The structure and ownership are said to represent short decision-processes and agility as well as trustworthiness and reliability. The managers of Mekanotjänst conclude that their management philosophy called “the Motorway”, with “the Acceleration Lane” for
handling new products and new processes, reflects a capability of quick response to customer demands, especially in product development processes. The demands for technical support in customers’ new product development processes are recognized as important, especially for some customers. Mekanotjänst has not invested in special construction competencies, but offer prototyping and contribute with technical and production skills. Services connected to IT and logistics, as for example EDI communication and VMI (vendor managed inventories) solutions, are seen as important distinct capabilities to cherish.

The supplier related issues as well as the logistics issues of the supply chain are seen as “weak spots”. The company is striving to coordinate the sourcing within the company group and to render the purchasing activities more effective.

**Rimaster i Rimforsa AB**

Rimaster (about 160 employees, founded in 1982) is also privately owned and part of six integrated companies, including a Polish factory for volume production. The company describes itself as a complete outsourcing partner, focusing on sub-contractual work and offering development and production in the fields of electrics, electronics and mechanics. The positioning between pure cabling and EMS (Electronic Manufacturing Services) is said to make the company an attractive supplier for chosen segments. Four customer segments are based on specialised skills in customer applications: industrial automation, communication systems, specialised vehicles and transport vehicles. The customer base is characterized by a few large product-owning international companies, e.g. ABB, SAAB, Siemens, Atlas Copco.

The experience of production in low-cost regions and well developed routines for transforming manufacturing in Sweden to low-cost production, is considered valuable. Increased demands for flexibility and price reduction are handled through balancing production in Sweden and in Poland. A balanced scorecard project implemented some years ago, gave the organization a number of key performance ratios, important for clarifying the leaders’ responsibilities and authorities. Pro-activity and energy is said to characterize the company; competence levels and competence development have become more outspokenly important.

Rimaster, like Mekanotjänst, focus on the “generic demands”: delivery precision, short lead-times, price, and quality, as well as flexibility and information. Customer agreements stipulate more forecast-based production with fixed lead-times. Rimaster also underscores the planning problems with the low accuracy rates in some customer forecasts and long lead-times from the suppliers, resulting in stockpiling. The importance of competence development, especially logistics, is recognized. Increased responsibility and a more complex planning scheme followed by a larger share of purchased material and more suppliers, are also pointed out. Logistics in production planning is seen as a necessary core competence for understanding the supply chains. They also see clear development potentials for supplier and logistics related issues, trying to coordinate sourcing and purchasing activities within the company group.

Rimaster recognises the value of taking an active part early on in the customers’ new product development process and has transformed the construction department in 2007, incorporating an engineering firm in the company group.

Performing well regarding “hygiene factors” such as price, quality, and delivery precision is stressed as an important capability. The CEO also sees “the culture to work with what you can influence” as a company capability. Rimaster has actively been working to consolidate
the customer profile, actually phasing out some customers to ensure the strategy of capability for certain customers. Emphasizing the strong customer commitment reaching far into the organization, the CEO describes the organization as fleet-footed, standing for rapid solutions and flexibility. “Rimaster wants, things do happen – there’s a ‘goddamn it!’ in the organization” he says.

NOTE AB

NOTE (about 1200 employees within the company group) is an EMS (Electronics Manufacturing Services) supplier, a service producing company selling the service to assemble the customer’s products. The company was founded in 1999 as an intermediary within the electronic line of business. A factory and a sourcing company in Sweden were merged – conveying manufacturing orders from Sweden to Central-European factories. NOTE has then grown through acquisitions in Sweden (in order to establish business close to the customers) and in Eastern Europe and China for low-cost production. NOTE went public in 2004 and has a vast customer diversification with several hundred customers. The focus is on four market segments: telecom, industry, vehicle/maritime and medical/technology/safety/security, offering electronics production from design to after-sale service. The strive is for balance between different lines of business, and customers with different fluctuations in the market.

Increased demands on cost reduction and flexibility have been strategically met by implementing Lean Production and by transferring high-volume production to low-cost countries (Poland, the Baltic States and China) for a long period of time.

Different important services have explicitly been named and defined – “productified”. One identified capability is the central sourcing, a special sourcing company with purchasing offices in Europe and Asia, enabling a comprehensive view of volume, products, supplier bargaining position, sourcing synergies and more. Another capability is the transformation of high-volume production to low-cost countries. Slightly more than 40% of the production is localised to Eastern Europe, in their own units and in external plants (which they call “expansion tanks”) with five subcontractors within EMS in Poland. The component database allows customers access to coordinated information directly from the suppliers of NOTE – from the choice, and availability of components to a complete product. This is linked to a development tool for the customers, in order to reduce time-to-market and product material costs. IT is extensively used in some factories, allowing the customers access to the ERP systems to follow the progress of their articles in the production line. Geographic proximity is important, the concept ‘Nearsourcing’ offers the presence of knowledge and competencies nearby, e.g. in the form of small lab- and prototype workshops, at a low risk and low cost. “One hour by car from the customer” is a goal. The COO of NOTE also points out technical competencies and abilities to handle customers and he underscores the co-operative work between sales and technical personnel towards customers, in teams of test- and process engineers, key account managers and others.

NOTE is the initiator of EMS-Alliance, consisting of electronics manufacturers in five countries: USA, China, Brazil, India and Sweden. The alliance gives the customers access to production in suitable member production units.
### Table 2. Comparing capabilities

<table>
<thead>
<tr>
<th>Capabilities</th>
<th>Mekanotjänst</th>
<th>Rimaster</th>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management of the firm,</td>
<td>YES?</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>including dynamic capabilities</td>
<td>Somewhat unclear organization, much influenced by the owner/CEO.</td>
<td>Clear authorities and responsibilities through goal-oriented management.</td>
<td>Central overhead functions. Distinct goals and responsibilities.</td>
</tr>
<tr>
<td>SCM, including central</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>sourcing and global sourcing</td>
<td>Some coordination within the group, recently strengthened by a central purchasing and logistics manager. Recently started sourcing from China.</td>
<td>Some coordination within the group, recently strengthened by a central purchasing and logistics manager. LCC sourcing, i.a. from their own workshop in Poland.</td>
<td>Central sourcing LCC sourcing from Balticum, Poland and China, mainly their own workshops. Component database.</td>
</tr>
<tr>
<td>IT / communication standards</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td></td>
<td>ERP-system, EDI frequently used towards several customers and suppliers. Integrated IT support for VMI-solution, used for two customers. Their own IT development competence.</td>
<td>ERP-system, EDI and VMI-support Business intelligence implementation initiated (QlikView ). Clear demands on EDI-solutions, both internally and externally driven Internal IT dept. exists.</td>
<td>Their own web-solution integrated to the ERP-system, letting customers follow the flow of their orders in some workshops. Information from suppliers via component database.</td>
</tr>
<tr>
<td>Supplier's proximity</td>
<td>NO</td>
<td>YES?</td>
<td>YES</td>
</tr>
<tr>
<td></td>
<td>Most customers 300 – 700 km away. Frequent visits to and by customers are prioritized activities.</td>
<td>Manufacturing units relatively close to most customers. Has a history of following customers.</td>
<td>The concept “Nearsourcing” – a strategy for expansion: small regional units (labs and prototype workshops) close to customers. Customers having their own desks at some factories.</td>
</tr>
<tr>
<td>Communication openness</td>
<td>PARTLY</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td></td>
<td>Open book quotation to a number of clients when required</td>
<td>Open book quotation to a number of clients, including mtrl, work, markup, profit etc</td>
<td>Materials, prices etc. available to customers via component database.</td>
</tr>
<tr>
<td>Cost reduction capability</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td></td>
<td>Mainly focused on production engineering competencies. Lean project initiated.</td>
<td>Lean project is going on. LCC sourcing of volume production</td>
<td>Lean production, LCC sourcing of volume production</td>
</tr>
<tr>
<td>Volume flexibility</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td></td>
<td>Mainly restricted by capacity in special machines. Some backup within the group, some from external manufacturers.</td>
<td>Volume manufacturing in their own manufacturing unit in Poland.</td>
<td>Volume manufacturing primarily at their own manufacturing units in Poland or Balticum. Contracting manufacturers used for extra capacity.</td>
</tr>
<tr>
<td>Breadth of product line</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td></td>
<td>Different types of production facilities, including prototype services and assemblage</td>
<td>Different types of production facilities, including prototype services and assemblage</td>
<td>Different types of production facilities, including prototype services and assemblage</td>
</tr>
</tbody>
</table>
Discussion
The capabilities of the three companies are compared in Table 2 and are further expounded upon below.

1. Management of the firm
The alignment of goals, the versatility and the ability to “make things happen” are crucial factors affecting the performance in almost every area. All “generic demands” – performance factors such as delivery precision, price, quality, as well as flexibility – are dependent on how well the management handles the balance between these factors. There seems to be an important development step for smaller companies here: the relationship between owner and management. By stepping aside from the executive management and appointing an external CEO and a production manager, the owner of Rimaster achieved an organization experienced as more goal-oriented with clearer authorities and responsibilities. The owner of Mekanotjänst still holds both these posts, which is recognized as a contributory cause of the alleged vagueness of the organization. To support process organization and cooperation between different organizational teams and to take advantage of different resources to build “organizational routines” (Grant, 1991) are important in the development towards system supply.

As purchasing was historically seen as a sub-routine to production in Rimaster and Mekanotjänst, the changed view of the management towards this function is important. In NOTE this focus was included from the start, in the merger of a factory and a sourcing company.

With deliveries of a larger part of a finished product, follows greater responsibility and a broader range of liabilities. The choice of customers to serve also affects development and deployment of resources and capabilities. The management must initiate and support new information and communication techniques, set the limits for what kind of responsibilities and liabilities the company should be able to take on, and invest in corresponding competence development.

2. SCM, including central sourcing and low-cost sourcing
The demand for a more comprehensive view must be reflected in the organization, as seems to be the case in NOTE. Cooperation, regarding purchasing in both of the smaller companies, is achieved through some degree of central coordination. The “status” of the purchasing department has increased recently, following the increased value of purchased goods and services, and the impact of logistics. Performance focus is mostly on cost reduction, while supply chain management is not given a priority in the smaller companies. The possibilities to make use of subcontractors’ material and process knowledge are not fully utilized. The alignment of the fundamental management components necessary to support the supply chain objectives and operations (Lambert and Cooper, 2000) does not seem to have fallen into place yet.

3. IT standards and communication systems
A highly automatized administration is necessary to keep the costs down and still be able to render support to the customers and the own organization. Reducing the share of customer unique handling and making better use of the existing system support is desirable to all the interviewed companies. The ability to handle EDI (electronic data interchange) as a means of routine communication is frequently mentioned.
Mekanotjänst has a dedicated IT-manager with high focus on technical development, IT security, and functional use of IT. Enterprise Resource Planning (ERP), electronic communication systems, systems for handling VMI, e-invoices and self-billing, are examples of administrative IT enablers, apart from different technical systems required for complex production. The IT communications development is, to a large degree, customer driven. Rimaster appears to perceive slightly less customer pressure with regard to, for example EDI-communication solutions, and their IT development seems to be more focused on internal support systems. The larger company NOTE, with an extensive use of IT, also has the most developed IT solutions of the three companies.

Utilizing IT to share more information with suppliers and customers is recognised as desirable (e.g. forecasts, early warnings, capacity information, drawings, offers), but here much remains to be done.

4. Supplier’s proximity, geographic location
All three companies rest upon a growth strategy and they all claim to have a very clear customer focus, stressing the importance of personal relationships. The physical proximity simplifies activities to support customer relations, and to take urgent measures if needed. The nearness to the customer facilitates an increased service level (small quantities, frequent deliveries etc). It is important to have close contacts with the customers and thus get “first-hand-information” about material requirements, cost limits, lead-times etc. NOTE has an acquisition policy that is both target-oriented and customer focused to attain both qualified production units and an attractive circle of customers tied to these units. Mekanotjänst has a local profile; production units have been acquired in the vicinity of the parent company and the focus has been on production and collaboration within the company group to widen the scope of the customer offer.

5. Communication openness
Open book calculation, with separately stated material prices, logistics costs etc is frequently requested. Only NOTE has an established routine to handle this for their customers, offering access to their component database.

6. Cost reduction capability
A proven ability to increase productivity, to manage sourcing effectively and in other ways reduce cost, is important to every supplier. The companies studied agree on the measures: LEAN production and low-cost sourcing. NOTE has these capabilities in place, Rimaster is well on its way, while Mekanotjänst is in the “starting blocks”. Most of the respondents from the three companies are of the opinion that the manufacturing processes are more or less similar to the competitors. Effective production is required by all, while effective logistics solutions and supply chain management “sorts out the wheat from the chaff” as the CEO of Mekanotjänst puts it.

7. Volume flexibility, production facilities and capacity
Mekanotjänst and Rimaster both mention the problems of handling unreliable customer forecasts. Rimaster and NOTE have high-volume production units in low-cost countries. Supplementing the offers by alliances with other supplier companies must also be taken into consideration. Mekanotjänst and Rimaster focus their efforts to handle this issue within the company group. No partnerships or alliances are of present interest. NOTE, of course, also cooperates within the company group but as part of EMS-Alliance they can also utilize a net of member production units.
8. Breadth of product line
All three companies explicitly point out the importance of serving specific customer segments. The products are complex and a system supplier should be able to analyze technical problems and report conclusions. The “troubleshooting” ability, looking up new subcontractors to solve questions within new problem areas, is also stressed. As the customers are buying “on a higher level” they expect the supplier to handle considerably more purchased materials and products.

Conclusions
The development from component to a more system supply strategy primarily requires that the supplier is performing well regarding “hygiene factors” (price, quality, delivery precision). But there is also a call for the development of certain “system capabilities”:
- The focus and control of the management on logistics development and solutions
- Supply chain management, especially central sourcing and global sourcing
- Managing communication and utilizing IT as an enabler, handling forecasts, planning production and sourcing, analyzing costs and more.
- Cost reduction capability – including both Lean production and low-cost sourcing
- Volume flexibility and breadth of product lines – meeting the customers’ efforts to reduce their supplier base.

Managing relationships is also brought out as an essential capability, handled through somewhat different strategies of proximity and close relations to the customers. Open communication, with open book calculation, requires trust between the parties. This seems to be most vital when it comes to design and development work in collaboration with the customers, an issue only briefly mentioned in this study.

When comparing the two smaller of the three studied companies it is also clear that the alignment of logistics capabilities to strategy has several dimensions. IT communication standards, in for example EDI, have for quite some time been considered very important to develop by one of the firms. The other company has only recently experienced an increased demand for this. As the firms work towards specifically chosen customer segments the customer demands seem to vary, and this obviously influences the emphasis on different capabilities.

Further research
To find out which resources are needed to form these capabilities will be a next step. Evidently a certain degree of development capability is important for a system supplier. Could this be aligned with supply chain management and perhaps further enhanced by supply chain collaboration?

The choice of customers or branches to serve has been indicated as one important factor for the alignment of capabilities. To find out if, and in that case why, this is so would be an interesting subject for further research.
References


4.3 Paper 3 – About resources: organizational, competence-based, and tools

Resources to form logistics capabilities—
From the perspective of a small- or medium-sized subcontractor

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One way for a small subcontractor to meet increasing global competition is to develop a system supplying ability, which implies more focus on logistical issues and a larger overall responsibility in the supply chain. Certain logistics capabilities have been identified as important to a small- or medium-sized subcontractor in order to cope with the system supplying role. Interviews have been carried out in a multiple case study with the purpose of identifying important resources for a smaller supplier with the ambition of forming logistics capabilities to support system supply. Resources within three different areas have been identified: organizational, competence base, and tools. Conclusions from a comparison among three companies, with different degrees of system supplying services, point out the importance of an organization with clear and distinct responsibilities and authorities. Competencies in logistics and enhanced understanding and use of IT support and communication systems are identified as areas to improve for the smaller companies.

INTRODUCTION AND PURPOSE

The role of small- and medium-sized, locally rooted subcontractors is increasingly important in some regions. Large multinational companies aim to cut costs and with a stroke of the pen may decide to outsource or move their manufacturing to low-cost countries (LCC). In the current climate of toughening competition, one strategy that enables suppliers to meet the strong demands for price reductions and still be able to offer high quality and flexible manufacturing is to take increasingly larger overall responsibility for delivery, that is, to become more of a system supplier.

The role of becoming a system supplier is not homogenous—it depends on how customers and suppliers interpret the undertaking. It is essential to cope with the increasing complexity in production and to cooperate with customers and subcontractors by suggesting the best production solutions while continuously work on cost reduction and productivity improvement
measures. Effective logistical solutions and supply chain management form an essential part of the picture. This also fulfils the desire of larger companies to reduce the number of first tier suppliers.

Much of the research on logistics has been conducted on large international companies, but comparatively little views conditions from the perspective of a small supplier (Rota, Thierry, & Bel, 2002). When it comes to resources much has been written about specific areas, such as IT communication, and resources concerning product development have been discussed by many (e.g., Kamath & Liker, 1994). It is difficult to find a complete picture of what resources are required by a small supplier to form logistics capabilities.

Decisions to form logistics capabilities, for example in management, IT, communication standards, or volume flexibility, imply important strategic aims and directions. The purpose of this multiple case study is to identify important resources for a small- or medium-sized subcontractor with no products of its own, but with the ambition to develop its logistics capabilities to support a system-supplying ability. The research questions are: what resources do these suppliers see as important to acquire, develop, or strengthen and which capabilities are supported by these resources?

Three industrial subcontractors have been studied, chosen for their similar line of business, their different sizes, and different development stages. This paper starts with a literature review, followed by a description of the methodology used. The three companies are briefly presented and the results of the study are described. A discussion relates the findings to the research questions, and the paper is finished with a conclusion and summary.

RESOURCES, CAPABILITIES, AND PERFORMANCE: LITERATURE REVIEW

A small selection of the literature concerning resources and capabilities and their impact on company performances provides a framework to this study. Chosen strategies influence the development of relations (internal and external) and resources. A resource-based view has been applied in order to find out what the previously mentioned demands could mean to a small supplier in terms of resources and capabilities. Möller, Johansen, and Boer (2003) point out that the resource-based perspective “shifts the focus away from goods and services and towards a knowledge-based perspective which takes insight learning and its effects on the relationship between buyer and supplier into account” (p. 371 ).
Grant (1991) points out the distinction between resources and capabilities, where resources are seen as inputs into the production process (including, for example, capital equipment, skills of individual employees, patents, brand names, finance, and so on) and “the capabilities of a firm are what it can do as a result of teams of resources working together” (p. 120). A firm’s resources are identified as the source of its capabilities, which in turn results in the main source of the firm’s competitive advantage. Capabilities are complex and the interaction between routines requires the cooperation of many different resources. Ray and Ramakrishnan (2006) attempt to elucidate the conceptions by the following definitions:

- **Resources** are “the tangible and intangible assets of a firm which can be drawn upon by the firm when required to achieve its objective(s)” (p. 4);
- **Competence** is “a combination of firm-specific resources, each of the resources being under the state of sufficiency, . . . , towards achieving specific organizational objective(s)” (p.15);
- **Capability** is “a complex combination of appropriate set of competences, . . . , towards achieving specific organizational objective(s)” (p. 16).

Capabilities relate to performance. Sarkar and Mohapatra (2006) advocate a capability-performance matrix to establish consistency in supplier performance. They see performance as “the demonstrated ability of a supplier to meet a buyer’s short-term requirements in terms of cost, quality, service and other short-term criteria” (p. 152). **Capability** is defined as “the supplier’s potential that can be leveraged to the buyer’s advantages in the long term” (p. 152). Long-term relations require suppliers that are both highly capable and good performers.

Sarkar and Mohapatra (2006) also point out another difference: although most performance factors are quantitative and easily measurable, the capability factors are often qualitative and present measurement problems. Despite the fact that these more subjective criteria (e.g., reputation for integrity, communication openness, quality of production facilities, and capacity flexibility) have been found to have a greater impact on the long-term performance, supply managers tend to prefer hard, measurable, objective criteria (Kannan & Tan, 2003). Developing relationships requires a considerable effort and represents resources that should be protected.

Morash (2001) presents the best practice research concerning supply chain strategies, capabilities, and performance, and differentiates between demand-side and supply-side capabilities. Supply chain strategies focusing on customer closeness (e.g., customized and segmental logistics and agility) are connected to such capabilities as responsiveness, value-
added customer services, innovative solutions, and flexibility while important performance measures relate to customer service and proactive quality. Demand chain strategies, however, focus on operational excellence (e.g., JIT and lean supply chains) and require capabilities such as low logistical costs, availability, coverage, standardization, dependability, and speed. Cost and productivity are the top priorities for performance.

It is important to note that there is a minimum of both demand-side and supply-side capabilities that must be developed by a supplier in order to be order qualified, for example, perform on-time delivery and show an absence of customer returns. Morash (2001) then concludes that best practice shows a value congruency among supply chain strategies, capabilities, and performance. Having reached minimum performance levels, suppliers should concentrate on developing those capabilities and performance metrics that support their chosen value focus. In excellent firms Morash finds that demand-side capabilities can be reconfigured, recombined, and resequenced to meet the changing demands of specific customers or market segments and thus form competitive advantages that are easier to attain, more difficult to imitate, and more sustainable than through supply-side capabilities. Morash (2001) also comments on “mass customization” strategies, which he sees as a hybrid of operational excellence and customer closeness strategies, in which the most important capabilities are flexibility and using IT as an enabler.

A long-term customer relationship is desirable, and according to Kamath and Liker (1994), it is the integration of the technology of the supplier that forms its basis. Kamath and Liker (1994) claim that suppliers too must be selective: “smart suppliers scan their major customers constantly to determine which are worthy of being partners” (p. 158). They also claim that successful partnerships depend on the right balance among a supplier’s technological capabilities, a customer’s willingness to share information, and both companies’ strategic requirements. Ellegaard, Johansen, and Drejer (2003) describe some of this from the customer point of view in their “customer attractiveness concept.” By focusing on being an attractive business partner the customer influences the supplier to act according to the customer’s wishes. This type of relationship often leads to considerable integration and thus promotes interorganizational competencies in order to obtain working synergies—resulting in a certain level of attractiveness on both sides.

Blomgren (1997) discusses the distribution of work within and between companies. He points out the types of requirements to which, for instance, the purchasing department can contribute in contrast to the construction department, and also the influence of the group executive board to different kinds of contributions. Blomgren (1997) sees the difference
between external and internal organizational boundaries as more of a difference in degree than a difference in kind. Gadde and Håkansson (2001) claim that “the opportunities for purchasing to act as a link between the engineering functions and suppliers are determined not only by the educational background and the competence of purchasing staff. The organizational design of the buying company is important as well” (p. 11). They also conclude that “in a small company there is no need to separate purchasing problems from production or marketing issues” (p. 13). Top management often prefers keeping them together. But Gadde and Håkansson (2001) acknowledge that there are considerable differences between companies, owing to their sizes but also to their extent of vertical integration.

Spekman, Spear, and Karnauff (2002) discuss supply chain competencies and see learning as a key component. They identify three challenges affecting supply chain learning: (1) the dilemma of cooperation versus competition in supply chain partnerships, (2) ensuring that learning happens throughout the supply chain and at different levels for maximum value, and (3) improving learning by a flexible structure—“permeable boundaries permit information to flow into the firm” (p. 53). Blomgren (1997) points out the justified question from a subcontractor’s perspective: what do we want to be good at/what are we capable of being good at? Bases are the present capabilities and resources, but development is about what the company strives to achieve in a longer perspective.

In this paper I have chosen to illustrate three types of resources as instruments for strategic management to form desired capabilities and achieve company objectives: organizational, competence-related, and different kinds of tools for efficiency and improvement (see Figure 1). The competence base is seen as central because it is both a result from and the basis of the organization and it influences and is influenced by the tools used. This is particular to small companies that have a limited number of employees and are often “multi-functional,” and thus very dependent on personal qualifications and characteristics. A large company often has other opportunities to attract specialists and “customize” desirable competencies. The different types of resources are seen here as interacting and, depending on how they are deployed and developed, shaping different capabilities. This is slightly different from the model by Ray and Ramakrishnan (2006), who use resources as building blocks of competencies and competencies, in turn, as building blocks of capabilities. Relations with customers and suppliers, and internally between different functions, are seen here as both dependent on the company resources and a development factor.
Möller, Johansen, and Boer (2003) sum it up well: “The resource-based perspective concludes that it is the special blend in a corporation’s pool of resources which constitutes its competitive advantage. . . . The resource-based perspective also encompasses a strategic bearing, which perceives the corporation as a portfolio of resources rather than products. This implies that the acquisition of skills and know-how becomes an important parameter for the corporation’s chances for creating competitive advantages” (pp. 369-370).

**METHOD**

This multiple case study is based on previous theory and on the findings of an exploratory survey comparing customer demands on components supply with those on system supply (Carlsson, 2007). System supply here refers to an overall responsibility for the functionality of a product or a system of assembled components, produced in several process steps, and the resulting liability for purchasing material and services. The administered survey indicated a few system competencies—for example, purchasing and logistics, development and project management, liabilities and handling electronic communications—compared to the more generic competencies, for example, delivery precision and short lead-times, quality and environment, price and price-reducing activities, and flexibility.

This multiple case follow-up study aims at finding out what resources a small- or medium-sized supplier values in order to improve system-supplying abilities. I chose to analyze Mekanotjänst because of my double role as a Ph.D. student and business developer at that company. Two other suppliers, Rimaster and NOTE, were selected for their similar line of business (subcontractors, supplying different manufacturing services) and for their expanding role in different degrees of system supply. Guided interviews (between one and two hours each) were carried out with employees on a managerial level, comprising the major part of the management groups in Mekanotjänst and Rimaster, but only one person in NOTE.
(though one well up in the company as COO, part-owner and co-founder). My experience from working at Mekanotjänst at a management level and taking part in relevant discussions has given me a good insight and preunderstanding of the subject. As the interviewees represent different functions of the companies the validity of the results is enhanced. The information collected through the interviews and from other sources (web pages, annual reports, internal documents, etc.) is well documented and has been checked with the companies’ representatives.

Starting from an understanding of capabilities as defined in earlier research (assessing supplier performance, see e.g. Morash [2001], Sarkar & Mohapatra [2006]), and confining myself to those with a bearing on logistics, I have chosen to concentrate on eight capabilities: management of the firm, supply chain management, existence of IT standards/communication systems, supplier’s proximity, communication openness, cost reduction capability, volume flexibility, and the breadth of product line. The three companies have been compared on the basis of these capabilities. The analysis focuses on resources responding to the previously mentioned system competence-related demands, though omitting the issues concerning development and project management due to the vague connection to logistics.

THE STUDIED COMPANIES

The three companies are all subcontractors to large industrial customers. They represent groups of companies, with expressed growth strategies and no products of their own. Mekanotjänst and Rimaster are small- or medium-sized companies and represent rather small concerns, with about 250 and 500 employees, respectively, while NOTE is considerably larger with about 1,200 employees. They meet the criterion of a widened total responsibility and all stress an extensive customer focus while striving to balance different business sectors and market fluctuations. In this study they also represent different stages of development towards system supply.

Mekanotjänst i Järvsö AB (about 120 employees) is one out of four collaborating mechanical subcontractors in a privately owned industrial group. The company describes itself as a complete supplier of mechanics and strives to be included as a production partner from a relatively early stage of the product development process, a goal achieved with some customers. The cooperation within the group enables the company to widen its appeal, an important means to developing its role as system supplier. Targeted business sectors are telecom, medical technology, electronics/instruments, and the engineering industry. The
circle of customers is rather narrow, consisting of mainly large, internationally active companies with manufacturing units in Sweden, such as Ericsson, ABB, and Maquet.

*Rimaster Rimforsa AB* (about 160 employees) is also privately owned and part of six integrated companies, including a Polish factory that increases volume production. The company describes itself as a complete outsourcing partner that offers development and production in the fields of electrics, electronics, and mechanics. The positioning between pure cabling and EMS (electronic manufacturing services) is said to make the company an attractive supplier for particular segments. The company has actively been consolidating the customer profile in line with the strategy to be capable to meet the demands of certain customers. Four customer segments are based on specialised skills in customer applications: industrial automation, communication systems, specialised vehicles, and transport vehicles. The customer base is characterised by a few large product-owning international companies, for example, ABB, SAAB, Siemens, and Atlas Copco.

*NOTE AB* is an EMS supplier, calling itself a service-producing company and selling the service to assemble customers’ products. NOTE was founded less than ten years ago as an intermediary within the electronic line of business, conveying manufacturing orders from Sweden to Central-European factories. Two Swedish companies, a factory and a sourcing company, were merged in order to obtain production in Poland. NOTE went public in 2004 (listed on the Stockholm Stock Exchange’s O-list) and has a vast customer diversification with several hundred customers. Focus is on four market segments: telecom, industrial, vehicle/maritime, and medical/technology/safety/security, producing electronics from design to after-sale service.

**ANALYSIS AND COMPARISON**

My analysis initially compares the two smaller companies to find out what resources they emphasize, and then I made a comparison with the larger company. The two smaller companies have much in common: the focus is still very much on “generic demands” or “hygiene factors”—delivery precision, short lead-times, price, quality, flexibility, and information. To perform well is considered a basic capability. The organizations are customer-focused, reacting rapidly and solving customer problems by taking urgent measures when necessary. Cost, quality, and time are the critical factors to shorten the industrialization process. The limited number of customers is in line with the ideas posited by Kamath and Liker (1994) concerning suppliers’ selectiveness, and the sales work is directed towards a rather narrow circle of industrial customers. What Ellegaard, Johansen, and Drejer
(2003) call the “customer attractiveness concept” is recognized by these suppliers in two ways: they cherish their customer relations as good reference customers and as drivers to develop the business.

More forecast-based production and stipulated fixed lead-times in customer agreements makes *efficient planning systems* an essential resource. A constant worry is to match customer forecasts with existing capacities. The low accuracy of some customer forecasts disturbs the planning process, resulting in much capital being tied up in stock and increasing risks. The need for *more integration*—especially towards the customers—is acknowledged. The increased share of purchased material implies larger responsibilities: effective and coherent planning and handling an increased number of suppliers. The supplier-related and logistical issues are seen in both companies as weak spots. Focus is on reducing purchasing prices and costs. Being cost-effective as well as providing *coordinated sourcing and logistics* within the company groups are important tasks and central purchasing managers have recently been appointed in both companies. The ERP system Monitor is used by both companies and is considered a suitable tool. Mekanotjänst use *EDI* as a frequent and preferred way of sending order-connected information to customers and suppliers and Rimaster also reports external and internal demands on EDI solutions. A *VMI support system* is also implemented by both. The processes need to be elucidated and improved, though, as explicitly desired is the *process of “early warning”* when problems arise.

In some areas the suppliers have had a different focus, for example, about how to handle *low-cost sourcing*. Mekanotjänst only recently has begun to establish such contacts. Rimaster claims that flexibility is increased and costs are reduced through their manufacturing in the Polish unit (often producing larger volumes and requiring labour-intensive production). Small volumes, spare parts, some prototypes, and preserial manufacturing as well as more complex articles are often handled in Sweden. *Lean production* has been implemented by Rimaster in parts of the production process, and is expected to achieve full effect during 2008. Mekanotjänst see the potential and has started a project to implement lean thinking in its organization. Increasing customer cooperation renders competence levels and competence development within the organization more outspokenly important. This was recognized early by Mekanotjänst, which for some years has been working to discern competence gaps and comparing these demands to the actual situation in order to form *training programmes*. Rimaster has increased its training focus and has started to implement a personnel administration system to handle this. *Leadership* (e.g., project leaders) and *logistics competencies* (e.g., production planning), are important issues to both companies.
A series of strategic organizational changes were initiated when the owner of Rimaster stepped down as CEO. The members of the managerial group assert that appointing a new CEO and a production manager made the organization much clearer. A balanced scorecard project some years ago gave the organization a number of key performance ratios, including the importance of clarifying responsibilities and authorities and promoting pro-activity and energy, and was considered to be of great assistance as means of control. An earlier concentration on sales has shifted towards delivery precision, quality performance, efficiency, and productivity of the divisions. Mekanotjänst is still owned and run by the founder, and the organization is perceived as somewhat unclear. Rimaster uses its intranet, accessible to all personnel, to communicate action programmes between different functions, for other information and instructions, forms, and so on, while the intranet of Mekanotjänst lies more or less fallow.

NOTE stresses geographical location, being “geographically and psychologically close” to the customer. NOTE has grown through acquisitions in Sweden to be “one hour by car from the customer”; their Excellence Units primarily focus on development, prototype manufacturing, and industrialization, and their industrial plants are units with high production capacity in cost-efficient countries (Poland, the Baltic States, and China), either with their own resources or by collaboration agreements with external plants as “expansion tanks.” Complex production—smaller volumes, complex products, and “unstable” products in a development phase or built-in products in larger systems—is retained in Sweden, for the same reason as Rimaster.

A centralized management and service centre (sourcing, human resources, accounting, IT, lean, sales and marketing, production, and corporate communications) manage the units. The goal is now to reach new markets with a larger central organization. The smaller companies also try to coordinate the resources of the company groups, although they have not yet reached as far. NOTE has fewer suppliers than the other companies but a larger share of personnel at work on global sourcing. The sourcing-central of NOTE (about 50 employees) enables a comprehensive view of issues such as volumes, products, supplier bargaining position, and sourcing synergies, and the company makes extensive use of IT. A tool developed from the supplier data gives coordinated information directly from the suppliers in a special search system. In some factories the customers may access the ERP systems and follow the progress of their articles in the production line. The internet connection facilitates and reduces the manual customer handling, minimizing the
administration and increasing the customer value. “Early warnings” are caught through automatized information flows (only at some factories though).

**DISCUSSION: WHAT RESOURCES ARE SEEN AS IMPORTANT AND WHICH CAPABILITIES DO THEY SUPPORT?**

As long-term relationships with the customers are highly valued by smaller suppliers, the strategy should be to concentrate on the resources that strengthen and stabilize those kinds of relationships, for example, the competence base, organizational approach and alignment, and tools (see Table 1, where the collected information has been structured accordingly). The concentration on customers within a few branches is evident, stemming from existing production resources and technology competencies considered attractive to customers within chosen segments. The subcontractors benefit by similar customer demands and can still spread the risks and better handle fluctuations in the market. The scarce resources would also compel the smaller subcontractor to prefer some customers to others. A demanding customer means development possibilities but the value for the supplier lies in demands that could be aligned to satisfy several customers and/or rationalize time-consuming activities. The reputation of a demanding customer is also important—to be a “preferred supplier” is seen as a marketing asset.
As the suppliers are often measured and evaluated on the basis of performance instruments such as quality ratings or delivery precision, naturally these areas are seen as very important, as “order-qualifiers.” The hard, measurable, objective criteria are obviously very important (Kannan & Tan, 2003). In the long run, being able to cope with these factors creates other factors that are instrumental in achieving competitiveness. All three suppliers in

<table>
<thead>
<tr>
<th>Capabilities</th>
<th>Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Organizational Competence base</strong></td>
<td><strong>Tools</strong></td>
</tr>
<tr>
<td>Management of the firm</td>
<td>Effective meetings within the executive group. Business plans, distinct goals, and KPIs. Relevant and effective IT systems to support different functions and overall analyzing needs.</td>
</tr>
<tr>
<td>SCM, including central sourcing</td>
<td>Models to classify articles and suppliers. Supplier evaluation and development tools. Uniform models for supplier agreements, logistical agreements, etc.</td>
</tr>
<tr>
<td>Existence of IT standards/communication system</td>
<td>Relevant and effective IT systems to support different functions and overall analyzing needs.</td>
</tr>
<tr>
<td>Supplier’s proximity</td>
<td>IT communication systems.</td>
</tr>
<tr>
<td>Communication openness</td>
<td>Formal and informal meetings. Intranet, web interfaces, and systems integration to share more information with suppliers and customers.</td>
</tr>
<tr>
<td>Cost-reduction capability</td>
<td>Relevant calculation and costing models. ERP system. Lean production system.</td>
</tr>
<tr>
<td>Breadth of product line/ability of a supplier to supply a number of items</td>
<td>Relevant calculation and costing models. Quality system.</td>
</tr>
</tbody>
</table>

As the suppliers are often measured and evaluated on the basis of performance instruments such as quality ratings or delivery precision, naturally these areas are seen as very important, as “order-qualifiers.” The hard, measurable, objective criteria are obviously very important (Kannan & Tan, 2003). In the long run, being able to cope with these factors creates other factors that are instrumental in achieving competitiveness. All three suppliers in
this study claim to focus on customer closeness and should, according to the findings of Morash (2001), concentrate on supply chain strategies, prioritizing resources that add to responsiveness, value-added customer services, innovative solutions, and flexibility. It is however obvious that the smaller companies feel compelled to fight a war on two fronts here—partly because they are not altogether comfortable with the minimum performance levels and partly because the downward pressure on prices forces them to focus more on cost and productivity. Their limited resources call for collaboration with competent suppliers and customers. They need employees with a thirst for knowledge and the ability to manage the acquired knowledge within the organization and use it as a stepping stone to add value to the customers.

**Organizational**

An expected effect of a customer’s outsourcing of its production processes is the exchange and broadening of knowledge between customer and supplier, which in turn should promote renewal and innovation of products, production, and processes (Quinn, 1999). This requires that knowledge exchange and cooperation is supported throughout the organization, minimizing the “functional silos” and trying to take advantage of different resources to build “organizational routines” (Grant, 1991, p. 122). All three suppliers claim they do this, though the extent varies. The most frequently mentioned actions are cooperation between sales and construction or production engineering. Collaboration within the company groups is an important means of widening the customer offer.

Both Rimaster and Mekanotjänst especially stress the importance of competent and capable leaders on different levels—strategically as well as operationally. This is well in accordance with the importance Teece, Pisano, and Shuen (1997) stressed on how a company coordinates, combines, and develops its different assets. Distinct responsibilities and goals are pointed out as important. Rimaster especially has experienced very positive development from clarifying these in the organization while Mekanotjänst is struggling to improve this.

Demands on purchasing and logistics are considerably higher on system suppliers and more dependent on broad competencies and a wide contact net in order to take on larger complex assignments. A centrally managed sourcing unit to increase and develop the supplier base is considered essential. Rimaster and Mekanotjänst both recently appointed a central purchasing and logistics manager to coordinate the business, and NOTE maintains a central sourcing unit.
A system supplier must be aggressive in establishing cost and prices affecting the end customer. Productivity is important, but so is quality, delivery precision, flexibility, and so on. Global sourcing from low-cost regions is required. Establishing manufacturing units in China to serve the customer there is desirable but risky. Rimaster already has a Polish production unit and considers this experience very valuable for future expansion. Lean production is an effective means of cost reduction to NOTE. Rimaster has chosen to implement lean production in parts of their manufacturing and plans to expand this, and Mekanotjänst is shortly initiating a lean production project. IT investments are recognized as a means of making communication more effective and to relieve the pressure on the administration. However, it is important that the different functions learn to adopt new IT tools wisely and revise their routines and processes accordingly.

**Competence base**

Customers want a system supplier to understand the complete product, or at least see its own module system as a whole, and be able to suggest improvements in order to optimize the final results in terms of function, cost, lead-time, and so on. The products are complex and quality as well as production are emphasized. A system supplier should be able to analyze technical problems and report conclusions. The ability to troubleshoot and look up new subcontractors to solve questions within new problem areas is also stressed.

All three suppliers claim that their ability to maintain close relations with their customers and their ability to react quickly to customer requests are very important to their business performance. Some of the capabilities that the managers of Rimaster and Mekanotjänst emphasize (e.g., a “fleet-footed organization,” rapid solutions and flexibility) are of a kind that could be considered cultural—perhaps an effect of having developed from a small firm in the hands of one owner for a long period of time. Barney (1996) and Coff (1999) both point out the importance of identifying competencies or success factors affecting the performance of a company, especially knowledge-based assets that are hard to imitate because of firm specificity, social complexity, and causal ambiguity. NOTE has managed to clarify the competencies of the company more clearly, in “productified” service offers.

Logistical competencies are pointed out as important, as well as purchasing competence and production competence. Supply chain management is an underdeveloped area in the two smaller suppliers, Rimaster and Mekanotjänst. Historically, purchasing was seen as a simple task (“calling off goods”) and the purchaser’s role was rather “low-status.” This has changed considerably during the last five years, but there is still a lot of work to do to alter that
attitude. During 2007 both suppliers strengthened their organizations with an overall purchasing manager, but the first focus for both suppliers is now on cost reduction. Supply chain management is not given all that much priority. The alignment of the fundamental management components that according to Lambert and Cooper (2000) is necessary to support the supply chain objectives and operations is not yet at hand. As the purchasing manager of Rimaster explain it: “the organization must mature in these matters.” NOTE, however, has been working with these issues from the start and has achieved much more. All suppliers mention the problematic unreliable forecasts from the customers. The importance of understanding the different IT support systems and developing their use is vital to coping with the increasing demands of shorter time spans and reduced costs.

Sourcing in low-cost countries is thought to demand high volumes and long lead-times. An ambition to keep as much production as possible in or nearby Sweden is also noted. The striving is for increased complexity as well as productivity, in competition with “best cost countries”. Proximity to the customer is seen as more important, facilitating an increased service level (small quantities, frequent deliveries, etc.). The need for profound knowledge in foreign languages, at the very least English, comes with global customers and global sourcing. This could be a problem for a smaller company that has developed in a local region and also made a good deal of internal recruiting, especially when it comes to the more formal English required in contractual discussions.

The increased overall responsibility as a system supplier is recognized by the suppliers. Delivering a larger part of a finished product requires a larger responsibility and a broader range of liabilities. The need for both a managerial comprehensive view and skilled operators is clear.

Tools

In order to handle a complex composition of demands, the routines requiring most personnel activities must be supported by both working models and relevant and competent IT systems. A highly automatized administration is absolutely necessary to keep the costs down and still be able to render support to the customers and the organization itself. The managers of the suppliers emphasized the importance of reducing the share of customer unique handling. Using more of the existing system support in a better way is considered desirable.

Both Rimaster and Mekanotjänst need to adapt models to classify articles and suppliers in order to allow the purchasing work to be more effective. Models to calculate and follow up
total cost in a consistent manner and models to assess forecasts according to uniform standards within the company are other examples mentioned by Mekanotjänst. Developing uniform models, such as supplier agreements and logistical agreements, is also seen as important.

In order to mechanize some routines, different IT support systems are important, for example, in ERP, electronic communication systems, and document handling. Different technical systems are necessary for the product engineers who work with drawings as well as with three-dimensional models and prerequisites for complex production machines. Utilizing IT to share more information with suppliers and customers is well developed by NOTE, but much less focused by Rimaster. Mekanotjänst is advancing its capabilities in EDI concerning order information but still sees the need to expand the electronic communication. Examples of information discussed by Mekanotjänst were forecasts, supplier information (early warnings), capacity information, drawings, offerings, and so on.

CONCLUSION AND SUMMARY

The important concepts regarding resources for small- or medium-sized suppliers are a clear organization, with a distinct and communicative leadership, and relevant and effective IT systems to support communication solutions. Logistical and purchasing competencies are mentioned as the most important for a small subcontractor to develop in order to cope with the demands of system supply. Experience from low-cost sourcing and from handling customer forecasts are also mentioned as important competencies to improve performances and reduce costs and risks of the companies. These resources support a number of important capabilities with an emphasis on logistics: management, SCM, existence of IT standards, and cost-reduction capabilities. Production capacity and support by qualified subcontractors are necessary resources to handle another demanding capability: volume flexibility.

Having a clear organization and a distinct and communicative leadership are pointed out by all three companies as significant resources. Putting together a management that has foresight, a sound knowledge of the market and the competitive situation, as well as the prerequisites of production, logistics, IT, and so on in a small company could be a challenge, however. Finding people with the right competencies and being able to attract and employ them is one part; affording them is another challenge. The operative work of the day is often prioritized before strategic management. Therefore, it is especially important to elaborate strategic business plans, supported by and communicated through distinct goals, and KPIs.
An advantage of the small, privately owned companies is the often short decision-making processes.

All three companies claim to have a very clear customer focus, stressing the importance of personal relations. They seem to aim at a mixed focus of productivity and customer closeness. Although the strategy is on customer focus, the cost reduction demands from customers and the profitability demands within each company occupy much of the resources, especially in the smaller companies with more limited assets. NOTE has developed more distinct profiles regarding customer closeness (near sourcing) as well as cost savings: lean manufacturing, production units in low-cost countries, centralized group-wide sourcing, and so on. Rimaster is well on the way with the same measures for cost reduction, but Mekanotjänst still has not quite decided about their direction. Both Rimaster and Mekanotjänst find the volume flexibility demanding, but they also stress their ability to react rapidly and to solve customer problems by taking urgent measures when necessary. The reliability of the forecasts from some customers is often rather poor, which causes problems in capacity planning and advance planning towards the suppliers. Realizing Morash's (2001) views about mass customization necessitates more resources that enhance the flexibility and IT that provides planning and communication tools.

The cost aspect of global sourcing occupies all companies. This is a demanding task for a minor company, requiring a lot from the organization, but considered necessary to develop. To establish manufacturing in its own units in China is by both the smaller companies regarded as advantageous, though risky. Rimaster considers the experience from the Polish unit to be an important advantage. NOTE has established its own production units in the Baltic states, Poland, and China. To coordinate the sourcing within the company group is considered important. Logistical issues also have an increased focus. From a manufacturing perspective, the smaller companies previously looked at purchasing as merely supporting the process of “supply on call.” This has changed and both companies have appointed qualified central purchasing managers. NOTE, however, has from the start purchased production services as efficiently as possible for their customers, which has also led to acquisitions of production units.

The demand for a more comprehensive view must be reflected in the organization—specifically recognizing that in Mekanotjänst, for example, the technology competence is more outspoken within the marketing personnel than with the responsible purchasers. The marketing personnel also have the most contact with the customers and thus get first-hand information about material requirements, cost limits, and so on. The possibility of making use
of subcontractors’ materials knowledge is thereby diminished. Most of the respondents from
the three companies are of the opinion that the manufacturing processes are more or less
similar to their competitors. Effective production is required by all! And as the CEO of
Mekanotjänst put it: logistics will “sort out the wheat from the chaff.”

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41(1), 37-54.
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5. Analysis and discussion

A reflection about business strategies and development initiates the discussion below. The companies have been briefly described in the previously presented papers (Chapter 4). A short summary of their perceived demands to be met is presented in chapter 5.2 below, along with what the respective companies consider are required capabilities and resources. For a more detailed description of each company see Appendix III – V. In chapters 5.3 – 5.5 Demands, Capabilities, and Resources respectively are analyzed with regard to the similarities and discrepancies, while Relations are discussed in chapter 5.6. These later sections are each finished off with a short summary, highlighting the conclusions and the connections to the theoretical framework.

5.1 Business strategy as a background to understand the context

Many small- and medium-sized subcontractors who offer manufacturing services experience pressure to align their business strategy to global competition. Existing demands are tightened, new demands arise; customers want more value for less money. Production skills are no longer enough; the place in the supply chain must be justified in more ways.

An overall view of the business is needed, including both customers and suppliers. The purchase and logistics strategy should be aligned to the overall business strategy but also coordinated with the marketing and production strategy. The resources – organization, competence-base, and tools – are used to acquire the desired long-term logistics capabilities in order to meet customer demands and achieve the company's objectives. In a small company the competence-based resources are seen as central; both a result of and the base of the organization, and they influence and are influenced by the tools used.

For a small supplier it is important to make the most of its limited resources; they must strive to develop distinctive capabilities to achieve a sustainable competitive advantage adding value to its customers. If some prerequisites are not at hand, or any resources lag behind, the imbalance will put pressure on the supplier to revise the purchase and logistics strategy and/or the business strategy.

The development strategy could be described in a number of steps:

- starting off as a component or capacity supplier
- developing capabilities to meet the demands on system suppliers from a limited number of customers, and
- then hone some of these capabilities to achieve a sustainable competitive advantage.
Definitions used:
- System supplier: a supplier with an overall responsibility for the functionality of a product or a system of assembled components, produced in several process steps, and the resulting liability for purchase of material and services.

- Resources: “the tangible and intangible assets of a firm which can be drawn upon by the firm when required to achieve its objective(s)” (Ray and Ramakrishnan, 2006, p. 1)
  - Organizational resources: e.g. organizational structure, strategies, investment policy
  - Competence-based resources: individual employees with knowledge, skills and experience in managing production technology, logistics, IT and more; leadership
  - Tools: e.g. IT-systems, working models, production units

- Capability: A combination of resources that can be relied upon on a long-term basis to meet customer demands and achieve company objectives

Descriptive model

Purchase and logistics strategy is particularly influenced by the customers and also by the supplier base. Owners and management add their views in formulating the demands and objectives for the organization.

5.1.1 Views regarding product development
The capabilities described below are tightly inter-connected with the business strategy and the purchase and logistics strategy. One strategic aspect is only briefly mentioned (as the link to logistics is considered very weak), although it may be very important to a system supplier: the ability to participate in customers’ new product development projects.

The choice of customer is closely connected with the ambition to take an early part in some of the customers’ new product development projects. This is, however, a matter where the pros
and cons have to be carefully considered. Supplier involvement within product development
have, by quite a number of researchers (e.g. Wynstra & ten Pierick, 2000; Wagner &
Boutellier, 2002; Ellegaard et al., 2003), been identified as an important issue, where the
supplier is often managed by the customer. Chung & Kim (2003) claim that this ambition
entails high transaction costs for suppliers. The expectation of benefits, and what these
projects would comprise, is important when a supplier is deciding whether to commit
themselves to new product development projects or not. Developmental capability may for
example mean producing prototypes (Blomgren, 1997), which is a common role for
manufacturers to play in their customers’ product design process. Mekanotjänst for one
strives to develop its consulting role towards the customers: the customers expect the supplier
to share its production knowledge in order to make the industrialization process (preparing the
products for serial production) as economical as possible. To be able to get paid for this work,
and at the same time have a good chance of filling up machine capacity, motivates the
supplier to get involved early in the customers’ new product development processes. As
Chung & Kim (2003) point out this consulting role is a demanding one, tying up both
engineering and production capacities in customer projects. These investments must carry a
high yield, i.e. lead to a fair amount of serial production in the factory.
5.2 Summing up the cases

The views of the respective companies – which demands they perceive and what resources and capabilities they consider essential in order to meet these demands – have been put together in the following tables.

5.2.1 Mekanotjänst

The description of this company is based on several sources: records of strategic meetings with the management group, interviews (according to the interview guide, Appendix II) with the purchasing manager of Mekanotjänst i Järvä and the quality and environmental manager of the Mekanotjänst group, a number of occasional interviews and discussions with, among others, the CEO and the marketing manager, supplemented by my own experiences and knowledge of the company as a member of the management, and both internal and external documentation.

The demands are the ones experienced in the organization – expressed by the customers as well as by the management. The capabilities and resources listed below are the ones desired, or thought required, in order to meet the demands. Some of these are realized, others are identified for future development.

### Table 5-1. Mekanotjänst: Required resources and capabilities

<table>
<thead>
<tr>
<th>Demands to be met</th>
<th>Capabilities required</th>
<th>Resources required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growth and increasing complexity in production and sourcing.</td>
<td>Capable management.</td>
<td>Organizational structure, including a clear and unifying leadership. Cross-functional groups and meetings. Common routines.</td>
</tr>
<tr>
<td>Cost-effective production</td>
<td>Production specialist capability, with breadth and depth within mechanics manufacturing</td>
<td>Production engineering and production know-how</td>
</tr>
<tr>
<td>Product development assistance</td>
<td>Prototyping</td>
<td>Production engineering and project management skills</td>
</tr>
<tr>
<td>Volume and product flexibility demands</td>
<td>Quick response to customer demands</td>
<td></td>
</tr>
<tr>
<td>Information and communication openness</td>
<td>Electronic communication standards (e.g. EDI)</td>
<td>Clear authorities and responsibilities. Cross-functional meetings and other customer meeting structures. Relevant IT-structure and IT-knowledge</td>
</tr>
<tr>
<td>Open book calculation</td>
<td></td>
<td>Common calculation models</td>
</tr>
<tr>
<td>Volume flexibility, production based on forecasts, stock-keeping and distribution</td>
<td>Logistics solutions (e.g. VMI)</td>
<td>Planning and logistics skills, sufficient production capacity, negotiation and contractual experience, IT-support systems, capital</td>
</tr>
<tr>
<td>Development of sourcing processes, systematic work with strategic suppliers, central sourcing within the company group</td>
<td>Efficient purchasing and supply chain management</td>
<td>Skills and experience of purchasing and supply chain management. Organizational structure.</td>
</tr>
<tr>
<td>Global sourcing, especially low-cost sourcing</td>
<td>Cost-cutting ability</td>
<td>Skills and experience of purchasing and logistics.</td>
</tr>
<tr>
<td>Reliability: “generic demands” as delivery precision, quality</td>
<td>Trustworthiness. Short decision-making processes, agility.</td>
<td>Organizational structure, including role of the owner. Efficient communication models, e.g. early warnings. Competence development program</td>
</tr>
<tr>
<td>Risk management</td>
<td>Risk management</td>
<td>Model and knowledge to identify, assess, and take action against risk factors.</td>
</tr>
</tbody>
</table>
5.2.2 Rimaster

The information about Rimaster is mainly based on interviews (in accordance with the interview guide) with members of the management group, i.e. the CEO, key account managers, the purchasing manager, the planning manager, and the production manager. In addition, information has been gathered from a master thesis (Hägglund & Johansson, 2006), from the homepage of Rimaster and from annual reports.

The demands listed below are experienced in the organization and the capabilities and resources are the ones identified to meet the demands. Many of these are realized, others are identified for future development.

Table 5-2. Rimaster: Required resources and capabilities

<table>
<thead>
<tr>
<th>Demands to be met</th>
<th>Capabilities required</th>
<th>Resources required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specialisation towards certain customer segments</td>
<td>Management Combining mechanics, electronics and low-cost production</td>
<td>Organizational structure, Specialised skills in customer applications, Understanding of the customer’s organization and purchasing philosophy, Personnel training programs.</td>
</tr>
<tr>
<td>Assisting in product development and constructional work</td>
<td>Product development</td>
<td>Construction unit with technical resources; technical construction and production engineering skills.</td>
</tr>
<tr>
<td>Volume flexibility.</td>
<td>Flexibility Problem solving ability</td>
<td>Production units in Sweden and in low-cost regions. Adequate production capacity, Logistics and production planning skills and methods to manage safety stocks effectively, ERP-system, Capital.</td>
</tr>
<tr>
<td>Price reductions</td>
<td>Cost-cutting ability</td>
<td>Production units in Sweden and in low-cost regions. Lean production system.</td>
</tr>
<tr>
<td>Global sourcing</td>
<td>Supply chain management</td>
<td>Purchasing and supply chain management competencies.</td>
</tr>
<tr>
<td>Central sourcing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reliability as regards sharpened basic demands e.g. quality and delivery precision.</td>
<td>Well-performing supply chain member, proactivity, short decision-making process and a culture to work with what you can influence, Customer commitment</td>
<td>Organizational structure, KPIs, clear responsibilities and authorities with competent leaders, Methods to follow-up and work systematically, IT support and analysis tools.</td>
</tr>
<tr>
<td>Risk reduction</td>
<td>Risk reduction</td>
<td>Negotiating competence and experience. Back-up for vulnerable production resources.</td>
</tr>
<tr>
<td>Information and communication openness</td>
<td>Communication system and standards (e.g. EDI)</td>
<td>Business management system, Documented processes, Clear authorities and responsibilities, methods and tools for information, ERP knowledge, other IT solutions and IT knowledge.</td>
</tr>
</tbody>
</table>
5.2.3 NOTE

The information about this company is to a very large extent based on a thorough interview (according to the interview guide) with only one member of the management team of NOTE AB. He has a background as production manager and was one of the founders of NOTE. Since 2002 he has been responsible for factories in Estonia and Lithuania and been part of the management team of NOTE AB as COO. He has, among other areas, been responsible for production strategy. A new role for him is Quality, R&D and Investments (aimed at production). Additional information about NOTE has been collected from the company website and from annual reports.

The demands below are in most cases met by the described capabilities and resources.

Table 5-3. NOTE: Required resources and capabilities

<table>
<thead>
<tr>
<th>Demands to be met</th>
<th>Capabilities required</th>
<th>Resources required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expansion</td>
<td>Management</td>
<td>Centralized organization. Technical skills and ability to handle customers</td>
</tr>
<tr>
<td></td>
<td>Customer focus</td>
<td></td>
</tr>
<tr>
<td>Product development</td>
<td>Product development</td>
<td>Component database Cooperative work between sales and technical personnel towards customers</td>
</tr>
<tr>
<td>Customer closeness</td>
<td>Customer closeness</td>
<td>Access to factories. Small development units (laboratory and prototype workshops) geographically close to customers</td>
</tr>
<tr>
<td></td>
<td>Trust</td>
<td></td>
</tr>
<tr>
<td>Volume and product flexibility</td>
<td>Flexibility</td>
<td>Volume production units in low-cost regions. EMS-alliance for suitable production units</td>
</tr>
<tr>
<td>Cost reduction</td>
<td>Cost cutting ability</td>
<td>Volume production units in low-cost regions. Lean production systems</td>
</tr>
<tr>
<td>Global and central sourcing</td>
<td>Supply chain management</td>
<td>Central sourcing unit with knowledge and experience of purchasing and negotiation. Central system suppliers of the mechanics production</td>
</tr>
<tr>
<td>Extended service, from design to after-sale services</td>
<td>Service production</td>
<td>IT systems and processes to integrate customer routines and processes with internal organizational routines and processes</td>
</tr>
<tr>
<td>Information and communication</td>
<td>IT communication standards</td>
<td>Meeting structure within the company group. Projects to bridge over different functions. Intranet for coordinating documentation. Component database “Early warning system”. Customer accessing ERP system through internet connections</td>
</tr>
</tbody>
</table>

When compiling the acknowledged demands, capabilities and resources of the three companies there are several similarities as well as several differences between the companies. These are further discussed in the following passages (chapter 5.3 – 5.6).
5.3 Demands

There seems to be a shift in the scope of the “generic demands”, often called “hygiene factors”, on a supplier. The demands for delivery precision, quality and competitive prices have been increased to comprise short lead-times, environmental demands and continuous cost reduction. Now they also often embrace flexibility and communication/information.

Apart from the wider scope of the “generic demands” these factors also seem to be more vigorously upheld by the customers. When a supplier is taking on the role of system supply some “system demands” are especially emphasized – to work systematically with purchase and logistics issues, handling product development and project management, and increasing responsibility towards the customers within different areas. The companies in this study differ in their development – both in their view of these demands and in the degree of fulfilment.

5.3.1 Raised level of demands – a developmental driver for the suppliers

The companies studied all agree that the customer demands have been tightened up – from desire to demand. In their contacts with the customers they generally now meet a new team of purchasers in negotiations – well educated and experienced, working on an international basis. They often act more professionally and concentrate more on price. This sharpens the demands twofold: the subcontractors must deal with the customer demands in a structured way and present development and performance that are in line with them. But the increased professionalism of the purchasers also requires an increased level of skills from the selling organization. The seller must now be able to discuss a lot more than “product and price”, for example they must be able to rationalize the work of purchasing and activities in order to increase efficiency and decrease costs (cf. Gadde & Håkansson, 2001). The price, or rather the cost level, is very much in focus; with a higher share of purchased materials and services in the products, an increased visibility (open calculation models) is often demanded. Make or buy decisions as well as specifications of what is to be purchased, lead-time reduction,
rationalization of logistics and of administrative routines, are matters that the seller must be able to discuss with the purchaser.

What is also clear is that the question about overall responsibilities has been raised. The smaller subcontractors find that customer demands today form a more comprehensive picture, developing from earlier demands on an article level to demands concerning the company organization and the administration. Skills and experience within several areas are sought for in order to meet increased demands. The importance of purchasing and logistics skills is especially emphasized. Both the smaller companies acknowledge a demand to manage or reduce risks, both from an internal economic perspective and from a customer perspective.

The distribution of work in the production chain is changing as the subcontractors handle an increasing part of the manufacturing, and ever so often, also take part in new product development. According to the buying companies this enables the subcontractors to achieve large scale production and create possibilities to lower the prices. The next step for many of the customers, after shifting more of the purchasing and supplier responsibility to a limited number of “preferred suppliers”, is to also shift the responsibility for stock and distribution on to the supplier. Mekanotjänst finds this favourable as it ties the customer closer to them and enables the company to adjust and optimize the production. The downsides are, however, the high demands on IT, the increased capital costs, and the risk of increased obsolescence. To manage IT, logistics, and business agreements is important and the competencies in these areas are essential.

The smaller subcontractors strive to alienate themselves from pure price competition and use the experiences from their various customer relationships to contribute with other benefits. The choice of customers to serve is important for the growth and performance of a small company. This is especially stressed by Mekanotjänst, identifying the value of a demanding customer in the development work of the company. But the company also points out that it is very important that these demands are well in line with the overall aims and the resources of the firm.

5.3.2 Developing from different starting positions

Although all three subcontractors point out the importance of meeting the toughening demands concerning delivery precision, shorter lead-times, quality, and price reductions the two smaller organizations dwell much more on the demands that are related to purchasing and logistics and the challenges these demands pose. NOTE, on the other hand, have a centralized purchasing organization and well developed solutions to meet these demands.

Some demands are not met at all by the smaller companies, or are only understood with a very narrow outlook. Information openness by NOTE, for example, may allow the customer to follow their orders in the ERP system of NOTE via a web interface. They have full access to material prices via a component database. The smaller companies present open calculations for specific customers, when required.

The three companies have also chosen to take different viewpoints regarding the demands of participation in a customer’s new product development projects. This is one of the most explicit demands regarding system supply. However, it requires time and resources to share between the ordinary business and the customer’s development projects, and/or specialized resources devoted to construction and development work. Mekanotjänst has so far chosen to
limit its participation to prototype production, but the ambition is to be able to participate earlier in the construction work in a more consultative role. Rimaster has established a construction unit, showing the customer more clearly that construction is a focus area, and aiming to tie the customer closer to them at an earlier stage. NOTE has a high focus on development and construction units and establishes small laboratories and prototype shops near its customers. The presence of knowledge and experience is crucial for having low risks and low costs.

Another area that differs between the companies is their models for achieving volume flexibility. Mekanotjänst tries to handle this within the company as far as possible by means of working overtime, hiring extra personnel for shorter periods, increasing shift work and so on. The next step is to buy capacity from subcontractors. Rimaster has a volume production unit in Poland and they transfer larger volumes and labour-intensive jobs to that unit. NOTE has several such volume production units of their own in different countries (the Baltic States, Poland, China); and as “expansion tanks”, they use subcontractors. In Poland, for example, they use five contract manufacturers within EMS, with other customers besides NOTE.

5.3.3 Lessons for logistics research (theory)
The shift towards a wider scope of “generic demands” is combined with a tougher customer attitude towards upholding the performance and meeting of these demands. For a system supplier it is also important to develop capabilities to meet “system demands” in, for example methodical work with purchase and logistical issues, handling product development and project management, and meeting increased responsibilities, directed towards the customers. This capacity of renewal is in line with the dynamic capabilities framework (Teece et al., 1997), where the strategic management is to adapt, integrate and reconfigure the available resources to match the changed demands.

An increased professionalism within the buying organizations requires a wider range of skills from the suppliers. The changing distribution of work in the production chain is an ongoing process requiring ongoing activities to rationalize purchasing, increase efficiency and decrease costs (Blomgren, 1997). Technical issues, always highly focused on in the subcontractor’s organization, are now accompanied by other matters that must be capably handled in the discussions with the customers: e.g. lead-time reduction, rationalization and development of logistical issues, risk management, and the important use of information technology for communications and efficient administration (Gadde and Håkansson, 2001; Monczka and Morgan, 2000). Demanding customers may, however, contribute to spiralling development and growth of a subcontractor into a system supplying role, provided that the demands correspond with the aims and resources of the supplier. Environments with increasing dynamism have been found to promote the performance and growth of small firms (Wiklund and Shepherd, 2003), a view confirmed by the management of Mekanotjänst in this study.

The background, the original business concept and the size of the company are important factors for how the subcontractors understand and chose to meet the demands. The smaller companies with their roots and excellence in the productive aspects appear to find it hard to adapt to the demands of purchasing and logistics in a supply chain. Not surprisingly it seems that size (and available resources) may lead to more profound activities towards e.g. participation in development projects or actual investments to manage volume flexibility.
5.4 Capabilities with logistics bearings

Möller et al (2003) point out that the resource-based view of the company shifts the focus towards a knowledge-based perspective, taking insightful learning and its effects on the relationship between buyer and supplier into account. Expertise and resources are in focus.

The companies studied claim that handling production in an effective and competent way is the necessary base for a subcontractor, but it is not enough. Other important matters are, for instance, being able to handle the customers professionally, understanding the customers’ businesses thoroughly, being aware of the customer’s demands and choosing which of these to live up to.

The three companies in the study were chosen on the basis of the similarities in their lines of business (subcontractors, supplying different manufacturing services), of their different sizes and roles in varying degrees of system supply. They all strive to offer their customers a more comprehensive solution. Wernerfelt (1984) states that by specifying a resource profile for a firm it will be possible to find the optimal product-market activities. From another angle Coff (1999) points out that knowledge-based assets are hard to imitate because of firm-specificity, social complexity and causal ambiguity. Looking at the companies from that perspective it is evident that the competence-base and other resources developed during the life-span of the company influence its choice of customers.

The capabilities focused in this study have been extracted from earlier research, though to some extent reformulated (see chapter 4.2 for more details).
5.4.1 The dynamic capabilities – a management matter

The strive to develop the system supplying abilities also means a strive to clarify the competitive advantages of the company. Teece et al. (1997, p. 509) describe these as “resting on distinctive processes (ways of coordinating and combining), shaped by the firm’s (specific) asset positions ..., and the evolution path(s) it has adopted or inherited.”

The term ‘dynamic’ refers to the capacity of renewal to align with changing demands, while the term ‘capabilities’ stress the strategic task of adapting, integrating, and reconfiguring different kinds of internal and external resources to match these demands. This is well in line with how the smaller organizations emphasize their production specialist capabilities, e.g. the breadth and depth within mechanics and manufacturing (Mekanotjänst) and the combining of mechanics, electronics and low-cost production (Rimaster). These capabilities are considered well founded in the respective organizations.

All three companies in the study have chosen to concentrate on a limited number of targeted customer segments and emphasize the importance of knowing the business of their customers well. This must guide their strategic choices of which capabilities to foster or which development to invest in, in order to meet or out-perform the competition.

When asked about other specific capabilities of their firms, the respondents sometimes answered in an evasive way. This goes especially for the smaller organizations. The distinction between competencies (often described as the combination of knowledge, skills and attitudes of an individual) and capabilities is unclear. It is also evident that customer demands influence the picture, but when it comes to a clear goal (such as which capabilities are necessary to develop) this picture is not complete. The production techniques and the production skills are seen by all the companies as the basis of their own capabilities. Development areas connected to production issues are clearly identified by the smaller companies; e.g. improve the logistics of production in order to reduce stocks, improve capacity planning, or the handling of volume with flexibility. In other areas the aim and direction of the development is somewhat vague, even if development issues are identified. The background and experience of the management teams seem to influence the attitude towards change and the decision process; a firm with a manufacturing background and focus is familiar with the issues of production and thus feel competent to make decisions, but might be more unfamiliar within areas such as, for example, IT structure or supply chain management. The two smaller companies, for instance, talk about the need of purchase and logistics competencies, as some kind of “magic formula”, providing an overall solution to a lot of problems. The strategic alignment of purchase and logistics seems to be dependent upon the newly recruited experienced purchasers, not a matter that concerns the management group as a whole.

The customers strive for suppliers with an ability to systematically foresee and handle problems. This makes it vital for the supplier to take in the whole situation, to keep well-informed and to act proactively on that information. It also stresses the importance of process-oriented management, managing flexibility and using information technology as an enabler. This seems to describe fairly well the situation of all of the studied companies, although it is expressed in different ways and with different emphases. The customer focus is very pronounced but so is the need to live up to explicit performance demands, such as delivery precision and quality. The two smaller organizations particularly mention reliability with
regards to “generic demands” (quality, delivery precision) and risk-management or risk-reduction. Trustworthiness, with short decision-making processes, proactivity, and customer commitment is indicated as a very important capability. Trust is also mentioned by the larger company, NOTE, in connection with customer closeness.

NOTE has been working systematically to broaden its service offer to the customers and to make it clear. Supply chain management has always been important to the company, as for example where systematic supplier evaluations and sourcing activities are used to enhance flexibility. The company identifies the central sourcing and the component database with the supplier information as distinctive capabilities. A more structured way of working with the suppliers is placed as an explicit demand on the smaller organizations from several customers. The argument is very often based upon price formation, but such factors as lead-times, guarantee of quality and volume flexibility are also conveyed.

The smaller companies are not acting much in accordance with the SCM concept. The focus is primarily on the customers, while the suppliers are more often seen as only representing a cost to be reduced. The sourcing departments of the smaller companies are still very far from applying the supply chain management tasks of coordinating processes and activities with and across marketing, sales, product design, finance, and information technology (cf. e.g. Olavarrieta and Ellinger, 1997; CSCMP). This is partly an organizational issue, bridging over internal and external functional bounds. But it is also, to a very high extent, a matter of attitude of the management; changing the sheer company focus to include looking at the supply chain as a whole from the ultimate customer point of view, thus identifies ways of streamlining it. The SCM capability is closely connected to information and communication technology (ICT) and communication standards, and the attitude towards open communication. IT and communication standards are also closely connected with the demands for cost reduction, administration reduction, and enabling a greater visibility between different parties of the supply chain. The importance of reducing delays and mistakes, of coordinating information in an effective way, is recognized.

This development is to a very large extent driven by the customers, sometimes also by offers from large suppliers. The smaller companies have invested quite a lot of time and money in setting up and handling EDI messages, but have only been able to implement these automatized routines for a few of their suppliers. As the collaboration within their company groups is extended, the need for internal coordination of information increases. Neither of the two smaller companies seem to have a coordinated and united communication strategy. The technical standards are considered quite high, allowing the companies to meet most of their customers’ requests for automatized communications. But the smaller companies act in a reactive way – solving problems when they arise. A fragmentation within for instance Mekanotjänst may also be seen, where different users only see “their part” of the IT system (the programmes and the information they use in their work). This has been recognized as a hindrance in the internal development of the use of the ERP-system. But incorporating the IT and communication standards in the business strategy in order to make use of the technology in a more proactive and unified way, seems to be a big step for the smaller companies.

Closeness to the customers is important and NOTE stresses their ‘Nearsourcing’ concept, with customer access to factories, as an important factor in the expansion strategy. For NOTE customer closeness means both a physical prerequisite (a developmental / manufacturing unit “one hour by car from the customer”) and the ability to handle customer relations. The
smaller companies focus on customer relations, and the importance of visiting the customers frequently.

Open communication is frequently exemplified by open calculation, required for several customers. Open calculation with regard to purchase prices of materials or services, is frequently handled and is also seen by the smaller companies as a possibility for benchmarking. A somewhat more controversial situation may arise when customers express views about the production costs of the company.

NOTE has a broader view of open communication and has developed web solutions, enabling their customers to follow the production of their orders in some factories. The component database for use by the customers is another example. The smaller companies use VMI-tools for a few customers (upon request from the customers), thus getting a better view of the customer’s requirements and enabling the customer to follow up on the production. The implementation of this tool by the own suppliers in order to increase visibility in the supply chain, is however slow.

Cost reduction capabilities are emphasized by all the companies, necessitated by both customer demands and by the requirement for profitability. The transfer of production to volume manufacturing units in countries with lower wages than in Sweden is one way of reducing production costs; another is to invest in lean production methods. NOTE and Rimaster have chosen both these ways. Mekanotjänst is now implementing lean thinking, but has no production outside of Sweden.

Flexibility is a word with a positive overtone when it comes to adapting to changes. This is a necessity in the development towards system supplying ability. Practice and experience set the breeding ground for routine development; to be able to adopt quickly to new routines may be essential in industries with rapid technological changes as well as in the changing global pattern of trade. It is a great challenge to the management groups to develop the organizations to be both efficient and flexible.

Volume flexibility is even more emphasized by the three suppliers and admittedly an important and demanding task. It is however also a more “definite” and tangible demand, as production capacity is an everyday issue for a manufacturing company. All the companies complain about the flaws of the customer’s forecasts and the connected effects on production planning and capacity utilization. Both NOTE and Rimaster have chosen to invest in production units in low-cost countries in order to meet volume fluctuations in a cost-effective way. The flexibility concerning, for example, rapid product changes are more often handled in Swedish production units.

All three companies seek to broaden the customer offer, but the breadth of products and services is partly connected to which customers and segments the company has chosen to focus upon. Both the smaller subcontractors cooperate within their company groups to offer different types of manufacturing services. Being able to guarantee the quality of the produced articles is a fundamental condition but to be able to offer the customers prototyping is considered a valuable service. Taking part in customer product development projects early on, is an explicit goal for all the companies; this calls for various resources and in for example Mekanotjänst, the value of such projects must always be assessed in relation to the effort. NOTE has a clear business model with local “Excellence Units” supporting the customer early on in the value chain with development, prototyping and industrialization services.
5.4.2 Summing up “system capabilities” and their links to previous theory

Initially eight capabilities with logistical aspects of the system supplier role were identified: management, SCM, IT/communication standards, closeness to customers, open communication, cost reduction, volume flexibility, and product and service breadth. When looking at these from a more overall perspective they might be condensed into three system capabilities: management of systems and processes, SCM, ICT/communication management, supplemented by the important basic requirement of managing the “generic demands” or the “hygiene factors” well (see Table 5-4).

Table 5-4. Extracting system capabilities, links to the other previously identified capabilities

<table>
<thead>
<tr>
<th>System capabilities</th>
<th>Comprising capabilities of</th>
<th>Utilizing resources to improve upon:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management of systems and</td>
<td>Open communication</td>
<td>Attitude to openness, IT investments, using IT as an enabler to enhance internal and external cooperation</td>
</tr>
<tr>
<td>processes</td>
<td>Cost reduction</td>
<td>Measures such as e.g. lean production, including lean and logistics training, rationalization investments</td>
</tr>
<tr>
<td></td>
<td>Volume flexibility</td>
<td>Routine development, coordinating investments and market strategy</td>
</tr>
<tr>
<td></td>
<td>Product &amp; service breadth</td>
<td>Choice of customers to serve and strategic alignment to customer demands. Organizing for internal and external cooperation, developing and sharing skills and knowledge. Assisting customers in new product development.</td>
</tr>
<tr>
<td>SCM</td>
<td>Open communications</td>
<td>Internal and external cooperation, increasing visibility</td>
</tr>
<tr>
<td></td>
<td>Cost reduction</td>
<td>Centralized control, global sourcing, efficient purchasing, supplier development, logistics and lean training programmes, cooperation over functional and company borders</td>
</tr>
<tr>
<td></td>
<td>Volume flexibility</td>
<td>Using supplier capacities</td>
</tr>
<tr>
<td></td>
<td>Product &amp; service breadth</td>
<td>Using supplier capabilities</td>
</tr>
<tr>
<td>ICT standards/communication</td>
<td>Open communication</td>
<td>Systems to standardize information, making the most of new technology for different sorts of communication</td>
</tr>
<tr>
<td>management</td>
<td>Cost reduction</td>
<td>Automatizing routines, facilitating information search and access</td>
</tr>
<tr>
<td></td>
<td>Volume flexibility</td>
<td>Increasing visibility, efficient handling of customer forecasts</td>
</tr>
<tr>
<td></td>
<td>Product &amp; service breadth</td>
<td>Increasing customer services</td>
</tr>
<tr>
<td>Basic qualifying capability:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Managing generic demands</td>
<td>Competitive prices</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Meeting quality and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>environmental demands</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Delivery precision/short</td>
<td></td>
</tr>
<tr>
<td></td>
<td>lead-times</td>
<td></td>
</tr>
</tbody>
</table>
Management: All of the companies studied are outspoken about focusing on the customer; for the two smaller companies, the strategy is to limit the number of customers. The strive to develop long-term customer relations as system suppliers makes it important for them to know the customers’ businesses and challenges well in order to choose future strategies. The market sensing and customer linking is emphasized and in line with what Day (1994, p. 49) points out below:

“a shared understanding of the industry structure, the needs of the target customer segments, the positional advantages being sought, and the trends in the environment”.

This must guide strategic choices of which capabilities to nurture or develop in order to meet or outperform the competition and create a competitive advantage (Barney, 1991). Striving to become a system supplier with the base in production skills means that the management has to identify and sharpen the competitive advantages of the company. Recognizing the specific assets of the firm, the ways of coordinating and combining these in processes, and the development strategies that have led to this present position, is required to achieve dynamic capabilities: ‘dynamic’ meaning capacity to realign to new demands and ‘capabilities’ meaning strategic resource management to meet these demands (Teece et al., 1997)

The need for competence development programmes is recognised by all three companies in the study, but the smaller companies are more specific about their aims and directions. The possibility to widen the scope of the offer to the customers, to include more responsive service and to render the business more efficient as well as more profitable is part of the development strategy for the smaller subcontractors. Performance and profitability are supported by employee knowledge and skills, as well as by knowledge embedded in technical systems, management systems, and values and norms (Day, 1994). Coffs (1999) view about knowledge-based assets being hard to imitate because of firm-specificity, social complexity and causal ambiguity describes well the situation for the companies in this study. “Mass customization” strategies, described by Morash (2001) as hybrids between demand-side (customer closeness) and supply-side (operational excellence) capabilities also seem to be applicable to the companies studied. The most important capabilities are then flexibility and using information technology as an enabler.

The production is seen as the basis of their own capabilities, where resources have been combined and developed for years, and where investments to reduce costs and increase effectiveness are taken for granted. Volume flexibility to meet customer forecasts is an important and demanding task, especially for the smaller companies. Flexibility in a wider sense, in rapid and efficient adaption of the organization to new routines, is also recognised by these companies as a necessary challenge in developing as a system supplier. Flexibility to changing demands is important but as Grant (1991) points out there is a trade-off between efficiency and flexibility – a limited number of routines may lead to high efficiency as long as the situations do not vary too much. The smaller subcontractors emphasize and take pride in their ability to take urgent measures when necessary. This might, however, mean deviation from ordinary routines, and less efficient use of the resources. Routines are refined through practice and experience and to be able to adopt quickly to new routines may be essential when technology or environment changes.

For the smaller of the subcontractors the capability of product and service breadth is dependent upon which customers the company are serving. To classify, develop and widen the scope of the service offer is considered important. Development areas connected to production issues are clearly identified, and the decision procedure is familiar. In other areas
the aim and direction of the development is somewhat vague, and the decisions harder to make, even if development issues are identified. The background and experience of the management teams seem to influence the attitude towards change and the decision procedure itself. What is important for future development is a wider role of management capability – to form the organizational structure and manage parts and processes of a larger system in inter-organizational collaboration (cf. Newbert, 2007).

**SCM:** Customers expect system suppliers to work in a structured way with their suppliers concerning price-formation, lead-times, quality, volume flexibility, and more. Despite the commitment to customer demands the smaller companies seem to have a notably low focus on further elaboration of long-term supplier relationships. They hardly mention their suppliers’ roles in improving flexibility or in developmental work, although they do comment on the problems of communicating unreliable customer forecasts to the suppliers. Cost reduction capability is however thought vital. It is upheld through outsourcing volume production to low-cost countries and / or through lean production methods. Logistics and lean training programmes are launched but the smaller firms are still far from fulfilling the coordinating tasks fundamental to supply chain management. This is partly due to organizational conditions, and to a large extent, due to the knowledge and attitudes of the management. Centralized control, which according to Christopher (1998) characterizes logistically skilled organizations, is well in place in the larger company with a focused way of working with SCM. The two smaller companies strive to coordinate and adapt functions and processes to a logistics flow. Their sourcing departments are still very far from the supply chain management tasks of coordinating processes and activities with and across marketing, sales, product design, finance, and information technology (cf. e.g. Olavarrieta and Ellinger, 1997; CSCMP). They have an awakening insight into logistics as a strategic source of sustainable competitive advantage, but logistics’ distinctive capabilities are complex, consisting of interwoven physical assets, organizational routines, and skills and knowledge of the employees. Strategic foresight to choose the right patterns is required, as well as time to develop and integrate different resources (Olavarrieta and Ellinger, 1997; Esper et al., 2007). The purchase and logistics function of the smaller companies is still often seen as a firm specific cost centre with distinct activities. Supplier development activities are not prioritized, and no categorizations of the suppliers for that purpose have been made. They try to standardize routines and logistics processes in order to increase efficiency and be flexible to changes in the market as well as changes in demands, lead-times or availability (Abrahamsson et al., 2003). They recognize the importance of competence development and both the smaller companies in this study have a special focus on logistics learning. It is vital that the recently appointed purchase and logistics managers of these companies understand and continuously facilitate these learning processes, as the capabilities of a firm stem from its wealth of knowledge and comprise one way of achieving customer satisfaction and competitive advantage (Olavarrieta and Ellinger, 1997; Esper et al., 2007).

**Information and communication technology (ICT) for managing communications:** IT and communication standards to forward information throughout the supply chain as well as the attitude towards open communication are important issues. IT communication development in the smaller companies is often customer driven to achieve cost reduction, fast and correct exchange of information, coordinated for increased visibility between the customer and the supplier. The larger company seems to have a more structured way of working with IT communication and has developed specific web solutions involving both customers and suppliers. Open and mutual information exchange about, for example, orders and stocks, are seen as important for cooperation and development (Rota et al., 2002).
Although the two smaller suppliers invest much time and money in automatized routines, the implementation of these for their own suppliers are surprisingly few. One example is a VMI-tool used for a few customers (initiated by the customers); although the VMI processes have helped the companies understand the value for a manufacturer (knowing the actual requirements of the customer instead of waiting for an order) this tool is not used for their own suppliers. In order to make the best use of information and communication technology it has to be managed to support specific chosen strategies as well as business relations. The functional use of different IT support systems seems to be increasingly focused on by the smaller companies, although the strategic management concerning communications in these companies leaves more to be desired. Communication is essential for maintaining relations: for the larger of the companies studied, customer closeness means both a physical prerequisite of small units close to the customers, and the ability to handle customer relations. The smaller companies keep up customer relations by mail, telephone and frequent visits. A key factor important for widening the service offer towards the customers, might be to manage communications well.

In new product development work different supplier development responsibilities demand different sorts of communication between supplier and manufacturer (Wynstra and ten Pierick, 2000) and involve many different functions within both seller and buyer organizations. The means of making this process more effective is done by using other methods to communicate, rather than rationalizing the exchange of information, as is the case concerning order information. The larger of the companies studied has founded its “nearsourcing” concept based on this, with development units close to the customers allowing a tight collaboration in new product development work. The smaller companies are more dependent upon sharing drawings and other information through the exchange of excel-sheets and other files, often discussed through telephone conferences.

**Managing “generic demands”**: The strive for the smaller subcontractors is for long-term relationships with a limited number of customers. As manufacturers constantly strive to reduce their supplier base and focus on selected suppliers it is necessary for the suppliers to focus on existing customers, which should also increase the possibilities to reduce costs and increase profitability (Kalwani and Narayandas, 1995). From the customer point of view the consistency in the supplier performance is essential. This is recognized by the suppliers as performance and trustworthiness is top priority, especially concerning the “generic demands”. The time perspective may be noted here: performance in terms of time, cost, quality, service and other short-term criteria has been measured for a long time. Capabilities, on the other hand, are seen as long-term potential where learning is expected (Sarkar and Mohapatra, 2006; Sobrero and Roberts, 2002). The interest in this area is increasing, especially for the smaller companies, but the focus is more scattered and often presents a complex task as interacting routines require the cooperation of many different resources (Grant, 1991). It takes time to form capabilities, and what makes this even more difficult for the smaller companies is that capability factors (unlike performance factors) are often qualitative and lack established methods of measurement (Sarkar and Mohapatra, 2006). The companies studied are aware of the fact that long-term relations require suppliers that are both highly capable and high performers, and that high efficiency often also sustains high levels of capabilities, (Narasimhan et al., 2001).
5.5 **Resources**

![Figure 5-4. Descriptive model - resources](image)

The resource-based view of course also applies to the different kinds of identified resources.

Although the mentioned resources show a lot of similarities, e.g.
- centralized organization, or organizational structure
- the need for technical and production engineering know-how
- IT systems and processes to integrate with customer routines
there are more differences. Here the companies have made some choices and they have a history of developing their resources according to those choices. NOTE, for example, clearly state that a centralized organization, a central sourcing unit, and central system suppliers are required resources. Their component database, the ‘Nearsourcing’ concept, and the EMS-alliance for suitable production units, are examples of other resources developed and used to acquire required capabilities.

### 5.5.1 Organizational resources – some common features

The organizational resources are especially pointed out by the two smaller companies.

**Strategic customer segments**: One important issue emphasized by the smaller suppliers is the choice of customers to serve. Different lines of business, as well as different customers, pose slightly different demands, especially the smaller organizations who point out that when you want to take on a wider role as a supplier you have to understand the customer’s business well. This means that with limited resources you have to work with a limited number of customers. It is important to choose customers with similar demands — for production techniques, logistics, communication solutions and more — in order to be able to develop as a system supplier. All the companies have chosen to work with a few specific customer segments, aiming at supply chains where production is not a core business of the customer —

<table>
<thead>
<tr>
<th>Resources:</th>
<th>Competence-based</th>
<th>Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organizational</td>
<td>Knowledge, skills, and experience of employees regarding -market/business -purchasing/logistics -utilizing IT Communicative &amp; planning abilities Decisiveness</td>
<td>Business plans, goals, KPIs Various models to promote efficiency IT-tools Their own units/ suppliers</td>
</tr>
</tbody>
</table>

### Demands and objectives
- customer choice
- central sourcing
- IT & communication
- collaboration
- investments
- Leaders prerequisites

### Capabilities with a logistics bearing
- Business strategy
- Purchase & logistics strategy
- Business plans, goals, KPIs
- Various models to promote efficiency
- IT-tools
- Their own units/ suppliers

### Resources with a logistic bearing
- Business plans, goals, KPIs
- Various models to promote efficiency
- IT-tools
- Their own units/ suppliers
selling production systems and production services, but not products. The ambition is to spread the risks and to achieve balance between different lines of business and customers in different phases of the business cycle. The companies studied concentrate on a few different lines of business to get production covering different product life cycles. A telecom product, for example, often includes production in large volumes but most often it is replaced within 8 – 12 months, whereas a medical technology product, although in smaller series, may have a lifespan of more than five years. Mekanotjänst and Rimaster both have a small customer base (8-10 large customers representing the bulk of the turnover) while NOTE on the other hand has hundreds of customers. All the companies have a very explicit customer focus – although this may manifest itself somewhat differently in strategic measures.

**Internal and external cooperation:** The companies studied are all part of horizontal business networks; collaborating within a group of manufacturing companies with the same owner(s). The collaboration between these companies is seen as an important competitive factor. Close integration between the companies in the group makes it easier to achieve flexibility to adapt to and meet shifts in the market. All the companies strive to increase centralized management, especially concerning purchasing and logistical matters.

The organization must support cooperation between different functions. Here the companies have different models. NOTE works in cross-functional projects, for example, to create a platform to move the manufacturing of a product. Teams of technical and sales personnel cooperate with the customers. Rimaster and Mekanotjänst frequently meet their customers in cross-functional group meetings to exchange information. All of the companies are organized by function and claim to coordinate their internal functions through processes (with varying success within different areas). The smaller companies benefit from the smaller format – to gather a few key people with different functions into an informal meeting around the coffee machine is an easy and effective way of sharing information and making decisions. But more complex production involves more functions and more people. The demands for documentation and ways of sharing information with customers and suppliers are rising and the need to solve this in a more structured way is stressed. Meetings are a frequently used model, and for operational issues or specific projects, those are often cross-functional. But when it comes to coordination, benchmarking, standards development and so on, the meetings are functionally based. The need for more information, search facilities, and common access to information is a generally expressed desire. NOTE and Rimaster use their Intranets for sharing information. Mekanotjänst has an Intranet but it is not used actively.

**New product development:** As was found in the exploratory survey, and in line with the previous theory, resources for product development are essential. This also includes the ability to work in projects and to have skilled project teams. Here the companies studied have chosen to understand and tackle this in somewhat different ways. The packaging and presentation of these services differ among the three suppliers. The level also differs – from regular construction services to prototyping.

NOTE focuses very much on product development, building and expanding their organization to support it, and investing in small units working close to the customers. They are, however, very clear about not developing any products of their own, as to not compete with their customers. Rimaster has identified product development work as strategically important, and has chosen to reinforce this by establishing it as a separate unit. Mekanotjänst, on the other hand, does not explicitly say that they work with product development. The company has a special prototype department, and they recognize the importance of having project teams
working with their customer’s new product development projects. Pure developmental work is seen as difficult as the company often has not enough knowledge about the functions of the customers’ products. Instead the focus is on production engineering, and on the industrialization process (preparing the products for serial production).

All the companies strive to take part in the customers’ new product development projects. The ambition is to be able to offer advice concerning production methods or adaptations that may shorten the industrialization process and reduce costs. The drive for the supplier is to draw the customer closer and to increase the possibilities of getting to produce a new product.

**Lean production to reduce cost:** The attitude towards lean production is evolving and there is now a consensus: NOTE has worked with lean production for a long time and claims that this makes production more efficient. This is a way to meet Chinese competition, where the logistical disadvantages consume more of the costs. Rimaster has implemented successful lean processes in parts of their production and Mekanotjänst has recently started a broad scale project to implement lean production.

**5.5.2 Organizational resources – …and some diversities**

Some differences stand out between the two smaller firms and the larger firm: the importance of the owner/entrepreneur for the overall aims and directions, the development and focus of purchasing, and the attitude towards alliances.

**Ownership and management:** Both Mekanotjänst and Rimaster are privately owned, and the entrepreneur who established each company is still active in their respective businesses. Here it seems that Rimaster has an advantage over Mekanotjänst in the development department, as the owner has turned over the management of operations to an externally recruited CEO. This measure has allegedly led to an increased clarity of the organization and has somewhat changed the focus, which is thought to be wholesome. The owner of Mekanotjänst holds several positions (production manager, CEO, chairman of the board) which makes the organization more unclear and could mean an increased risk of sub optimized decisions.

The two smaller organizations stress the importance of good leadership: clear, decisive, communicative seem to be key factors when describing the “dream-leaders”. And these leaders seem to be rare. A smaller company with many functional leaders internally recruited, often without formal education or training for their role could be problematic. A management representing foresight, with sound knowledge of the market and the competitive situation, as well as the prerequisites for production, logistics, IT, and more, might be difficult to arrange in a small company. To attract a specialist may be difficult; to employ that person may be too expensive. The small company needs “generalists” more than specialists – it is necessary that the employees, especially the leaders, can handle a lot of different situations and matters. Their attitude and readiness to change is also important. Management support is always necessary when it comes to changes and development.

**Purchasing function:** Regarding the view on the purchasing function there is historically a difference in outlook. The smaller companies have started out from a very marked production focus, providing sub-contractual work, initially sometimes with materials provided by the customer. Purchased materials and services previously represented a smaller part of the total production cost and the number of suppliers was considerably less than today. The purchasing function was for a long time viewed as a “call-off function”, an attitude that has changed
today. NOTE, on the other hand, was established about ten years ago when merging two Swedish companies – a factory and a sourcing company which had access to production capacity in Poland. The higher focus on purchasing matters with a large central sourcing unit, could of course also depend upon the special conditions of the EMS line of business, with very large suppliers as counterparts.

The purchasers of the smaller companies in this study explicitly declare their ambition to be more involved in production and marketing issues. The importance as well as the difficulties of developing purchase and logistics processes and integrating them into an organization focused on production, is recognized by the smaller companies.

Alliances: The smaller organizations are somewhat hesitant to form alliances with external parties, being protective about their right to make decisions. Summing up the pros and cons regarding management and gains of alliances, makes this a complex matter which is difficult to develop. NOTE is the initiator of EMS-Alliance, consisting of electronics manufacturers in five countries, giving the customers access to production in suitable member production units. The smaller companies focus on extending the cooperation within their own company groups.

5.5.3 Competence-based resources – common features...

Customer focus and the ability to handle customer relations professionally are pointed out by all the companies. But customer focus can mean different things: from a systematic trouble-shooting competence to an ability to take urgent measures when something threatens to or has gone wrong. The systematic way to tackle problems or to develop routines is sought-after by the customers. This is identified as a leadership issue by the smaller companies; identifying competencies as decisiveness, ability to take a “helicopter view”, together with sound knowledge of the market and the prerequisites of production, logistics, and IT.

Internal competence development programmes are mentioned by all three companies – coordinating education and training programmes. The importance of good leaders in the organization is stressed by the two smaller suppliers, together with knowledge and experience concerning purchasing and logistics. NOTE sees technology know-how and skills to handle customers as critical. The understanding of the customers’ business is pointed out by all the companies as being important.

The value of working with lean production for cost reduction has also been recognized by all three companies. In Mekanotjänst, who are just at the early stages of implementation, this has a strong focus in the competence development programme for the personnel as a whole.

To have experience with global sourcing, especially from low-cost countries is seen as important in order to actively work with cost reduction for the customers.
5.5.4 Competence-based resources – … and different challenges

The differences between the smaller companies in comparison to NOTE regarding size, background, and development status, can be seen in several areas:

**Purchasing and logistics** are areas where the two smaller companies have identified shortcomings. These concern planning and production logistics, purchasing and market related logistics, experiences of sourcing from low-cost countries, and systematic purchasing work with a more centralized focus in order to reduce costs. Contractual legal skills as well as understanding different calculation models are also mentioned in this connection.

**Volume flexibility:** The ability to handle and act on customer forecasts are much stressed by the smaller companies – involving production planning with production logistics skills, LCC experiences, centralized sourcing and more.

**IT:** For the smaller companies the development is more dependent upon specific demands from its customers. How new solutions and systems are implemented may be dependent upon competencies to make full use of the investments. There is a difference between just meeting specific demands of one customer, and realizing the full potential of the IT solution in question, e.g. for other customers or for the suppliers. Functional responsibility to utilize IT as an enabler to rationalize administrative routines is sought-after by Mekanotjänst. But where and how are they influenced? Customer driven IT-projects guide the development to a large degree, in combination with the interest and competence of the IT-manager. One important factor is the pedagogy used; teaching the users how to best make use of different IT support systems.

**Personal dependencies:** The smaller companies with a limited number of employees are much more dependent on specific people and their skills and experiences. This means that they may be more vulnerable if something happens to a certain person. It may also mean that the combination of different competence-based resources could be more difficult to handle (e.g. a skilled technician in a smaller company may not be good at English, which can make the communication with international customers difficult).

In Mekanotjänst, for example, the sales personnel are recognized as technically more skilled than the purchasers. To prevent any communication deficiencies the purchasers are anxious to participate in customer meetings at an early stage. Otherwise this may result in reduced possibilities to convey the correct message about the prerequisites to the suppliers.

**Communication** skills are two-fold: technical, to fix automatized communication solutions for order handling and so on, and communicative, to act as an intermediary and convey or elucidate other sorts of information between different parties. The latter skill has been brought up by Mekanotjänst as important; deficient communication between different functions can cause great problems. Process routines are being implemented in order to remedy this, but knowledge and experience are also needed to get processes to function well. Rimaster is more accustomed to working with processes and the placing of the different managers close to each other in the office milieu seems to facilitate the communication between the different functions.
5.5.5 Tools – common features...
This is very much about models and routines; there is a need to coordinate and simplify the routines, to automatize routines, to reduce the number of unique customer routines and more. But it is also about strategic alignment. In what way should the demands of volume flexibility be met, for example? The investment policies influence the choice here.

Clear guidance and communication: The use of business plans, communicated goals, KPIs and efficient follow up are recognized as important by all the companies, though the focus varies somewhat. In a more centralized organization, such as NOTE, the need is more for follow-up and giving external information to shareholders, while in the more decentralized organizations of the smaller companies, the internal communication of the common goals is essential and the KPIs are intended mainly for “governing” purposes.

5.5.6 Tools – …and different conditions
IT: In the smaller organizations the development of different IT communication tools are governed mainly by the demands of the customers. NOTE, on the other hand, has for example developed internet access to increase information to the customers as well as to streamline their own administration. A component database for the supplier side is also offered as support for customer development work as well as for their own organization.

Purchase and logistics: The structured way of working with purchase and logistics is in many ways only in its infancy stages in the smaller organizations. Both Mekanotjänst and Rimaster have engaged qualified and experienced purchasing managers to develop this area. A classification of articles and suppliers is recognized as one important prerequisite and this remains to be done in both of these companies. To increase the collaboration within the company groups, coordinating logistics needs, using uniform models of agreements, are examples of other prioritized tasks in the smaller organizations, while in NOTE these areas are well developed.

Localisation/customer closeness: The smaller companies focus on customer relations, and the importance of visiting the customer frequently. Mekanotjänst and Rimaster recognize the need for tools to automatize the order-related information flow. For NOTE the physical prerequisite of a developmental / manufacturing unit “one hour by car from the customer” is a central part of the expansion strategy.

5.5.7 Summing up and comparing with theory
The two smaller companies show many similarities regarding the resources. The reasons why the larger company presents a somewhat different picture may be, besides its mere size and thus larger resources, due to its different background (merger of a manufacturing and a sourcing company) and the owner conditions. The more obvious conformities and diversities that are shown when grouping the companies like this are presented in Table 5-5 below.
<table>
<thead>
<tr>
<th>Organizational resources</th>
<th>Competence-based resources</th>
<th>Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Conformities</strong> – all three companies:</td>
<td><strong>Conformities</strong> – all three companies:</td>
<td><strong>Conformities</strong> – all three companies:</td>
</tr>
<tr>
<td>- Choose strategic customer segments</td>
<td>- Stress internal competence development programmes to coordinate education and training</td>
<td>- Recognize the importance of business plans, KPIs, communicated goals, and efficient follow up</td>
</tr>
<tr>
<td>- Have extensive cooperation within the company groups</td>
<td></td>
<td>- Utilize IT to increase information exchange</td>
</tr>
<tr>
<td>- See new product development as an important service</td>
<td></td>
<td>- Recognize the importance of facilities to assist customers in their new product development processes</td>
</tr>
<tr>
<td>- See lean production as important for cost reductions</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Diversities</strong> – the smaller companies:</td>
<td><strong>Diversities</strong> – the smaller companies:</td>
<td><strong>Diversities</strong> – the smaller companies:</td>
</tr>
<tr>
<td>- Concentrate on fewer customers</td>
<td>- Have more focus on lean implementation</td>
<td>- Are more governed by the customers in the development of IT communication tools</td>
</tr>
<tr>
<td>- Recognize the importance of the owner/entrepreneur for overall aims and directions</td>
<td>- Recognize certain shortcomings concerning purchasing and logistics.</td>
<td>- Lack some important basic and uniform models to improve the way of working with purchase and logistics.</td>
</tr>
<tr>
<td>- Need to develop and focus more on purchasing</td>
<td>- Are more uncertain about how to handle customer forecasts and volume flexibility.</td>
<td>- Have taken different stands such as to invest in specific construction units</td>
</tr>
<tr>
<td>- Are more hesitant about alliances</td>
<td>- Have a more customer-driven IT development</td>
<td>- Have also taken different stands such as to invest in production units in low-cost countries</td>
</tr>
</tbody>
</table>

The differences between the studied companies are also much a result of their history, developing their resources according to different customer choices and different strategies. Many occasional events and incidents (for example development projects, training programmes, cooperation with customers and suppliers, troubleshooting) result in a number of valuable resources, and especially in the smaller companies these are often tightly connected to the people employed and their unique knowledge. This makes them difficult to replace or copy. This is in line with the resource-based perspective, seeing the corporation as “a portfolio of resources rather than products” (Möller et al., 2003, p. 370), and being used to understand how a firm’s resources and capabilities may affect its performance (Barney, 1996). This special blend of resources constitutes the companies competitive advantages, where expertise and resources provide the prerequisites in the long run. Identified strengths and weaknesses of the companies may be used to build or strengthen “resource position barriers”, for example customer loyalty (Wernerfelt, 1984).

The companies have chosen to serve special customer segments in order to spread the risks and counterbalance customers in different phases of the business cycles and with different product life cycles. Motivation seems to be a strong driver for small firms (Wiklund and Shepherd, 2003) and the critical questions for the management of a small subcontractor are to establish what the company wants to be good at and what it is able to be good at (cf. Blomgren, 1997, p 249). The smaller subcontractors target their sales activities towards a
limited number of specially chosen customers, as thorough knowledge about the customers and their business conditions is required. In order to develop as a system supplier it also helps if these customers have similar needs and demands. The right balance among the supplier’s technological capabilities, the customer’s willingness to share information, and both companies’ strategic requirements seems to be important. Both the smaller companies mention customers or lines of business that have been dropped due to a strategically bad match, following the advice of Kamath & Liker (1994, p. 158): “smart suppliers scan their major customers constantly to determine which are worthy of being partners”. Although this might sound pretty presumptuous by a small- or medium-sized subcontractor it could mean taking up a more important strategic stand.

The smaller companies emphasize the importance of a demanding customer for the development of different resources. These resources may then be used as “stepping stones” for a growth strategy, where these or related skills are used for other customers or in entering into a new or similar line of business (cf. Wernerfelt, 1984).

The distribution of work within and between companies is an important issue (Blomgren, 1997). The companies studied strive to centralize management and benefit by large-scale effects in e.g. purchasing. They all collaborate within their company groups, in a horizontal network to widen the customer offer and facilitate flexible production solutions. Cooperating in teams to use existing practice and experience is an established routine in the organization of the largest company, but this way of working is also stressed by the smaller companies. Cross-functional teams in meetings with customers and participating in common projects support cooperation over functional and company borders.

The functional organizations are, to various extents, combined with working in processes. The smaller companies may initially benefit from their smaller format, but more cooperation over functional and company borders requires more methodical ways of working and more structured ways of sharing information. This is especially important in new product development work or in industries with rapid technological changes requiring fast learning of new routines (Grant, 1991; Wynstra and ten Pierick, 2000). New product development is recognized as an important area to cover, but with different resources the companies have chosen different strategies for the customers: the smallest company offers prototyping facilities and participating in project teams, the larger companies establish special units for supporting customer’s new product development work.

An important difference between the larger public company and the smaller entrepreneurial companies is the ownership, which may have affected the overall aims, the clarity of the organization, and the attitude towards alliances. Another difference is the focus on purchasing in the organizations, based on company history and their different business conditions, yet the development is, however, converging. The smaller companies acknowledge the importance of an efficient purchasing function and the purchasers try to increase collaboration with other functions as well as within the company group. The findings of this study are such that in a small subcontractor the sales personnel might possess more knowledge about the customers’ need and more technical skills than the purchasers. Both of the smaller companies strive to increase the collaboration between the sales and purchasing departments in order to make the best possible use of the skills on both sides. This is in line with Gadde & Håkansson (2001), who argue that in a small company, production and marketing issues do not have to be separated from purchasing problems. The larger company has established business alliances and a centralized management for collaboration within the company group. Although the
smaller companies adopt a wait-and-see policy regarding the need for alliances the cooperation within their company groups is extended.

The customers strive for suppliers with an ability to systematically foresee and handle problems, qualities that the smaller companies refer to as good leadership and competence development. Other priorities for the smaller subcontractors are to develop cost-reducing routines by acknowledging the importance of global sourcing with the help of experienced purchasing and logistics personnel. Trying to streamline the business and cut costs has led all the companies to focus on lean production, in different phases. The smaller companies with rather few employees are more dependent on the skills and experiences of specific people and are thus vulnerable. Combining the different skills would be an asset but might also be more difficult to handle. The identified challenges to be met concern purchase and logistics, acting on customer forecasts and planning for increased volume flexibility, which is well in line with the objectives described in supply chain management literature (cf. e.g. CSCMP; Halley and Nollet, 2002; Lambert and Cooper, 2000). To make a wider use of implemented IT investments is another improvement area, somewhat connected with required communication skills.

Tools are much about the operative work with models and routines for coordination, simplification, and automatization, and also concerns strategic alignment where investment policies may influence the decisions. In the smaller organizations, IT communication tools are to a very high degree influenced by the customers, while the larger company works with its own development plans for its customers and suppliers. Purchasing and logistics are functions that require a number of routines and working models, still to be developed within the smaller companies. Prioritized here is collaborative work within the company groups.

All three companies in the study recognize continuous learning as being important. This is in line with several researchers who even suggest this to be the only way to achieve sustainable competitive advantage (e.g. Day, 1994; Olavarrieta and Ellinger, 1997). Logistics learning is considered a prioritized area by both of the smaller subcontractors, but according to Esper et al. (2007) it requires a lot of involvement by the management: culture (open-mindedness, shared vision, commitment to learning), structure (supporting a learning culture through internal systems, processes and incentives), relations (relationships with supply chain exchange partners seen as a source of learning) and the temporal component (rapid learning, and institutionalizing it in the organization). These factors have not quite fallen into place yet.

5.6 Relations

The importance of customer relations is emphasized by all three suppliers. This is a topic that permeates all the resources. Organizationally this is, for example, shown by strategic choices of the customers where the relationships may be developed with a long-term perspective; communicative ability and the skills necessary to handle customer relations require competence-based resources; and communication tools are developed to support the everyday order information flow. The latter purpose of rationalization seems to be the one in focus when speaking of supplier relations. All three companies have explicit ways to support internal relations and communication, bridging together organizational borders through cross-functional groups and project teams.
An important reason why the smaller suppliers have chosen to concentrate on rather few customers is to have enough resources to keep up the relationships adequately and to get to know the customer’s business thoroughly. The frequent reorganizations of some customers may lead to negative consequences if a well-established personal relation is shifted. It may also be a stroke of luck: this person may reappear and facilitate new business with a new customer. One goal for Mekanotjänst is to develop relations higher up in the hierarchy of its customers, thus getting a better “foothold” within the organization of the customer. Having direct access to the ears of the decision makers will help make them less vulnerable to solely being presented as a figure in a performance follow-up.

All three companies emphasize the importance of trustworthiness and reliability concerning the basic demands or the “hygiene factors” (for example quality, or delivery precision). Risk management and risk reduction activities are mentioned in this connection, as is quick response to customer demands and, by NOTE, an “early warning system”.

The focus is on long-lasting relationships, trying to broaden the offer to the customers and avoid the clean-cut price competition. This should also enable the supplier to further strengthen the business relations through appropriate development steps. One example of this is the expansion strategy of the larger of the companies, with its “nearsourcing” concept: proximity to customers, allowing the customer frequent entry into the factories, and in some cases also into their ERP-systems, to follow the production. To be chosen as a “preferred supplier” is highly valued as the customers reduce their supplier base and focus on selected suppliers (Kalwani and Narayandas, 1995). This is an ongoing process and it is especially important for the small- and medium-sized suppliers to “stretch” their capabilities in order to live up to the increasing demands.

5.6.1 Lessons for logistics research (theory)

Relations span over all kinds of resources: organizationally in the choice of customers to serve, competence-based in communication and ability to handle customer relations, and in tools and models for everyday communications. To deepen the relationships with customers at different organizational levels is a deliberate goal for all three companies, as is trying to stand out from the competitors and to be known as a trustworthy, reliable, and proactive business partner.

The customer is often seen as the managing and deciding part and the supplier as active, trying to get the customer’s attention. This is true for example in Mekanotjänst, but it is not the whole picture. As Ellegaard et al. (2003, p.349) point out: “Non-economic factors, particularly trust, are complementary to economic ones in the governance of exchange relationships.” The relationship marketing (RM) researchers emphasize the buyer-supplier relation as a dynamic entity, developing through interactive processes. This is a view that is also much emphasized by the suppliers studied in this report.

The time perspective of business relationships has been studied and discussed by many (cf. e.g. Kalwani and Narayandas, 1995; Sobrero and Roberts, 2002), stressing the sustainability of capabilities over time and thus a correspondingly predictable and high-level performance. Aligning the long-term customer base to the business strategy is thought to enable the suppliers to make the best use of their know-how and capacities, to automatize routines, and choose the most appropriate development steps in order to strengthen the business relations and make them more profitable (cf. Kalwani and Narayandas, 1995). The aim to reduce price
competition by broadening the service offer is quite in line with the thoughts of Sobrero and Roberts (2002), who claim that the expectations of a commodity supplier are mainly about lower prices.

Logistics is externally oriented and extends over functional and company boundaries. Therefore logistics learning is seen as a key area, especially by the smaller companies with a great influence on the development of business relations. So far, however, they primarily focus on customer relations. Logistics learning capability involves effective maintenance and facilitation of the learning processes as well as converting the outcome of the learning to new useful strategies and operations, supporting further development of other logistics capabilities (Esper et al., 2007).

The analysis model has been modified in order to capture the relations dimension (Figure 5-5).

![Figure 5-5. Descriptive model – relations dimension added](image-url)
5.7 Developmental steps

The demands on suppliers are increasing, but they are different for different types of suppliers (see Figure 5-6). However, some demands are basic to all suppliers: “hygiene factors” for example, to meet the demands of quality, delivery precision, and competitive prices. When developing toward a more collaborative role in the supply chain the basic demands remain, though they may be upheld more strictly by the customers. Additional new demands are raised and must be managed adequately. More effective handling of the increasing number of subcontractors, more effective purchasing routines, cost cutting abilities, information and communication routines are required.

![Figure 5-6. Different types of suppliers – different demands to meet](image)

For a small supplier with tough competition, it is important to choose its strategy carefully in order to make the most of its limited resources; it must strive to develop distinctive capabilities to achieve a sustainable competitive advantage adding value to its customers. Often a small organization, with only limited resources, has several of the components that according to Esper et al. (2007) are required to form logistics learning capabilities. The culture and the structure of the firm have often developed side by side and have been formed by the owner. Relations to customers and suppliers are often well established and the possibilities for a small firm to make rapid decisions and changes are well known. The available resources, the management and the attitudes towards learning may from this perspective be assets or liabilities.

The increasing demands of the development phases of a small supplier, with no products of its own, may be illustrated in two steps (Figure 5-7):

![Figure 5-7. Development steps towards system supply](image)
There are a number of steps inbetween in this development, but these are not focused on in this thesis. Managing the “generic demands”, handling “hygiene factors”, are required by all of these component and capacity suppliers. The system suppliers meet increased and new system demands that also require formation of system capabilities. To achieve a sustainable competitive advantage, it is necessary to develop distinctive capabilities. The development is of course not as straightforward as indicated here. As the suppliers have different customers with different demands they have to act on different levels simultaneously. But a supplier aiming to develop towards taking on a system supplier role has to make strategically wise decisions regarding required capabilities, and then they must consistently act according to these decisions. Using its resources to render processes more effectively will successively lead to a firmer foothold on a more demanding, mature, and hopefully rewarding level.
6. Conclusions

The purpose of this thesis has been to describe what the widened role of system supply might mean to a small- or medium-sized subcontractor in terms of demands, capabilities and resources, by answering the following research questions:

1. What are the demands on the logistics system of a system supplier compared to a component supplier?
2. What logistics related capabilities are considered especially important by a supplier developing system supplying ability?
3. What does this imply for the suppliers resources – organization, competence-base and tools?

These questions have been answered in detail in the respective paper (Chapter 4.1 – 4.3), dealing with one question each, and further discussed in the analysis above (Chapter 5.3 – 5.6). A short summation below is followed by what I have found to be the most important “gaps” needed to be filled for a small supplier that wants to develop system supplying ability.

6.1 Demands on a system supplier

The “generic demands” for price, quality, and delivery precision are further tightened, and more factors are transforming from being a desire to an outright demand (e.g. automatized order communication and handling volume flexibility). Increasing professionalism from the customers’ purchasers requires increased and new competencies in the selling organization. “Product and price” is not enough any more. After shifting more of the purchasing and supplier responsibility to a few preferred suppliers the next step for some customers is to also shift the responsibility for stock and distribution. This draws the customer closer to the supplier and may facilitate the optimization of the production; it also increases the capital costs, the obsolescence risks and the demands on IT systems.

The overall demands are increasing, but differ for different types of suppliers and depend on the customers addressed. When developing toward a more collaborative role in the supply chain, additional new demands are raised and must be managed adequately. More effective handling of an increasing number of subcontractors, more effective purchasing routines, cost cutting abilities, information and communication routines are necessary. They add up to a few “system” demands of special importance: systematic purchase and logistics work, product development & project management, and increased responsibilities.

Purchase and logistics demands cover systematic work with supplier assessments and development work to render the buying processes and the logistic solutions more effectively. Other demands are low-cost sourcing, effective material replenishment systems and a skilled logistics organization that is able to actively handle its subcontractors. System deliveries consist of more cooperation, where logistics and purchase are very important ingredients for making it work, while component deliveries, to a greater extent, depend on the internal production skills.
Demands for *product development and project management skills* are significantly more stressed on a system supplier, although only peripherally dealt with in this thesis due to low logistics significance. A system supplier is expected, to a much higher degree than a component supplier, to have access to experienced project leaders and project teams, to collaborate in design and product development, and contribute with know-how regarding material choices, technical solutions etc. Customers stress that a system supplier should “understand” the complete product to be able to suggest improvements to optimize the final result regarding function, cost, lead-time, etc. It concerns complex products, and quality as well as production issues. A system supplier should be able to analyze technical problems and report conclusions as well as search out new subcontractors to solve questions within new problem areas.

*Liability* demands rated as considerably more important for a system supplier concerning e.g. spare parts responsibility, responsibility for subcontractors production (quality, environment, Code of Conduct etc), product liability insurance as well as explicit routines for contingency planning, secure IT-systems, and product guarantees. System supply requires systematic work to secure the line of supply through the entire supply chain.

The organization should be “complete” with skills and knowledge within several areas, e.g. IT-systems and their applications, quality- and measurement organization and production organization, with more diversification as a system supplier.

Focus on flexibility when developing as a system supplier should be placed on the production equipment to manage rapid product changes and on an organization to manage changes in customer demands. The demands for production engineering skills and for managing rapid volume changes are equally important to a component supplier. More important for a system supplier are the ability to handle electronic information via EDI and to keep the customer informed before changing the production process or supplier.

For a small supplier the choice of strategy to meet these demands is important in order to make the most of its limited resources. Striving to avoid pure price competition makes the choice of customers to serve important. A demanding customer may make a considerable impact on the growth and performance of a small supplier, provided that the demands correspond to the overall aims and resources of the company. Acquiring, improving and refining capabilities for a sustainable competitive advantage may be a way to maintain the desired long-term relations, adding value to the customers. Logistics learning capabilities may be central to this connection (see e.g. Esper et al., 2007).

### 6.2 Capabilities and resources important to a system supplier

Capabilities and resources are entwined. It is *the way the resources are used and interact* that determines if a capability exists. New capabilities are established starting out from standardized and well-known routines. Just possessing a skill or a technique is not enough – it must be frequently used and combined with other resources in processes to form distinctive capabilities, refined through practice and experience. This constitutes the real challenge for the development of distinctive and sustainable capabilities, which is important for the system supplier role.
Five especially important system capabilities are identified: management of systems and processes, SCM, ICT/communication management, and relations management, supplemented by the most important basic capability which is managing the “generic demands” or the “hygiene factors” well. How these relate to demands and resources are further described in Table 6-1 below.

Table 6-1. System capabilities to meet demands and utilize resources

<table>
<thead>
<tr>
<th>SYSTEM CAPABILITIES</th>
<th>MANAGER OF SYSTEMS AND PROCESSES</th>
<th>Utilizing resources – to improve upon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development &amp; project management</td>
<td>Collaboration in construction and development work. Experienced project leaders/teams</td>
<td>Organizational: Strategic customer segments and alignment to customer demands. Focus on leadership supporting cross-functional teams and processes. Attitude to openness. Management focus and strategies for lean production and effective sourcing and logistics. Investment policy coordinating investments and market strategy.</td>
</tr>
<tr>
<td><strong>Liability</strong> Establishing company liabilities and allocating resources to meet increasing responsibilities (managing spare parts, product liability insurance, patents and registered designs etc)</td>
<td>Flexibility Production capacity for rapid product and volume changes, high production engineering knowledge, organized for rapid changes in demand</td>
<td>Competence-based: Distinct and communicative leadership, able to take a “helicopter view” with good knowledge of the customers’ businesses as well as internal capabilities.</td>
</tr>
<tr>
<td>Communication and information Information before change of production process or supplier, rapid response to technical changes</td>
<td>Organizational: Strategic customer segments and alignment to customer demands. Focus on leadership supporting cross-functional teams and processes. Attitude to openness. Management focus and strategies for lean production and effective sourcing and logistics. Investment policy coordinating investments and market strategy.</td>
<td></td>
</tr>
<tr>
<td>SCM</td>
<td>Purchasing &amp; logistics Systematic work with purchasing processes and supplier development Global sourcing, logistics knowledge</td>
<td>SCM</td>
</tr>
<tr>
<td><strong>Liability</strong> Establishing company liabilities and allocating resources to meet increasing responsibilities (for subcontractors’ production, quality, environment, Code of Conduct etc)</td>
<td>Flexibility Utilizing supplier capacities and capabilities</td>
<td>Competence-based: Forecasting and capacity planning, handling and acting on customer forecasts. Logistical and purchasing skills, contractual and legal knowledge. Experience from sourcing and/or manufacturing in low-cost regions. English-speaking.</td>
</tr>
<tr>
<td>Communication and information early-warning-process</td>
<td>Organizational: central sourcing unit, consolidated to guide the subcontractors. Volume manufacturing units and/or qualified subcontractors.</td>
<td></td>
</tr>
<tr>
<td><strong>Relations:</strong> co-operating within the company group and with external partners for system supply. Close collaboration in new product development.</td>
<td><strong>Tools:</strong> Forecasting evaluation. Decision-making process regarding capacity utilization. Material replenishment systems. Process for “early warning”. Models to classify articles and suppliers. Supplier evaluation and development tools. Uniform models for supplier agreements, logistical agreements</td>
<td></td>
</tr>
<tr>
<td><strong>Relations:</strong> co-operating within the company group and with external partners for system supply. Close collaboration in new product development.</td>
<td><strong>Tools:</strong> Forecasting evaluation. Decision-making process regarding capacity utilization. Material replenishment systems. Process for “early warning” Models to classify articles and suppliers. Supplier evaluation and development tools. Uniform models for supplier agreements, logistical agreements</td>
<td></td>
</tr>
</tbody>
</table>
### ICT STANDARDS/COMMUNICATIONS MANAGEMENT

<table>
<thead>
<tr>
<th>Demands to be met</th>
<th>Utilizing resources – to improve upon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication and information</td>
<td>Organizational: ICT structure and policies. Organizational focus on deployment and development of capabilities such as EDI and web site for customer/supplier log in. Constructive about sharing information with customers and suppliers. <strong>Competence-based:</strong> Communicative ability. Understanding IT support systems and developing their use within and across the borders of the organization. ICT personnel with educational as well as technological skills. <strong>Tools:</strong> Intranet, web interfaces, and systems integration to share more information with suppliers and customers. Standardized information in automatized routines. <strong>Relations:</strong> Formal and informal meetings. Facilitating information search and access, increasing visibility and customer services. Educational as well as technological support to their own personnel and to participate in customers’ or suppliers’ ICT development projects</td>
</tr>
<tr>
<td>Automatizing order-related routines (EDI standard messages), early-warning-process</td>
<td></td>
</tr>
<tr>
<td>Increasing visibility</td>
<td></td>
</tr>
<tr>
<td>Efficient handling of customer forecasts, stock-replenishment based on forecast or consumption</td>
<td></td>
</tr>
</tbody>
</table>

### RELATIONS MANAGEMENT

<table>
<thead>
<tr>
<th>Demands to be met</th>
<th>Utilizing resources – to improve upon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development &amp; project management</td>
<td>Organizational: strategy for expansion, preserving existing and establishing new customer and supplier relations. Organized to support internal and external cooperation, within the company group and with a limited number of customers and suppliers. <strong>Competence-based:</strong> Understanding the customers’ businesses. Experience to make well-founded decisions concerning both customer and supplier relations. Organizing skills <strong>Tools:</strong> ICT systems. Cross-functional meetings within and across the borders of the organization. <strong>Relations:</strong> More trust in the customer-supplier- relation enables suppliers to invest</td>
</tr>
<tr>
<td>Collaboration in construction and development work</td>
<td></td>
</tr>
<tr>
<td>Flexibility</td>
<td></td>
</tr>
<tr>
<td>Utilizing supplier capacities and capabilities</td>
<td></td>
</tr>
<tr>
<td>Communication and information</td>
<td></td>
</tr>
<tr>
<td>Increasing visibility</td>
<td></td>
</tr>
</tbody>
</table>

### MANAGING GENERIC DEMANDS

<table>
<thead>
<tr>
<th>Demands to be met</th>
<th>Utilizing resources – to improve upon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Competitive prices</td>
<td>Organizational: Co-operative leaders in cross-functional teams and processes. <strong>Competence-based:</strong> Production technology, planning, production, purchasing and logistics skills. Quality and environmental systems. Lean production and rationalization skills. <strong>Tools:</strong> Relevant calculation and costing models. ERP system. Lean production system. Action plans, with distributed goals and KPIs, tightly followed up. <strong>Relations:</strong> co-operation in cross-functional teams, frequent communication with customers and suppliers</td>
</tr>
<tr>
<td>Total cost responsibility, activities to increase productivity, obtain cost savings and reduce prices</td>
<td></td>
</tr>
<tr>
<td>Quality &amp; environmental demands</td>
<td></td>
</tr>
<tr>
<td>Quality and environmental certificates</td>
<td></td>
</tr>
<tr>
<td>Proactive work with quality improvements</td>
<td></td>
</tr>
<tr>
<td>Delivery precision/short lead-times</td>
<td></td>
</tr>
</tbody>
</table>
**Systems and process management**

The two smaller organizations stress the importance of good leadership, market sensing and customer linking. A careful choice of which and how many customers to serve is important as a more comprehensive responsibility towards their customers also implies thorough knowledge about their businesses. The available resources must guide the strategic view of the company’s capabilities, to sharpen the competitive advantages.

The strategy of a small subcontractor to widen the offer to the customers in a mix of operational excellence and customer closeness, stresses the importance of flexibility, internal and external communication, and the use of information technology as an enabler. The versatility and the ability to “make things happen” which characterize many small organizations are crucial factors, affecting the performance in almost every area. Volume flexibility as well as rapid and efficient adaption to new routines are also recognized by these companies as necessary challenges in system supply development.

Investment strategies to align, for example, capacity and ICT to the demands are important. An advantage of the small, privately owned companies is the often short decision-making processes with a corporate culture of “can do” and commitment. With deliveries of a larger part of a finished product, follows a larger responsibility and a broader range of liabilities. The management must establish the strategies, set the limits for what kind of responsibilities and liabilities the company should be able to take on, and “package” the services to fix the prices. Competence development programmes to support the wider responsibilities are required.

The operative work is often prioritized in small companies and to elaborate on strategic business plans and to unify the different functions towards common strategies are important issues (to agree on which demands to fulfil, align resources, acquire capabilities). These strategies should be supported by and communicated through distinct goals and KPIs on the operational level. There seems to be an important development step for smaller companies here and that is the relationship between owner and management. By appointing an external CEO a more goal-oriented organization with clearer authorities and responsibilities may be achieved.

Competent leaders are a prerequisite but this is not enough. An open-minded management team that understands the importance of the supply chain and increased visibility is important. In a small company many employees are multifunctional. But the functional organizational context of a system supplier must support cross-functional teams, a clear process organization, and take advantage of different resources to build “organizational routines”. As managers of a system supplier the leaders must recognize their more comprehensive role of managing a wider system, and intra- as well as inter-organizational processes.

**Supply chain management instead of “purchase and logistics”**

Working in a more structured way with purchasing activities as well as with supplier development activities are explicit customer demands on small system suppliers. The two smaller companies in this study have implemented competence development programmes to increase logistics competencies within planning and production, as well as within purchasing functions. But supplier development activities are not prioritized and the focus on further elaboration of long-term supplier relationships seems to be low.
My impression is that the smaller suppliers still see purchasing and logistics as just a separate function; certainly they are more focused than before, but not enough to change the overall strategies. The coordination between different functions is more up to personal initiatives than a structured strategic move by the management. The “status” of the purchasing department has increased recently following the importance of the performance; as the value of purchased goods and services increases, so too does the impact of logistics.

Central issues for the companies are central sourcing, and global sourcing (especially low-cost sourcing), demanded by the customers and driven by the need to reduce costs. Supply chain management is a concept sometimes mentioned, but there are no guidelines for supplier relations and it is not prioritized in the smaller companies. Most often in the discussions with the suppliers, the focus is on price and other factors directly affecting the cost of the purchasing company, not on facilitating integration of supply and demand between the companies. The possibilities to make use of subcontractors’ material and process knowledge are not fully utilized.

The need for tighter alignment of purchasing and logistical issues with the marketing function is mentioned. With an increasing share of purchased materials and services, effective logistics solutions are needed to meet customer demands of short lead-times and volume flexibility. Utilizing IT to enable communication solutions and increased visibility in the supply chain is vital. The risk of obsolescence and unnecessary stock is evident if the entire picture is not made clear. Handling customer forecasts requires an overall view of all available production capacities, including those of well qualified subcontractors.

Managing communications by information and communication technology (ICT)

The need to focus on EDI (electronic data interchange) to automatize more of the order-related communication and reduce costs is recognized. In the smaller companies this development is often customer driven and a dedicated IT-manager is decisive for the focus on technical development, IT security, communicational and functional use of IT. Enterprise Resource Planning (ERP), electronic communication systems, systems for handling VMI, e-invoices and selfbilling, are examples of IT enablers required by a system supplier. In a second step, as far as time and resources permit, these communication tools may also be implemented for some of the suppliers. Up until now this has been done to a surprisingly low degree in the two smaller companies of this study. With a more distinct supply chain management policy there ought to be great opportunities to get a lot more effect out of these investments.

To increase visibility through standardized information processes – internally and externally – is not very often mentioned as a goal by the smaller companies in this study. The experiences of VMI systems have, however, taken this perspective, especially in connection with customer forecasts of varying quality.

New product development work, on the other hand, involves many different functions within both seller and buyer organizations, with many different demands on communication. To render this process more effective requires other forums to communicate rather than rationalizing the exchange of information.

It is also important to utilize information technology to constantly keep personnel well-informed and alert to changes, helping the organization to coordinate its activities in cross-functional teams and processes and thus responding to customer demands. As the
organization grows, this requires strategic communication-management, prioritizing and coordinating resources, to make the most of the cooperation the company has with both its customers and suppliers.

**Managing relations**

Relations need support from all kinds of resources – from an organizational mindset to the use of tools and models for everyday internal and external communications. In a small company with limited resources and demanding customers, close contacts and cross-functional meetings with the customers are important to get “first-hand-information” about new projects as well as ongoing business, material requirements, cost limits, lead-times and more.

The smaller companies strive to deepen the relations with customers at different organizational levels, to be known as trustworthy, reliable and proactive business partners. With a limited number of employees it is relatively easy to keep the personnel well informed, acting in an integrated way with its customers. As the company grows and takes on wider responsibilities it is crucial to preserve commitment and efficiency by keeping all employees well informed about changes and new customer demands and by distributing power of decision, supported by standardized and well-known routines. To align the long-term customer base and the capabilities more closely to the business strategy would further strengthen their business relations and make them more profitable.

Communication openness concerns attitude and cooperation, internal and external relations. The smaller companies in this study sees the cooperation within the company group as a way to offer breadth of products and services to the customers. They are more hesitant about external supplier networks. As logistics span over functional and firm boundaries logistics learning is an important way to influence the development of business relations. If managed properly the outcome may be new useful strategies and operations, and a constructive dialogue with customers and suppliers for development of other logistics capabilities.

**Managing “generic demands”**

To be trustworthy when it comes to fulfilling the “generic demands” is top priority for all suppliers; it is an order-qualifying capability. The customers are strictly following-up on e.g. quality and delivery precision, and long-term relations require that the suppliers are both highly capable and high performers. The small suppliers are used to these demands, although they sometimes might find them hard to cope with. The other required system capabilities described above must be prioritized and aligned to also strengthen this capability.
6.3 *The descriptive model*

The descriptive model may be supplemented to illustrate these findings – resources that form the prioritized system capabilities to meet increasing demands (Figure 6-1).

![Figure 6-1. The conclusive descriptive model](image)

6.4 *Theoretical contributions and practical implications*

A lot of research about logistics has been carried out concerning large international companies, but comparatively little covers the situation and the conditions of a small- or medium-sized subcontractor with no products of its own. Much is written about the relationships between customers and suppliers, but the customer’s point of view is, however, over-represented in the literature, while studies from a supplier perspective are rather few (see e.g. Rota et al., 2002; Chung and Kim, 2003; Blomgren, 1997).

This thesis has identified logistical demands and challenges facing a small supplier when evolving as a system supplier to large international companies. Important capabilities for a small- or medium-sized supplier have been identified and illustrated; they are capabilities with a logistics bearing and supporting system supply. Though this is a small study (needs to be expanded in order to be conclusive) it contributes to an overall picture of four different types of resources that are required by a small supplier to form logistics capabilities that focus on system supplier capabilities. Although specific system supplier aspects have been dealt with in earlier research (e.g. product development, communication) it has mainly been based on the conditions of large companies. The conditions of a small supplier with limited resources are essentially different and the study of their situation and development constitute an important issue.

To develop into a system supplying role is a decision with many strategic implications. Coping with the increasing complexity in production; handling an increasing number of
suppliers; cooperating with customers and subcontractors to suggest the best production solutions; continuously working on cost reduction and productivity improvement measures are examples of everyday activities that require appropriate resources. Decisions to transform these resources into logistics capabilities, concerning for example management, IT and communication standards, or volume flexibility, implies important strategic aims and directions. To make the offer clear to the customers, as well as within their own organization, resources need to be “packaged” for a number of marketable distinctive capabilities. Effective logistic solutions form an essential part of the picture, but the logistics capabilities may be designed differently, in different business relations or lines of business.

This study shows that a small supplier may have to consider the pros and cons when choosing to invest in developing the business and relations towards a demanding customer. The existing resources, e.g. in the form of personal skills, or production technology and quality system, may be seen as assets if fulfilling the demands would mean enhancing and strengthening these resources in manageable steps. A customer posing such demands could be seen as a help in the development of the company. Demands requiring exclusive special treatment or completely new knowledge, on the other hand, could mean losing efficiency; and to meet them would call for more consideration before investing time and money. The small- or medium-sized company that wants to take on a system supplying role for a customer needs to carefully identify and evaluate that customer’s demands. It is not only a matter of being able to handle the necessary technology; it is also about e.g. organizational issues and communication. These efforts are directed towards long-term relationships; which is also in line with the interest of the customer to reduce the number of first tier suppliers.

The resource-based view (RBV) offers a strategic perspective into understanding how a firm’s resources and capabilities may affect its performance (Barney, 1996). A small- or medium-sized enterprise is the result of its history; a number of valuable resources shaped by occasional events and decisions (such as development projects, training programmes, cooperation with customers and suppliers, troubleshooting). These resources are often tightly connected to the people employed and their unique knowledge, and thus difficult to replace or copy.

This study points out the importance for a small supplier to identify, develop and shape its existing resources to form different capabilities. Meeting the “generic demands” is considered a necessary capability for all suppliers. In striving to develop from a component or capacity supplier to a system supplier a number of “system demands” need to be met, coping with more comprehensive systems and processes. One very important capability here is Supply Chain Management (cf. e.g. CSCMP), requiring complete management commitment. But it is also very important to be sensitive to the customers and to changing demands – continuous learning, especially logistics learning, is required to uphold the position and to form and preserve necessary system capabilities.

This mix of resources that are used to acquire capabilities may also be used to shape a company’s competitive advantage, where the products constitute the base of short-term competition, but expertise and resources provide the prerequisites in the long run. Barney (1986) introduced the VRIO framework, identifying competencies or success factors that are Valuable, Rare, Inimitable (or very costly to imitate), or for which the firm is Organized for leverage. Resource position barriers can then be built up as it is “much easier to pioneer a position than to replace someone else who already has it” (Wernerfelt, 1984, p. 174).
The developmental steps taken to create a successful system supply may be supported by these theories, both resting on the resource-based view: the Supply Chain Management to meet increasing demands, and the VRIO framework to form sustainable competitive advantages.
7 Suggestions for further research

The conditions of small subcontractors differ considerably from those of larger companies, especially regarding resources. To expand upon this knowledge about different types of resources required by small suppliers to form logistics capabilities (focusing particularly on system supplier capabilities) would be a contribution to the development of these kind of suppliers and their role in the supply chain.

The strategic alignment in a small- or medium-sized company is pointed out as important, but how structured are the different choices? Are the effects being discussed and analysed by the management? How much of the development is customer or event driven? The choice of customers or branches to serve has been indicated as one important factor for the alignment of capabilities. To find out if, and in that case why, this is so would be an interesting subject for further research.

More and more customers are demanding increased responsibilities from the suppliers when it comes to customer’s stock and distribution. This is often met with a constructive attitude as it draws the customer closer and enables the supplier to adapt and optimize the production better. The negative aspects of it are the high demands on IT, and a “capsized” traditional business model because of the increased amount of capital tied up in customers’ stock. This is further enhanced by extended payment terms. To transfer the demands on to the suppliers further up in the supply chain is one strategy. But with the competitiveness of the supply chain in focus there should be better ways. The customers’ management of the supply chain has been much investigated, but the possibilities of small suppliers utilizing their businesses with large international customers in order to get good, profitable, financial agreements could be worth looking into.

The companies studied see very clear advantages of working closely within the company group, centralising and/or coordinating purchase and logistics, customer offers, and so on. The importance of good relations is emphasized by all the companies, but most often with the specification “Customer relations”. What about supplier collaboration, outside the company group? What are the difficulties? Supply chain management is a neglected issue in smaller companies – how may supplier collaboration best be developed?

This study focuses on the capabilities with logistics bearings. A central part that is almost completely omitted in this study is about supplier collaboration in customer product development. To small subcontractors who offer manufacturing services, the possibilities to get paid for their concurrent engineering services are slim. The customers often see these as a part of the product offer, however innovative the solutions may be. What is needed to distinguish and “package” these services as a separate offer? Could this be aligned with supply chain management and further enhanced through collaboration?

A goal for future research would be to deepen the knowledge about how logistics systems can be designed for such manufacturers, how guidelines for logistics functions and planning systems suitable for a small system supplier could be developed, contributing to effective and profitable flexibility and delivery capacity.
References


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APPENDIX I Questionnaire – addressed to customers and suppliers respectively
Enkät

Krav på underleverantörer

Läs det här först!


Med systemleverantör avses en leverantör med helhetsansvar för funktionen hos en produkt eller system av sammansatta komponenter som framställts i flera förädlingssteg, samt därutöver ansvar för inköp av material och tjänster.

Jag vill med enkäten få dina synpunkter på vilka krav på de olika leverantörsyperna som är viktigast för er som kund. I den sista frågeställningen är det fritt fram att ta upp områden som inte är omräknade tidigare i enkäten.

Fylla därefter enkäten till 0651-189 10 (Mekanotjänst). Tack för din medverkan!

Inga-Lill Carlsson

Företagsuppgifter

Företag / division: ____________________________

Befattning/huvane (namn och funktion): ____________________________

Avdelning: ____________________________

Vilka produkter tänker du på som komponentleveranser? ____________________________

systemleveranser? ____________________________

Ange för de viktigaste produkterna:

- Produktkomplexitet: □ Hög □ Medel □ Låg
- Produktlivslängd: □ Lång □ Medel □ Kort
- Seriestorlek: □ Små □ Medel □ Stora

Dina huvudsakliga kontakter med underleverantörer är med leverantören:

□ Säljare □ Planeringsavdel □ Kvalitetsavdel □ Godsavdel □ Annan

Ungefärligt antal underleverantörer inom produktion: _______

varav systemleverantörer: _______
Enkät

Krav på underleverantörer

Läs det här först!


Med systemleverantör avses en leverantör med helhetligt ansvar för funktionen hos en produkt eller system av sammansatta komponenter som framställts i flera förädlingssteg, samt därtill knutet ansvar för inköp av material och tjänster.

Jag vill med enkäten få dina synpunkter på vilka krav på de olika leverantörtyperna som du ser som de viktigaste för kunderna (de som kunderna enligt din mening lägger tyngst vikt vid). I den sista frågeställningen är det fritt fram att ta upp områden som inte är omnämnta tidigare i enkäten.

Tack för din medverkan!

Inga-Lill Carlsson

Företagsuppgifter

Företag / division: ________________________________________________

Befattning/ansvar (namn och funktion): __________________________________________

Avdelning: ____________________________________________________________

Vilka produkter tänker du på som komponentleveranser? __________________________________________

systemleveranser?: _______________________________________________________

Företaget är: □ enbart komponentleverantör □ komponent- & systemleverantör

Ange för de viktigaste produkterna:

○ Produktkomplexitet: □ Hög □ Medel □ Låg

○ Produktlivslängd: □ Lång □ Medel □ Kort

○ Series/egenskaper: □ Små □ Medel □ Stora

Dina huvudsakliga kontakter med kunderna är med dem:

□ Inköpare □ Planeringsavd □ Kvalitetsavd □ Godkänd □ Annan
HUR VIKTIGA ÅR NEDanställdes krav på en komponentleverantör resp en systemleverantör? Kryssa i **dubbelbalk** på en skala från 1 till 7 för de båda leverantörstyperna var för sig:

1 står för **hekt ordentligt krav** medan 7 står för **absolut avgörande krav**.

<table>
<thead>
<tr>
<th>A. Leveransäkerhet</th>
<th>Krav på komponent-leverantör</th>
<th>Krav på system-leverantör</th>
</tr>
</thead>
<tbody>
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<td>Att leverantören</td>
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<td>• har kort ledtid att håller säkerhetslager</td>
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<td>• levererar kompletta order i rätt tid</td>
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<td>• alltid lämnar korrekt leveransdokumentation</td>
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<td>• förpackar och sänder godset korrekt</td>
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<tr>
<td>• ansvarar för lagerpåfyllnad och/eller förbrukning</td>
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<th>B. Kvalitet &amp; miljö</th>
<th>Krav på komponent-leverantör</th>
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<tr>
<td>Att leverantören</td>
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<tr>
<td>• tillverkar produkter i rätt och jämna kvalitet</td>
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<td>• kan upprätta korrekt matprotokoll</td>
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<td>• för statistik över leveranskvalitet</td>
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<td>• är kvalitetcertifierad enligt ISO 9000 el dyl</td>
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<td>• är miljöcertifierad enligt ISO 14001 el dyl</td>
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<td>• har underleverantörer som uppfyller samma kvalitets- och miljökrav som leverantören själv</td>
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<td>• arbetar med kvalitetsbärande aktiviteter (proaktivt)</td>
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<td>• har en saubr reklamationshållning</td>
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<th>C. Inköp &amp; logistik</th>
<th>Krav på komponent-leverantör</th>
<th>Krav på system-leverantör</th>
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<td>Att leverantören</td>
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<tr>
<td>• arbetar med effektivisering av inköpsprocesser</td>
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<tr>
<td>• systematiskt arbetar med leverantörsstyrning</td>
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<td>• systematiskt arbetar med leverantörövervakning</td>
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<td>• arbetar med inköp från lågkostnadsleverant</td>
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<tr>
<td>• utvecklar kostnadseffektiva logistiklösningar</td>
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<tr>
<td>• har materialstyrningssystem med bra logistikstöd</td>
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<tr>
<td>• har tydlig logistikorganisation med hög kompetens</td>
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Februari 2006
Skilnad i krav på systemleverantör jämfört med komponentleverantör

Hur viktiga är nedanstående krav på en komponentleverantör resp en systemleverantör? Kryssa i du bedömning på en skala från 1 till 7 för de båda leverantörstyperna var för sig: 1 står för helt oväsentligt krav medan 7 står för absolut avgörande krav.

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<tr>
<td><strong>D. Pris</strong></td>
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<tr>
<td>Att leverantören</td>
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<tr>
<td>redovisar öppna offerter med sätningsvisat materialpris och nedtrutna kalkyler</td>
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<tr>
<td>arbetar med produktivitetshöjande aktiviteter för kostnadsbesparningar o. prisreduktion</td>
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<tr>
<td>tar ansvar för att totalkostnaden blir låg</td>
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<td><strong>E. Flexibilitet</strong></td>
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<td>Att leverantören</td>
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<tr>
<td>har produktionsutrustning som klarar snabba produktbyten</td>
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<tr>
<td>har hög kompetens inom produktionsvekter</td>
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<tr>
<td>klarar snabba volymförändringar</td>
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<tr>
<td>har en organisation som snabbt och säkert svarar upp mot ändrade kundkrav</td>
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<td><strong>F. Utveckling</strong></td>
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<td>Att leverantören</td>
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<tr>
<td>vidareutvecklar och förbättrar verktyg och produktionsprocesser</td>
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<tr>
<td>deltar i produktutveckling</td>
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<tr>
<td>kan medverka vid konstruktion - behörskar frågor som materialval, tekniska lösningar, ythandlingar</td>
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<tr>
<td>har kompetenta projektledare/Projektteam</td>
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<td><strong>G. Kommunikation och information</strong></td>
<td></td>
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<tr>
<td>Att leverantören</td>
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<tr>
<td>snabbt bekräftar order</td>
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<tr>
<td>ger snabb respons på tekniska ändringar</td>
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<tr>
<td>ger ”early warnings” vid ev problem (proaktivt)</td>
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<tr>
<td>informerar kunden före ändrad produktionsprocess eller leverantörsbyte</td>
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<tr>
<td>kan hantera kommunikation via EDI eller motsvarande</td>
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Februari 2006
Skilnad i krav på systemleverantör jämfört med komponentleverantör

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### II. Ansvar

Att leverantören

- kan lämna produktgaranti: □□□□□□□
- har produktavarsförsäkring: □□□□□□□
- kan hantera patentfrågor, mönsterskydd och liknande för att förhindra intrång i någon immateriell rättighet kopplat till Kundens produkt: □□□□□□□
- tar reservdelsansvar efter att produktionen av produkten upphört: □□□□□□□
- tar ansvar för sina underleverantörs produktion m. a. p. kvalitet, miljö, Code of Conduct m.m.: □□□□□□□
- upprättar aktuellt verktygsregister: □□□□□□□
- har en säker dokumenthantering (ritningar, anvisningar, instruktioner etc): □□□□□□□
- har säker datasyستem (genremot inlägg m.m): □□□□□□□
- sköter sekretessfrågor ansvarsfullt: □□□□□□□
- har system för att identifiera och hantera risker: □□□□□□□

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Vilka tre områden skiljer enligt din uppfattning mest mellan en systemleverantör och en komponentleverantör? Du behöver inte känna dig lätt av punkterna ovan.
Rangordna och motivera:

1. 

2. 

3. 

Övriga kommentarer: 

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APPENDIX II Interview-guide
Intervjuguide

Mot systemlevererande förmåga…
(ut ett logistiskt perspektiv)

Frågor i fokus:

Leverantörsstruktur
Inköpsstrategi & leverantörsklassificering
Samverkansformer. Betydelse för utveckling.

Planeringsproblematik
Prognoser & planering (av inköp, produktion, lager)
Processorientering – integration mellan lev/kund,
ansvarsfördelning
Informationsutbyte: med kunder/leverantörer och internt

Organisation & kompetensutveckling
Fokus på inköp & logistik, prognoshantering, planering, IT
Betydelse för processorientering, ökad visibilitet och ökad
samverkan över företagsgränserna

Kravbild:
Hur ser man rollen som systemleverantör?
Hur upplever man att kraven har förändrats/förändras över tid?
Hur har företaget i stort förändrats för att möta kraven på en systemleverantör?
Hur har inköpsstrategi och krav på företagets leverantörer påverkats?

Vilka resurser (organisation, kompetenser, verktyg) måste utvecklas för att uppnå
systemlevererande förmåga?
Hur har man tänkt när det gäller resurser?
Hur har man tänkt när det gäller särskiljande förmågor?
Vilka nyckelfrågor måste man hantera?
Vilka kritiska resurser måste utvecklas?

Hur kan stegen i utveckling mot systemlevererande förmåga se ut?
I vilken ordning byggs olika resurser upp?
Vilka beroenden ser man mellan dessa resurser?
Vilken betydelse har organisationen för ökad processorientering och intern/extern
samverkan?
Hur avgörande är företagets storlek i den här utvecklingen?
Vilken har varit ledningens roll inom inköps- och logistikfrågor?

Styrning – förmågor:
Hur ses och beskrivs processer över företagsgränserna mot kunder och leverantörer?
Hur arbetar man med kompetensutveckling?
Hur ser man på och hanterar ökat ansvar inom olika områden?
Hur möter man kraven på flexibilitet?
Hur styr man sina leverantörer?
Hur samordnar man de egna enheterna?
Hur tänker man när det gäller automatiserat informationsflöde?
APPENDIX III  Mekanotjänst
MEKANOTJÄNST I JÄRVSÖ AB
The description of this company is based on several sources: records of strategic meetings with the management group, interviews (in accordance with the interview guide) with the purchasing manager of Mekanotjänst i Järvsö, Jean-Pierre Lindgren, and the quality and environmental manager of the Mekanotjänst group, Bertil Asplund, a number of occasional interviews and discussions with, among others, the CEO Christer Fransson, and the marketing manager Henry Wallin, supplemented by my own experiences and knowledge of the company as a member of the management, and both internal and external documentation.

Background and line of business
Mekanotjänst i Järvsö AB is a relatively small Swedish subcontractor (about 120 employees and a turnover around SEK 200 million). The company, established in 1976 by the present owner, has evolved from a one-man firm to a well equipped industrial supplier and has a pronounced desire to continue to grow. It is one out of four collaborating mechanical subcontractors in a privately owned industrial group, Mekanotjänst Industrier. The management intends to meet the increasing global competition by evolving from a component manufacturer to the wider role of a system supplier, a development that has been initiated although the scope of the concept is not yet altogether clear. The cooperation and coordination within the company group is however seen as an important means to achieve this.

The company describes itself as a complete supplier of mechanics, involved as a design and production partner in the production chain at various levels. For some customers the company is included in the process as a production partner from a relatively early stage of product development (occasionally even design work following functional specifications). Expertise is claimed in the fields of design, logistics, industrial engineering, quality, high-speed machining, and laser technology. At the web site the company declares: “Our strength lies in becoming involved as a design and production partner in the production chain at various levels. We can assist our clients with both design and development work. We prefer to be included in the process as a production partner from an early stage. Together, we can arrive at construction solutions that make the job easier and more cost-effective.” The marketing director claims that when asking a customer why Mekanotjänst have been the chosen supplier the answer is often: “Mekanotjänst has a lot of production within its own ranks.” The competence regarding their own production is also considered a good foundation for purchasing competencies within these areas. The offers may concern simple products, but the scope and the overall solution create complexity.

Based on client needs and specifications, the company develops prototypes within the context of process-oriented projects – designing construction solutions with the right equipment and using the right material. In the production chain, prototypes are created in direct consultation with the client. The business concept is bent on small- to medium-size volumes, excluding the very large volumes and extensive price competition of consumers’ commodities. The aim is to offer serial production as cost-effectively as possible. The company has some, though limited, experience of being responsible for spare parts for a few customers.

The targeted business sectors are telecom, medical technology, electronics/instruments and engineering industry. The customers are mainly large, internationally active companies with manufacturing units in Sweden, as for example Ericsson, ABB, Maquet, NOTE and others.
The company is certified according to the present customer demands; the same quality and environmental management system for the industrial group.

The sales volume has roughly doubled in the last few years – from about SEK 115 million in 2003 to about SEK 200 million in 2007. The increase mainly concerns complex articles and this is one reason why the share of purchased material has also increased considerably during the last years – from about 55% of the invoiced value in 2003 to over 70% in 2007.

The managers of Mekanotjänst conclude that their management philosophy called “the Motorway”, including an “acceleration lane” for new products and new processes, reflects a capability of quick response to customer demands, especially in product development processes. Services connected with IT and logistics, as for example EDI (electronic data interchange) communication and VMI (vendor managed inventories) solutions, are seen as important distinct capabilities to cherish. The development of sourcing and suppliers is seen as included in the product offer, as is assistance in construction and production adjustments. The supplier-related and logistical issues of the supply chain are however seen as “weak spots” in the organization. To remedy this an overall strategic purchasing and logistics manager has been appointed to coordinate the sourcing within the company group and to render the purchasing activities more effective. Mekanotjänst has only recently started sourcing from China, but the increased customer pressure has led the company to investigate investments in their own production capacity in China.

The sales personnel of Mekanotjänst have a reputation of being very highly competent in technical engineering. This makes the company trustworthy regarding production capabilities as well as problem solving capabilities. The purchasing manager of Mekanotjänst i Järvsö claims that the company is capable of taking urgent measures with respect to flexibility yet is still able to keep the prices down.

The top management agrees that what distinguishes the company group today is the breadth and depth within mechanical manufacturing, being capable as a whole. The role as production specialist is important, production and production engineering are core functions. The private ownership and the structure of the company group strengthen the reliability and the trustworthiness, and help preserve short decision-making processes and agility.

**Customer demands – from a supplier’s point of view**

The focus is still very much on the “generic demands” of all suppliers: delivery precision, short lead-times, price, quality, flexibility and information. More and more of the production is based on forecasts. Fixed lead-times are stipulated in customer agreements. The increased share of purchased materials means greater responsibility for the company – planning capacity as well as purchasing and production effectively in order to meet customer demands, being keenly aware of how the customer forecasts develop in order to minimize the risks of obsolescence and optimizing stocks. This also means both an increased number of suppliers and an increased responsibility towards these suppliers – e.g. forwarding customer forecasts or modified quality demands. More customers also require sourcing in low-cost regions.

Some level of developmental capabilities is recognized as important to many customers. Mekanotjänst has not invested in special construction competencies, but may contribute with technical and production skills in customers’ new product development. Keeping up with increasing demands regarding competence levels and competence development within the organization are seen as important issues. A high degree of service, and doing the right things
from the beginning, is necessary; letting the engineers wait for product development is not constructive. Prototyping has been developed as a process. Participation in construction work has occurred, reference objects exist, but the organization is not built to support this. There are not enough resources on hand, although the knowledge exists within the company group. The customers spend millions of kronor on consultants for services that Mekanotjänst could offer, such as participation in construction work, project participation, prototyping, securing processes, and production adaptation to large scale industrialization. At the same time the customers want fewer suppliers. Liabilities following construction services are however important to consider. The commission must be very clear on this point!

The quality and environmental manager of Mekanotjänst Industrier (henceforth called the quality manager), has been investigating what the demands on a supplier of life-sustaining medical devices would be and confirms the trend of fewer but more important suppliers with a greater responsibility. He thinks a further step may be actualized: as the OEM-supplier (manufacturing a complete product for the customer, packing and delivering it to the customer’s customer). Developmental responsibility does not necessarily come with this as the customer may see the knowledge about the product as its core competencies, safeguarding the development and management. From a decent general standard Mekanotjänst has learned to handle more exacting demands of specific lines of business, as for example for medical devices or for castings. What is important to consider is that nobody can be world champion at everything…

The quality manager claims that the customers exert a considerable influence on the supplier’s development, especially when it comes to the pace of it. Where the demands from the customer are outspoken the pace of development to meet these demands are increased. One example is risk management (demands from Ericsson AB). This became part of the Mekanotjänst work environment certification (which was a decision of its own).

Most customers have shifted much of the purchasing and supplier responsibility on to a limited number of preferred suppliers. In the next step more and more customers will also want to shift the responsibility for stock and distribution on to the supplier. The management of Mekanotjänst finds this favourable as it draws the customer closer and enables the company to adjust and optimize the production. The negative points are however the high demands on IT, the increased capital costs, and the risk of increased obsolescence. VMI is emphasized by some customers, however, it is unclear if that is a newly raised demand or if it has been brought out earlier but not demanded from Mekanotjänst. The competency regarding logistics has however increased considerably. The quality manager claims that “earlier we were very much governed by the customer, while we are now more of an equal. Today, it is not the customer who forces the demands upon us, which in turn makes us work reactively, but instead we understand the language and can occasionally be pushing our suppliers.” As he says this he pauses and then adds: “or should be able to push them, it is a matter of priorities. We have an IT-solution (VMI) to offer our suppliers, but have chosen not to give this priority.”

The purchasing manager claims that the company must deepen its system supplying ability in order to be an interesting supplier: “The customer demands today form a more comprehensive picture, developing from earlier demands on an article level to demands concerning the company organization and the administration. From the very specific and detailed instructions some years ago we are now getting a more all-embracing role, facing more responsibility concerning e.g. planning and support towards the customer.”
More and more customers are demanding increased responsibilities from the suppliers regarding customer’s stock and distribution. This is met with a constructive attitude as it draws the customer closer and enables the supplier to adapt and optimize the production better. The negative aspects of it are the high demands on IT, and a “capsized” traditional business model because of the increased amount of capital tied up in customers’ stock.

To manage IT, logistics, and business agreements is important and the competencies in these areas are essential. The ability to increase and decrease capacities, to speed up and slow down processes becomes important, along with a highly automatized administration. In order to reduce safety margins it is important to pay attention to system parameters and to trust the system support. Customer agreements with well-defined terms will give a sense of security; and that is the goal.

Customers increasingly demand open book calculations – they want to ascertain that Mekanotjänst has competitive purchase prices and they want to understand how the production costs are calculated. The routines for calculation are not quite consistent and attention has been called to the shortcomings concerning the translation of different terms to a uniform standard price.

Regarding the purchasing strategy and forwarding the demands on to the suppliers there is still a lot left to do, the purchasing manager says. The quality manager agrees that the company has a strong demand from the customers to work more systematically with its strategic suppliers – and that no or slow progress has been made. This is an area where much more should be done. What is especially pointed out by the customers is for example an increased focus on environment, work environment and ethics. When sourcing from eastern countries these aspects may be important.

The top management recognizes the importance of a supplier network with critical competencies. At the same time it is essential to not “get into the clutches of” some large material suppliers. Personal relations are important. The ambition for the company should be to be important to its suppliers in order to pass on or increase customer demands.

The demand for openness means, according to the quality manager, that “the customer sees us as more equal to a department within the customer than a regular supplier. This demands communicating very openly with each other.” Today, this is handled from case to case – there is no uniformity in handling this type of demand. The matters range from great to small things: delivery problems, calculations, quality and other issues. The quality manager claims that this might be controversial when the customer wants to know in detail how we produce an article – “this may feel as we are revealing our trade secret, how we do things, while the customer is eager to maintain a secure manufacturing process thus demands to know in detail how we do it.”

**Resources**

The quality manager claims that the company is too “broad” today, trying to do too much. By this he means that the company aims at being good at everything, from heavy work to precision mechanics. It is necessary to reduce the area of competence – although he expresses no opinion about if this should be defined by special techniques or by fewer and more specialised customers. He emphasizes two key issues: one is to be able to govern the communication between Mekanotjänst and the customer; to receive, handle, and forward the information to the right places – so that we get the signals of the “ought-to-be-values”. The
other key issue is to make sure there is enough flexibility to enable the company to keep pace with volume fluctuations, model changes and other changes.

He sees communication as a mere practical question: technical solutions for communication between the parties, may also be organizationed in forms of meetings to reach all persons concerned and to be sure that the information has been understood. "No big deal – more of just doing it!" He sees automatized information flow as an absolute necessity for the future (examples mentioned are forecasts and order management). "With the tools (e.g. PipeChain, EDI) to automatize the information in the flow some of our competitors will accomplish this and we will be left behind. This is a competitive factor." He acknowledges the importance of the relationships and the ability to communicate, acting non-prestigiously and helping out when necessary. The use of telephone conferences has increased considerably lately and is now a very common way to communicate with customers and suppliers.

Regarding the flexibility he considers the company is too rigid today. Routines to handle flexibility must be created, and to find solutions here, he thinks it is necessary to have partners and help one another during peak periods. Access to capacity is a problem – insufficient flexibility may be caused by insufficient capacity. Basically this is about having enough capacity (including that of partners).

The marketing department point out that the mode of calculation must be more standardized. A “total-cost model” to compare the price to the total cost is necessary in order to avoid calculation blunders, e.g. mixing up total cost and price in incoherent calculations. Another reason for uniform calculations is that an advantage a supplier may have to offer (in overall concern agreements) may not be evaluated and handled in a similar way within the company group.

Generally the sales department has better opportunities to technically judge how much an article should cost. The purchasing department sees more “statically” on this. The technical know-how is often better in the sales department. The collaboration between these departments has improved, but there is a lot more to gain here. The sales department is backed by the customer and has the offered price as support in deciding what is reasonable or not. The purchasing organization must be technically experienced and competent – and work with proactive subcontractors - to be able to give counterproposals of alternative products and materials.

The purchasing manager claims that the internal communication within the company is a competence that has to be nurtured in order to get a better overall picture. The use of IT-tools must be developed – there is a great potential in the tools already at hand, it just needs to be guided and prioritized differently. Different departments have to be more driven towards IT. The competencies within transport logistics are improved, but still not sufficient. If this is to be administrated by the company itself, an employee who knows what is going on and who has comprehensive responsibilities is needed. Having such a resource within their own ranks or buying these services from a logistics company is a choice that needs to be considered. The purchasing manager claims that the companies he knows that buy these services convey a very positive picture of their experiences.

The company has a department for prototyping and cooperates with customers on their new product development projects. There is no in-house development competence; established contacts with a consultant are occasionally utilised.
Regarding contracts and agreements with suppliers more competencies and more decisiveness is required. Formal contracts are needed to a larger extent, but it is also important to maintain good relations with important suppliers – and this requires more resources. The purchasing manager claims that much has changed regarding the company structure with most suppliers. “Each person has more to do – the relation part becomes smaller and smaller.” The dependence on, and thereby also the vulnerability of certain personal relations is increasing.

One positive aspect is that business is done between two people; if these two trust each other the chance for an agreement is better. But it is dangerous to be dependent on a single person with the customer. Rapid reorganizations must be handled and relations updated. Personal relations are very important at every level, as the purchasing manager remarks: “When the marketing department informs us about new jobs they often use the name of the purchaser – which means that it is actually the relations that are important. Some people have ‘jumped’ between different companies but we are still with them...”

Historically the management has not been taking the purchasing issues seriously enough, the quality manager remarks. Purchasing has grown to be an extensive part of the business, while the resources and competencies have not quite followed this development.

Concerning competencies, it has been a tradition to recruit internally to a great extent, and the recruitments have perhaps not been so clearly aligned to the tasks as would have been desired. He claims that the competence analysis is not done as a specification of requirements for recruitments – “it is influenced by what we have today. “ There is nothing wrong with giving people the chance to be promoted, but it must not be too often as there is a risk in this. The company must get influences from the outside and has to recruit personnel with a good theoretical background. The quality manager comments further upon competence development: “We know what we have to do but we do not do it. This task is not prioritized. We, in the management, who are supposed to inform how strategically important competence is to get ahead, have failed in this mission. The responsibility for competence development is clear, but is not taken on; and this behaviour does not bring about any consequences.” An increased responsibility will be required and this, in turn, will require that employees develop. Increased responsibility must be accompanied by competence development and increased authorities.

The quality manager points out the importance of good leadership. Top management must represent clear leadership – knowing what you are aiming at. This is to be followed up by clear leadership by the middle management; and here he sees that some competencies of these leaders fall short. Focus for these managers should be on coaching and supporting the personnel instead of engaging in everyday trivial work, operational matters, which is what they are doing today.

IT functions such as e.g. logistical support systems and communication solutions are pointed out as being very important. A highly automatized administration is necessary – the number of unique customer routines must be reduced, for example concerning forecasts and order handling. Communication must be developed in different ways – such as by having connections between computer networks, telephone conferences etc. It is important to increase the visibility in the supply chain by sharing information about forecasts in order to shorten lead-times (minimize risks and uphold commitments). To get, and give, early warnings when original plans have been diverted are stressed. The concept of cross-functional group meetings (“TFG – tvärfunktionella grupper”) has historically been introduced to a
Following the development concerning IT is important, but so is making the most of already available systems – utilizing the potentials for enhanced efficiency. The “Agent” in Monitor is one example of a tool for automatized routines that could be used to a greater degree. Utilizing VMI between the Mekanotjänst companies, suppliers and customers, and utilizing the database for risk evaluation and follow-ups are other examples. It is important to use IT and the operating systems to reduce tied up capital and risks of obsolescence in stock. Paying attention to parameters and devoting resources to keep files and records up to date, in order to be able to trust the system support, is important.

Although there is a lot more to develop the IT function is something the company is proud of. Accessibility is very good, as is the technical security level; and much time and money has been invested in projects to develop communication solutions and the use of the ERP system, Monitor. EDI has been used as a communication means for several years. Recently an IT support system for VMI management – PipeChain – has been installed for two customers and this will be developed for suppliers as well. A special IT coordination software – Inobiz – have been implemented in order to coordinate – translate and transfer – data between PipeChain and the ERP system. Technically the capability is high, but it is a challenge to get the different functions to require more development regarding IT tools. To be on the lookout and follow what is happening here is important.

Development steps
The CEO as well as the sales manager stress the importance of being proactive in the industrialization process (the process of preparing a product for serial production, or transferring it to high volume production), e.g. to think low-cost production before the customer, offering a combination of production engineering solutions and low-cost sourcing. Meeting customer requests in combining the original business with traded products is considered to be a winning concept.

When asked to prioritize activities and resources the following agenda was outlined:

- Focus more clearly on productivity, lead-times, delivery precision, and flexibility. Resources must be summoned throughout the organization to improve performances. Measures need to be taken to increase machine capacity, increase employee flexibility, and better coordinate the activities of market, planning, and production functions. A consultant of Lean Production will be engaged for this work. Part of the culture and the leadership within the organization needs to change – taking offensive measures to meet underachievement instead of offering excuses…

- Support the concept Motorway and anchor it internally and externally. In this work the middle management is an important resource. To be able to offer the customers production techniques and material knowledge in important areas is essential. Time is an important factor, when the “acceleration lane” must be short.

- Handle high-volume production and increase flexibility through better sourcing and guarantee quality, from suppliers in low-cost regions as well as locally. Being able to offer a low-cost alternative is necessary – to “mark that square with a cross” for the customer. At the same time it is recognised that working with low-cost countries requires plenty of
activities regarding quality and logistics, and the management is aware of the importance of allocating adequate resources. Something to be improved is the effort to reduce risks and distribute them on to the suppliers.

The attitude of the management is important for the development of logistical issues; they must be aware of the importance of these questions hence guide the development. The purchasing manager thinks that the focus has to be changed from price to total cost for the whole supply chain. He comments upon an extensive logistics project that was carried out a couple of years ago, with two separate goals: to increase logistical competencies within the organization (especially with planning, purchasing and production management) and to decrease stock. This was a big investment which gave a good result on several levels. The management was heavily involved and it has resulted in valuable learning about logistics, and changing attitudes.

The purchasing manager reflects: “in our organization the word ‘project’ far too often has a negative connotation; it has been misused and is regarded and handled with irony.” But he clarifies by stating that working in projects – investing the necessary time and resources – is a very successful means of achieving development. He emphasizes however that the competency to work in projects, using proper methods and allowing enough time and resources, is something that has to be improved upon in the organization.

The purchasing manager emphasizes the following developmental issues:

- An automatized information flow: using our suppliers to a higher degree, informing them more clearly about our demands – using our tools for increased automation.

- Flexibility – shorter lead-times from the suppliers should be prioritized. Third party logistical alternatives, hubs and other solutions together with suppliers should be investigated. Apart from planning, the coordination is important, e.g. coordination and the consequences of agreements for customers and suppliers.

- The passing on of customer information further out in the organization – to increase the understanding of what the customers demand – is an important issue that must be kept up. When understanding what is required it is easier to work with improvements.

Developing long-term collaboration with their own suppliers is a topic for improvement. A strive should be to be important to the suppliers, in order to transfer the increased demands to a wider circle. Within some areas, e.g. castings, this is however impossible – the company will always be far too small to influence the suppliers. Classifying articles and suppliers are basic requirements. The classification of suppliers is necessary to work with the development of chosen suppliers, which must be capable companies that can cope with supplier audits. Supplier agreements have to be concluded, and improved, dividing and distributing risks from our customers on to our suppliers. Effective stock-keeping and shorter lead-times are essential, as is having alternative suppliers and continuously comparing costs. The purchasing department must be responsible for “pulling the cost discussion another round”. The purchasing and logistics manager works comprehensively for the group and is often directly involved with the sales department concerning the customers, getting to know their demands thoroughly. The problem is then to convey the message to the suppliers. It is important not to “swallow” everything but be able to influence the customer (knowing the suppliers’ situation
and capabilities and offering them to the customer in order to get a business and terms of agreement that the company can live up to with the assistance of its suppliers).

The internal collaboration is also a topic to improve upon. Intermediary business transactions involve a strong administration and if production is transferred from one unit to another the priorities of customers’ orders may be questioned. Perhaps a separate sales company, representing all the industrial units of the group, should be the organizational unit facing the customers.

Handling communication and flexibility is fundamental to entering the field of a system supplier according to the quality manager. Guidance from the CEO/production manager has an indirect impact. The way the company works today is not effective. He claims that “a fundamental condition that is not on hand today, and that has to fall in place first, is a common guiding star, a leadership that makes everyone walk the same way. Today this is too vague.” He thinks that the key ratios of today have not enough guiding effect and that “we are probably still remaining in the role of the small company here”.

**Guidance and coordination**

The top management is not satisfied with the results of the internal collaboration work. The advantages of cooperating within a group of manufacturing companies – with common resources for administrative and IT services and with possibilities to exchange experiences in functional network groups – have not come to full use. The work of the network groups is good but advancing slowly as “the heart is in a daily operational situation in the different units”.

The quality manager sees that the management is often involved in operational issues and that the status of strategic work is not very high in the organization. He thinks that the size is important and ponders: “what if we are too large to have the advantages of a small company and too small to attain the advantages of a large company?” In order to be regarded as a system supplier, the company must have competencies that are easier to acquire for a larger company. This concerns for instance ‘soft’ competencies; enough muscles to focus them and point them out as important requires a company of decent size to carry the costs.

The organization governs the orientation of the work. With a functional structure the guarding of one’s specialities preserves functions. The quality manager says that “what we have done up till now is to say that we had processes – in reality it is what is done within a function that has been mapped out and we have thought this to be a process” and claims that process oriented work requires a cultural change in the company. Traditionally there has always been a sheet metal department, a cutting department and for several years an assembly department. “If the company is to think in processes and find a number of common processes to work within, then the organization must reflect this, perhaps in some form of a matrix.” He also points out the varied production “where one extreme is to consider each article to be a process, described according to the manufacturing of the article. The key is to find a limited number of common ways of working. If it had been simple to find the common denominators we would probably have been there now...”
**Suppliers**

The structure of the supplier base plays an important role in the management of purchase and logistics. The company has a large number of different kinds of suppliers, of which many have been taken over from customers. The suppliers have been categorized by type of supplier and strategic category (see Figure III-1).

<table>
<thead>
<tr>
<th>Type of supplier:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. raw material suppliers,</td>
</tr>
<tr>
<td>2. component suppliers,</td>
</tr>
<tr>
<td>3. subcontractors and surface treatment suppliers,</td>
</tr>
<tr>
<td>4. machinery suppliers (including spare parts),</td>
</tr>
<tr>
<td>5. IT suppliers (hardware and software),</td>
</tr>
<tr>
<td>6. service suppliers and administrative suppliers, and</td>
</tr>
<tr>
<td>7. customers (supplying components).</td>
</tr>
</tbody>
</table>

On another level **four different strategic categories** have been weighted by importance:

A. strategic supplier according to the quality system,
B. customer governed supplier,
C. Other strategic suppliers for production and/or administration, and

omission of letter notation means “no strategic supplier”.

In 2007 the total number of strategic suppliers in these categories were 18 strategic suppliers in the quality system, 175 customer governed suppliers, and in total 122 other strategic suppliers for production and/or administration (of which 65 were used during 2006). The total number of active suppliers in categories 1 – 3 is approximately 200 active suppliers for production. The total number of active suppliers, including all kinds of suppliers, is 1,536 according to the business system. Only five supplier assessments were done made in 2006 – involving three of the strategic “A” suppliers and two others.

Some attempts to group the suppliers in other ways have been made, e.g. when it was established which suppliers used the same MRP-system as Mekanotjänst: Monitor. This was done in order to be able to “force” the suppliers to introduce a new routine for sending invoices via EDI, supported by a module in Monitor.

There is a basis for having a potent supplier structure but the more or less nonexistent classification routines regarding e.g. what characterizes a “strategic” supplier, makes it less useful. Different demands and follow-up routines towards different sorts of suppliers would make the purchases and the logistics more efficient. It would also put more focus on the IT support systems that are necessary to simplify the administration.

**Flexibility**

The demand for volume flexibility is extensive. The customer agreements call for a short lead-time (often about 1 – 2 days) while the throughput time, including sourcing lead-time, could be as long as 4 – 6 months. Flexibility is often attached as a condition in the customer agreements – originating from forecasts and calling for a volume flexibility of 10 – 30% in a few weeks time. This puts a lot of pressure on the planning of production and sourcing. The capacity can for a short time temporarily be increased through overtime, engaging extra personnel, or buying capacity from a subcontractor. The sourcing is more critical and demands a more long-term focus. When volumes increase above what the company claims is
their business concept – “small- and medium-sized series” – this calls for other production engineering support and competencies than before, and other tools and fixtures than the employees are used to.

A location near to the customer is important; a supplier in the proximity of the customer adds to increased service, where small quantities and frequent deliveries means less capital tied up in the customers’ stocks.

Liabilities
Earlier the company has recognized liabilities concerning product quality, handling of drawings, and other issues mainly managed within the company. Liabilities concerning the supply chain – customers and suppliers – are rather new to the company. Customers now call attention to the company’s increased responsibility for managing its suppliers – their quality, delivery precision, environmental work and Code of conduct, and more. The liabilities following the VMI process are another example – taking responsibility for the customer’s stock as well as for their own production capacity.

Vision for the future
The CEO communicates his vision for further development of the group:

![Diagram](image_url)

*Figure III-2: Development vision*

Here he sees Mekanotjänst Industrier (MTI – the parent company) as a comprehensive and uniting “system supplier / system integrator”, with the rest of the companies within the group as pure production units, or “component suppliers / contractual suppliers”; to be supplemented by a close cooperation with a number of external suppliers.

Production and production technique are core competencies. Investments and development of know-how in production technique must not be neglected. Mekanotjänst should consist of niche suppliers – top class in production – combined with the overall strength and competencies of the concern/parent company. Specialist functions within development, purchasing, communications, logistics should perhaps be concentrated under the “MTI-hat”, which should be strengthened by more competencies in purchasing, contractual competencies,
quality & environmental issues. Using specialist resources situated anywhere in the group, lending capacities and competencies between the companies are important. The customers are buying specialist competency from the separate companies and generalist competency from within MTI. Construction or design services could possibly be bought. So far the company has not had any pure construction tasks but more adapting designs. Perhaps this could initially be an opening for alliances within the construction/design area. It would most probably create possibilities for the company.

Logistical solutions should be a target service, as should the ability to handle volume purchases from, or production in, low-cost countries. Well thought-out activities are then needed concerning quality and logistics. Competence in logistics, contractual knowledge and a solid competence regarding IT support systems are also needed to handle vendor managed inventories and to be part of the customers’ distribution organization. The rate of capital turnover is of importance to the profit margins. Short lead-times cut the stock levels and capital tied up. Effective operating systems and follow-up routines to handle production and stock are needed.
APPENDIX IV Rimaster
RIMASTER I RIMFORSA AB

The information about Rimaster is mainly based on interviews (in accordance with the interview guide) with members of the management group, i.e. the CEO Mikael Holmqvist, key account managers Andreas Kronström and Patrik Andwester, the purchasing (and logistics) manager Kjell Svensson, the planning manager Fredrik Björklund, and the production manager Johan Hagström. In addition information has been gathered from a master thesis (Hägglund & Johansson, 2006), from the homepage of Rimaster, and from annual reports.

Background and line of business

Rimaster AB, founded in 1982, privately owned and part of the Rimaster group (six integrated companies with a turnover in 2007 of about SEK 300 million and 500 employees), focuses on sub-contractual work. The company describes itself as a complete outsourcing partner who offers development and production in the fields of electrics, electronics and mechanics. In 1997 cooperation with a Polish factory was initiated in order to be able to offer low-cost production to the customers. In 2007 the construction department was transformed, incorporating an engineering firm into the company group.

The positioning between pure cabling and EMS (Electronic Manufacturing Services, e.g. companies such as NOTE, Partnertech, Flextronics) makes the company an attractive supplier for certain chosen segments. The focus is on four customer segments based on specialised skills in customer applications: industrial automation, communication systems, specialised vehicles and transport vehicles. The customer base is characterized by a few large product-owning international companies, for example customers such as ABB, SAAB, Siemens and Atlas Copco. Less than ten customers account for 90% of the turnover; in total there are about 70 active customers. The lead-times towards customers are fixed, stock is used as a buffer and forecasts form the basis of purchasing. The responsibilities of the customer are however not always written in a contract.

The company has actively been working to consolidate the customer profile, actually phasing out some customers to sure up the strategy of having the capabilities necessary for certain selected customers. Within transport vehicles the company earlier worked with a Polish unit in large volumes. A factory in Poland with 600 employees, manufacturing for Volkswagen was closed down a few years ago – the intention was to avoid working towards the automotive industry. The largest segment is special vehicles, with about 70% of the turnover. The automation industry is a relatively large segment, while the communications systems is very small today (it was an important segment for Ericsson in the 90-ies). The CEO says that “you aim at whom you want to be capable towards”.

The CEO emphasizes the strong customer commitment far out in the organization – everybody wants to fulfil a customer demand. He describes the organization as fleet-footed, standing for rapid solutions and flexibility: “Rimaster wants, things do happen – there’s a ‘goddamn it!’ in the organization”. “Relations and performance in harmony produce energy, abilities to take action” he claims. The culture to work with what you can influence is also seen as an important capability.

A Balanced Scorecard project a couple of years ago gave the organization a number of key performance ratios, which was important to clarify responsibilities and authorities. Pro-activity and energy is said to characterize the company, and their work to become a “lean”
manufacturer. The leaders of different functions maintain that the responsibility has increased, and so has the authority. They point out the drive in the organization and the ability to take action. Competence levels and competence development have become more outspokenly important.

**Strategic aspects of customer demands and system supply**

The CEO of Rimaster in Rimforsa states that the notion “system supplier” has become something of a fashion trend. “To be a system supplier has no value of its own – you have to understand where in the supply chain of the customer we are to play a part” he says. “You aim at a supply chain where the customer has no core business – selling production systems, not products.” He points out the different steps for a supplier: component, modules, subsystems (corresponds to system supply, e.g. lorry cabins in Rimaster’s production) and product (where Rimaster today has no product of its own). In the discussion about system supplier he thinks that many are trying to defend the number of jobs in Sweden – “trying to be a system supplier for the wrong reason”. The CEO considers it important to reflect on why – what is to be achieved? This is not customer-driven; the expectation is less pressure on cost.

The CEO sees a second wave of outsourcing within the area of industrial product-owning customers:

1. Previously customers wanted access to low-cost countries, and assembly units in China were established by the customers

2. Customers can handle outsourcing /LCC, i.e. new products in increased competition. Purchasers used to working in an international environment demand additional value from the suppliers.

“The volume exists and is increasing” he says and means that it is about “running faster than the competitors.” The CEO does not believe in creating industrial networks – they are difficult to handle. Business must be the base, e.g. supply networks on a contractual basis, where someone owns the order. A company should have the critical segments under their own control.

Many customers claim to want long-lasting partnerships but the organization sometimes pulls in another direction – the strategy says one thing but local purchases are handled differently. The philosophy of the purchasing organization of the customer is important to understand; that means more than the line of business concerned. The customer demands are not changed but sharpened: from “wish” to “demand”. There is a new team on the purchasing side – well-educated, international, experienced – professionals! Some have a healthy focus on coordination within their own organization and the suppliers both internally and externally. Others have a more single-sided focus which spirals downwards. Many still want to have Swedish contacts, though the importance of this is decreasing as new purchaser become more professional and more price-focused, especially regarding larger volumes. It is easier to get better cooperation when the volumes are lower. A complex variety of products increases the importance of having the right product at the right time and decreases the focus on price.

A change towards a more complete picture is necessary. China, Eastern Europe and North- and/or South America – even smaller customers get tougher about global demands on the suppliers. Closeness is not enough; production in Sweden alone is too expensive. Low-cost production is demanded. You have to be in China to serve the customers’ factories there, and
being there helps with the next step of doing business with new customers. It also implies more demands on the marketing department to find new jobs “at home” when products are transferred abroad. In order to support its customers, Rimaster is about to establish itself in China. A preliminary study with this in view was carried out three years ago, but as the company had not enough financial stability then, the establishment was considered too risky. China will however be a focus area for Rimaster in 2008. Today original components are sourced to China. The planning manager feels that the company has all the requirements necessary to face the China establishment: the experiences from starting production in Poland combined with the recruitment of a purchasing manager who has worked a lot with China in earlier projects. At the same time, in Poland, the possibility to start production in Belarus is being investigated.

The increased demands for flexibility and price reduction are handled through balancing production in Sweden and in Poland. The experience of production in low-cost regions and having well developed routines for managing the transformation from manufacturing in Sweden to low-cost production is valuable. Some customers stress the importance of development and Rimaster recognizes the value of taking an active part early in this process.

**Resources**

**Organizational prerequisites**

The CEO describes the system for management of the spheres of activities as a process structure. The resources are assembled in functions. An event-guided business management system is described from activity, tool, information, responsibility, goal, and others. The company is accustomed to process working. Distinct responsibility and follow up makes the responsible employees follow their parts of the process and share information across functional borders. The planning function e.g. is responsible for delivery precision across functional borders, which demands coordination with other functions (marketing, purchasing, production and others).

A restructuring of the management a few years ago made the organization clearer. Jan-Olof Andersson had several roles: CEO and production manager in Rimforsa, CEO of the development company, and CEO of the Kisa unit. When he went on as company group manager he was replaced in Rimforsa by Mikael Holmqvist as CEO and by Johan Hagström as production manager. Furthermore, a strategic supply manager was appointed, who was also responsible for services aiming at logistics. The demands on the organization were increased and people have grown with the responsibility. The respondents agree that more distinct roles and responsibilities have facilitated the communication, made it easier. The goal-oriented management contributes to influence and participation, though the follow up could perhaps be stricter. The purchasing manager describes the short decision-making process. Demarcations and mandates for decision is clear – information is given to the rest of the management. Often the responsible manager tests an idea on somebody before taking it further. The company has a clear “management by results” policy and the responsible managers are left with relatively free hands to reach these results.

Closeness to the supplier is seen as a basis for retaining manufacturing like Rimaster’s in Sweden – communication and closeness. Competence, shorter delivery times and development times are decisive. The Rimforsa unit is used for production in smaller series, e.g. spare parts and other small scale production. Large series and labour intensive jobs are manufactured in Poland.
The involvement of the management in logistical matters is very high according to the purchasing manager, who is also on the board of directors. This is a way to emphasize the importance of these matters and to preserve broad experience. This position indicates the importance of logistics to those around him, something that has also been emphasized by the group manager.

The planning manager points out other resources in addition to logistical competencies: competent production engineers enable rapid handling of new jobs; mutual check-ups in order to secure quality; purchasing with effective supply channels for material at the right price and right time; the prototype flow where assemblers review and ascertain complete and uniform work instructions and guarantee quality. The same procedure is used in Poland.

The production manager points out the importance of a positive work climate and sees this as an important resource – to catch ideas from those in practice and to have a fruitful dialogue! He sees the method of working with a lean based production flow – adapted to their own business – as a win-win concept. A critical engineering review of the customer’s documentation is done. Standardized routines exist in the build-up of articles. Earlier, the production groups were focused on the products of a specific customer, and are now instead focusing on similar products, regardless of which customer the production is aimed for. This results in better planning and flow. The effort is to visualize the production flow through a kind of kanban-system, where the day’s planned production is gathered on a rolling conveyor belt where the operators fetch their jobs. A lead-time of about three weeks into the production gives planning in advance about the same time. The technology department has trained the personnel to understand the customers’ documentation. Instructions and training is carried out per customer. A productivity increase of 10% has been achieved during 2007. Full effects of the changes are foreseen for 2008.

The size of the company is considered important – a supplier must have technical resources and be able to integrate the technical department with a technical construction department. It is important to keep watch over new technology or development regarding components, minor production facilities or tools. The importance of backup for vulnerable production resources is also emphasized.

Resources, among other competencies (experience and theory), are required for some challenges. In small companies there is a lot of personal experience, which makes it difficult to bandy ideas as there are too few people with the corresponding competencies. The planning manager claims that development according to a step model may mean large steps for a small supplier. It is difficult to prioritize which steps are the most important – which have the best influence / outcome on what the company wants to achieve. “Kaizen, Lean, 5S, SCM, logistics – it was too much at one time” says the production manager. Distinct guidance by key performance indicators is needed. From the beginning logistics was not looked at, only production was considered to be the problem. The company focus was on sales and invoicing – now it is on delivery precision, quality and several performance indicators related to efficiency and effectiveness, and what the departments are doing.

Concerning the resource demands the marketing department’s view is “First get the business…”. Production capacity is important – but new employment implies constraints and costs and are dreaded. Business becomes more and more project governed – with more irregular production, where basic staffing must be handled during peaks and declines.
is required, but from the market perspective they consider it cheaper to grow outside Sweden – it is easier to transfer an article.

**Competence-base required**

Competence is seen as a combination of:

```
Leadership
Training

Knowledge, training and theory

Ability
Will
```

*Figure IV-1: The outlook on competence*

A high customer focus in the form of will and capacity has not always taken the lead right from the start. Rework will be eliminated and routines will be rendered more effective through, among other things, a better theoretical basis. Leadership training is considered essential and is now taken care of. Some new leaders have also been recruited to the organization in order to get hold of the desired competencies. Operative competence development is ongoing, the strategic development is more ad hoc. Directed education is effected, e.g. soldering tests for a certain customer. Current training for quality outcome as well as for more instructions according to adjusted requirements is carried out. A personnel administration module for better following-up of competency gaps is being implemented.

The focus is on lead-times, and on delivery problems. The customer takes no responsibility for this. In some agreements Rimaster has lead-times for 10 to 15, sometimes 20 days, from order to delivery. Lead-times for components included are often up to 90 days, which calls for good forecasts and material authorizations in order to reduce capital-intensive stocks. Agreements in order to eliminate or reduce the risks are desired, something that leads to tough discussions. When differences occur there is a risk for deadlocks.

One problem to deal with is the low accuracy in some customer forecasts, which disturbs the planning process and, with long lead-times from the suppliers, results in lots of capital being tied up in stock. The importance of competencies in logistics, knowledge about safety stocks, systematic work and IT-support is pointed out. A new method for safety stock of components has for example been initiated, resulting in improved and satisfactory control of these. Coordination for the customer is arranged, giving proactive suggestions to help the customer, and them-selves.

Logistical arrangements in production are seen as a core competence, understanding supply chains. The work to procure training is concentrated to employees in leading positions, such as logistics training for planners and other internal logistics production. The logistics training that is now carried out is seen as strategic and it will be evaluated before being passed on to more employees. It is expected to give the theoretical foundation common ground and new knowledge. Other topics concern key account management (diplomaed market economist), and quality training.
The marketing department stresses the demands for forecasts, and expresses their view about these: Demands concerning customers’ production plans is one example, as is demands to register forecasts – the formats and time aspects. Logistics from their point of view is often about e.g. forecasts via EDI, or collection of goods. The work is concentrated on direct customer orders and orders on call; any system for vendor managed inventory is not of immediate interest although it is foreseen in the future. They see the importance of a better utilization of the ERP system Monitor – more active, more contacts with the supplier of Monitor due to customer demands and follow-ups with customers (e.g. lower costs – working smarter), and organizational changes. The CEO also points out that the ERP-system could be used to a greater extent. Lacking the possibility for a dynamic analysis, an IT-tool for analysis (Qlikview) is about to be implemented as a complement.

Processes handled between different functions, are described (documented) by the quality department, and are accessible on the Intranet. There are also routine descriptions to be found, forms with reference to the business and more practical functions as for example the ordering of meals. Everybody has access to the intranet.

IT-based solutions may involve collecting orders or drawings from the customers’ system. The IT solution is rebuilt for EDI-invoices, which up till now has not been handled. The IT-function is composed of just one employee, but several of the other employees have sound knowledge of IT.

Distinctive capabilities perceived as important to Rimaster’s development is the combination of mechanics, electronics and the low-cost production in Poland. The CEO also points out other important capabilities, such as performing well regarding the “hygiene-factors”: price, quality, and delivery precision. The competitive factors are rapid deliveries and high quality. The production competency is seen as basic but not decisive. The purchasing manager points at factors such as being orderly (the work with SS and Lean) and the structure of the business. The corresponding work in Poland has paid off well, e.g. there has been a reduction in the number of complaints.

The production manager stresses flexibility and the significance of being known as agreeable. A good relationship is important! Proactivity is also seen as important and he gives an example: The assemblance of a cabin where Rimaster saw the opportunity and got the job. He explains that it is difficult to be heard and get opportunities with customers, and that is why reference objects are so important.

Proactivity is also emphasized by the CEO – constructively, obligingly, exercising professionalism in problem solving ability, to “find the solution and sell it, not get stuck in a ‘trench warfare’ with the customer.” The marketing department is more specific about this: to be proactive in cost-cuts (material choices, construction reviews) are steadily growing demands. The customer cannot and/or has not the time to critically scrutinize components and this raises the demand for a closer cooperation with the suppliers. Rimaster shall have resources as a complement to the customers. The key account managers of the marketing department state that “we work too little with the suppliers today. Supplier meetings with marketing participation are needed.” The most important thing to clarify according to them is: “What do the customers really want? We need to be a step ahead when the demands
It is important to have the competence to handle changes; capacity and knowledge is required both operationally in the workshop and in the administrative set-up.

Strategic development with the customer is important to some customers. It can assist the customers in their construction work or help them work out their own solutions. A construction- and development department is seen as important; primarily to maintain products and to be invited to updates of existing products. A separate unit has been formed and the number of employees increased from three to eight. Some also work by the hour as freestanding consultants. It becomes clearer to the customer that Rimaster focuses on construction and the customer is drawn in early in the process. Without this competence, the key account managers of market department claim, some of the customers would not have been interested in Rimaster. The production manager says however that this might be some kind of “Catch 22” for a small company – too few constructions, too big projects - the company is afraid to invest, dares not to employ personnel due to not having the assignments.

**Sourcing**

Almost all manufacturing is done directly based on customer orders, while material is procured based on forecasts. The share of material is large for the finished products though it varies over the segments, from 45 – 55% for cabling to considerably higher shares for panels and electrical cabinets. The work to centralize purchasing – produce common agreements – has been initiated. The company ElektroSystem in Söderhamn, with the same type of manufacturing for different customers, has just been incorporated into the group. Through the coordination the same components should be procured in larger volumes. Offers from Poland and Söderhamn are coordinated, and gradually the same suppliers are to be used. The purchasing manager is of the opinion that the company group must mature to this.

The Polish organization is to be likewise engaged – with relevant education and with the corresponding use of the business system Monitor. Today the article numbers do not correspond, but the articles are searchable through double article numbers. Lorries (“sling lorries”) travel between Poland and Sweden two times per week. Poland has had its own customers to provide for, while sourcing for the Rimforsa customers (when production has been transferred to Poland) has been done from Rimforsa. Poland will take over the responsibility for this. The establishments in Poland and China will enable more effective work concerning materials and logistics.

The purchasing manager claims that it is a “suppliers market” in times of prosperity – which leads to long lead-times. Good relations may be crucial and good contact with suppliers is important – to work closely, and exchange information. The forecasts for the suppliers are essential – which is difficult as the customers’ forecasts have shortcomings. This is important to improve upon. Good forecasts make it possible to make greater demands on suppliers as to delivery precision and quality. Large suppliers can be more difficult to deal with for a “small player” he claims. It is sometimes necessary to ask the customers for help in reducing prices and purchasing costs. The company is however a large customer for some suppliers.

According to the purchasing manager Rimaster has too many suppliers, of which some are customer governed. The constructors should be informed of the importance of not expanding the assortment. Preferably there should be a manual informing them of which marks/which assortments should be used. The decision is however ultimately up to the customer. The purchasing manager sees slender possibilities to reduce the number of suppliers significantly.
Three purchasers have different spheres of responsibilities: materials tied to drawings versus standard components / electronics components from distributors. The plan is, to a higher extent than before, to work with supplier meetings. The company ponders on how to best group the suppliers in order to bring forward information and listen to their views – together or in private.

**Communication and coordination**

Customer contacts are to a high degree related to order and delivery information and are handled by phone, personal meetings, mail, and weekly telephone-conferences with some customers. Quarterly meetings and project- or problem-solving-meetings with customers are arranged, often with broad participation – with technicians, quality personnel and others.

An order is received by letter, fax, mail, EDI or Internet. Some customers have web-based systems for orders and information. More EDI communication is desired – for less handling, better general overviews and more uniformity. A kanban-method is used for some customers (products with short- or medium-long lifecycle and low volume). When Rimaster discovers shortcomings regarding the internal communication of their customers the company supports them through close collaboration.

The internal collaboration within the company group is managed as a state of internal supply, purchase of components between the companies. The running-in of products is often done in Rimforsa; production during the process of product growth and maturity is transferred to Poland and during the phasing-out period the production is often taken back to Rimforsa. The logistics between the companies are supported by the exchange of delivery plans each night between Rimforsa and Poland. Weekly surveys are done at telephone-conferences, where for example, materials, tools, and test equipment are gone through before a product transfer.

The planning manager experiences increased communication between the functions; there are joint meetings, weekly planning meetings for information. Customer team-meetings, with most of the large departments, go through customer by customer focusing on delivery precision, quality matters, mode of transport, up-dates, and future development. The management group meets every two weeks for the spread of information. Major decisions are taken on a company group level. The marketing department advocates tighter cooperation with suppliers in order to communicate the demands and find new solutions. An increased cooperation between the marketing and purchasing departments is also indicated by the CEO.
APPENDIX V NOTE
NOTE AB

The information about this company is to a very large extent based on a thorough semi-structured interview (see Appendix II: Interview guide) with Peter Jansson in November 2007: He is the COO and member of the management team of NOTE AB, and has a background as production manager at Norrtelje Elektronik. He was one of the founders of the company who built it up and he is thereby also one of the founders of NOTE: the factory in Norrtälje was merged with a sourcing company in Arningen in order to get assistance with production in Poland. The sourcing company had an office for distribution in Poland. In the time that followed companies have been bought – factories in Poland and in China. Since 2002 Peter Jansson has been responsible for factories in Estonia and Lithuania and been part of the management team of NOTE AB as COO. He has been responsible for production strategy among other things. A new role for him is Quality, R&D and Investments (aimed at production). He points out, however, that the CEO of the manufacturing companies report to the company group manager, not to the COO.

Additional information about NOTE has been collected from their web-site and from annual reports.

Background and line of business
NOTE is an EMS supplier, considerably larger than Mekanotjänst and Rimaster, and a customer to both companies. As a contract supplier, calling itself a service producing company, it sells the service of assembling customer’s products.

The company was founded in 1999 as an intermediary within the electronics business – conveying manufacturing orders from Sweden to Central-European factories. Two Swedish companies, a factory and a sourcing company, were merged in order to obtain production in Poland. NOTE has grown through acquisitions in Sweden (in order to help establish business close to the customers) and in Eastern Europe and China for low-cost production. NOTE went public in 2004 (listed on the Stockholm Stock Exchange’s O-list). Its turnover has developed from SEK 4.5 million in 1999 to about SEK 1,700 million in 2006 (about 1200 employees).

The focus is on four market segments: telecom, industrial, vehicle/maritime and medical/technology/safety/security, producing electronics from design to after-sale service. NOTE has vast customer diversification with several hundred customers. The goal is to balance between different lines of business and customers with different fluctuations in the market.

NOTE has developed special tools in order to support new product development. They have explicitly named and defined different services – “productified” the services. NOTE is the initiator of EMS-Alliance, consisting of electronics manufacturers in five countries: USA, China, Brazil, India and Sweden. The alliance gives the customers access to production in suitable member production units.

Increased demands on cost reduction and flexibility have been met strategically by transferring volume production to low-cost countries (Poland, the Baltic States and China) for a long time. The COO stresses the importance of a close relation to the customer, “geographically and psychologically close”. “One hour by car from the customer” is the goal. Factories have been bought with consideration given to the location, to be close to the
customers. “Access to factories is seen as the foundation of closeness” he claims, and in some cases the customers even have their own desks at the factory.

There was a lot of customer focus 5 – 8 years ago. A change-over be noticed. There is more focus on process, e.g. lean production lately, and the main focus during the last year has been on sourcing – cheap materials and rapid deliveries. A function in Gdansk, a sourcing-center of 50 employees, has been established. This is a resource that, among other things, creates databases of components showing availability on the market, and construction support for the customers. In a year this sourcing-center is to serve all the companies in the group. The intention is to be best – on agreements, and in control. Nordic factories place orders in Poland and get deliveries directly to the factories. This cuts down a lot of resources in Sweden. You get everything together: volume survey, certain products, better position with the suppliers, synergies within purchasing and various other effects.

NOTE makes an extensive use of IT, e.g. in the supplier database and in communication with their customers. In some factories the customers have access to open pages in the ERP systems and can follow the progress of their articles in the production line.

When asked what he sees as distinctive capabilities of the company Peter Jansson mentioned the central sourcing, the component database and the geographical closeness: e.g. in Oslo a small laboratory and prototype workshop with only 18 employees have been established – high-volume production, if any, is transferred to Eastern Europe – a concept NOTE calls ‘NEARSOURCING’. The COO points out technical competencies and the ability to handle customers and stresses the co-operative work between sales and technical personnel with customers, in teams of test- and process engineers, key account managers and others.

NOTE is now entering a new phase – from a turnover around SEK 0.5 billion to SEK 1.8 billion it is now time to reach new markets. England, Germany, Denmark – a large expansion is planned, with a larger central organization.

Customer demands
NOTE does not use the expression “system supplier” but calls itself a service producing company – selling the service of assembling the customers’ products. The offer is for everything from design to after-market sales and repairs.

The development of the company goes hand in hand with the customers’ demands. Subcontracting within electronics is a relatively new line of business. 25 – 30 years ago the customer handled the production themselves. Ericsson started to outsource production why there is a strong trend within EMS in the Nordic countries.

Customer demands get tougher and tougher: time of delivery, precision (sometimes on the hour), quality, price reductions. There has been an enormous development right from the beginning, when

1. the customer handled the production itself, to when
2. material-kits were left from the customer to the subcontractor for production, to when
3. the supplier became responsible for development towards the customer, to when
4. the supplier now takes some responsibility for the final product.
In the end of the 90s and around the years 2000-2001 in connection with the telecom-crisis, the customer went directly to China for production. How would NOTE meet that price formation – more effective production, lower labour costs?

The choice fell on Poland – a large country with very competent personnel – and on the Baltic States. Nordic manufacturers turned to Poland for production, retained the complex production and got the total picture matching the one from China. The production today in Eastern Europe matches China’s. The trend is towards production where the final products are sold.

Lean production (Toyota production system) gives a more effective production. The logistical disadvantages cut out more costs. Chinese companies are establishing themselves in Europe, while the market for EMS within Europe is growing again.

Resources
Critical resources are technical knowledge and competence to handle customers. The presence of knowledge and competence is crucial, yielding low risk and low cost locally. This concept is carried out in England in the form of a development company. The production process in itself is about the same as the competitors. Effective production is required by all.

Customer closeness is stressed (to be integrated with the customer and be entrusted); this is created by supplying good things and having a close relation – “geographically and psychologically close”, “we are an extension of the customer’s business”. “One hour by car from the customer” (is not quite up to standards regarding e.g. Torsby serving Gothenburg, and for northern Sweden). Factories have been bought with the location in mind, to be close to the customers. Access to factories is the basis of closeness. In some cases the customer has its own desk at the factory. Customer focus – being keenly aware of the customer, listening – is incredibly important. “You may fail completely with a product on some occasion and still save the situation if you have a good relationship with the customer. If you do not have that you are out instantly.”

Sales personnel and technical engineers co-operate with the customers in teams of test-/process engineers, key-account-managers and others.

Guidance and coordination
Cross-functional teams meet about four times a year. Members of the companies’ management groups, for instance purchasing, HR, and production, meet for coordination, benchmarking, developing standards and other things. A CEO-forum meets to discuss for example budgets and strategies.

Projects bridge over different functions to create, for example, a platform to transfer the manufacturing of a product. In total there are about 600 employees in Sweden and 600 in Eastern Europe. Employees in leading positions within the group of companies know each other.

The intranet could be better and is about to be up-dated. It contains however manuals, agreements and other documentation that needs to be coordinated.

Externally the information flow is partly highly automatized: In some factories the customer may go into the production and see where the products are through open pages in the ERP-
systems. The Internet-connection facilitates, reduces manual customer handling (not having to tie personnel to the phone with routine customer questions) and increases the customer value. The possibility is however not at hand in all factories.

This gives “early warning” (first by way of internal “filters”) to take measures and then get in contact with the customer.

Automatization of getting information to suppliers is in progress (availability of products are attained by way of the component database).

NOTE has their own NOTE Academy for the competence development of all personnel; that covers everything from introduction to trainees. This is the second year for this coordination of training and education; some training is bought, some is arranged by the company itself, and the concept is to develop further to cover soldering, quality systems, standard IPC (association connecting electronic industries), leadership educations an so on. The concept will be developed more for customers/suppliers – which is not the case today.

**Suppliers**

Materials make up for about 70% of the cost estimates. The customers have very good knowledge about price formations and the calculations are often open and more transparent.

The securing of suppliers is done through quality assessments, system evaluations and other routines. Certified NOTE-suppliers fulfil contractual demands. About 90% of the suppliers have quality assurance. Today there are about 300 suppliers; the goal for 2010 is about 70 suppliers. Electronics components are bought from large international suppliers, often customer controlled: the manufacturers have different distributors, where they choose someone with good terms, as for example in stock-keeping. Cabling, sheet metal and other customer unique products are bought from local suppliers and there are lots of these! The intention is to find central suppliers to coordinate this, i.e. system suppliers of the mechanical production.

The availability of components is collected in the database, which is the information from suppliers. Customer specific suppliers are handled more manually.

**Flexibility**

NOTE has several hundred customers – a wide spread of customers. Ericsson accounts for 20% of the turnover (telecom in total about 30%). The goal is to have balance between the different lines of businesses and the customers in different phases of the trade fluctuation – different “legs” of the same size. High-volume production, sensitive to economic fluctuations, is transferred abroad to Eastern Europe (slightly more than 40% of the production), at a fifth of the labour costs and is thereby a lower risk. Subcontractors in Poland handle the production in their own factories and, as “expansion tanks”, five subcontractors within EMS in Poland are used. These are subcontractors with between 30 and 100 employees, with other customers than NOTE.

Smaller volumes, complex products, “unstable” products in the development phase or products that are built into large systems are retained in Sweden. This production is not as sensitive to price competition and the planning in advance is better.
Liabilities
The customer owns the product – NOTE has no consumer liability. The company is very explicit about not having their own products; they do not compete with the customer! This could create conflicts, such as with resource problems.

The responsibility for the durability of the components and the assembly of the products lasts for between one and two years. The customer takes the responsibility for the construction. NOTE has only a small responsibility for the choice of materials –95% of the time it is the customer that controls this. NOTE strives to be part of the design in order to ensure the best production prerequisites. The company may also help – with support from its suppliers – to find alternative materials to replace unobtainable materials.
THESES IN LOGISTICS

DOCTORAL THESES


