

Logistics and Transport Management
Master Thesis 2000:11

Supplier Performance Development

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ISSN 1403-851X
Printed by Novum Grafiska

ABSTRACT

The recent year's development in the industry has led to procurement activities increasing in their importance. All in all, this means two changed prerequisites. Totally new claims will be charged on the procurement department. Further, also the relations to the company's suppliers' will change. In order to cope with this development the companies have been forced to create systems for measuring, evaluating and developing suppliers as a way to reach higher competitiveness.

In this thesis we develop a common general process in the form of a recommendation to improve the essential parts of Lear Corporation's suppliers' delivery service performance. To solve our problem we investigate literature and previous research in the subject. We also conduct a benchmarking study of five companies in order to get ideas of how to approach the problem. In our recommendation we define some essential key variables in the area of delivery service and give suggestions for supplier evaluation. If the supplier diverges from the objectives we recommend a four step supplier development process.

Key words: Delivery Service, Performance, Development, Improvement, Supplier, Key-variables.

PREFACE

This master thesis is our last assignment in the Master Program Logistics and Transport Management at the School of Economics and Commercial Law, University of Gothenburg.

We would like to thank the persons who have been supporting us during the thesis writing. Specially thanks to our tutor Peter Rosén at School of Economics and Commercial Law at Gothenburg University and Arne Alfredsson, Logistic Manager at Lear Corporation, Tanum and Lennart Tillqvist, Purchase Manager at Lear Corporation, Trollhättan. Further we want to thank our families for being supportive and understanding during this period.

Göteborg, December 2000

Christoffer Sellberg

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1 INTRODUCTION

In this chapter the background of the research problem will first be discussed, followed by the problem statement and the purpose of the thesis. We will end this chapter by giving you the limitations and the disposition.

1.1 Problem Background

The assembled activities of business logistics stand for between 18 to 30 percent of GNP in United States, as well as in Scandinavia. This relation show the importance of a serious management of business logistics and the necessity of having the relevant accounting, follow-up and efficiency control system for the costs and revenues that can be related to business logistics.¹

In order to cope with this development the companies have been forced to create systems for measuring, evaluating and developing suppliers as a way of reaching higher competitiveness. However, it is hard to measure along the whole material flow to receive a complete picture. This obstacle must be seen in relation to the fact that the demand for methods of measurement constantly increases. The demand increases mainly due to three reasons. First, business logistics can to a greater extent be assumed to contribute to the company's profitability, which demands that the contribution to the total result must be measurable. Second, the different measurements are an important support in the business logistics development and third, a quicker change rate demands more flexible methods of measurement.

A Company's total profitability can be related to certain achievements of the business logistics. The industries' increased awareness of business logistics has lead to implementation of various material planning systems (MPS) such as Just-in time and different quality/management systems like total quality management (TQM) and QS-9000. All these systems have also conveyed that supplier development strategies are being performed in various ways. This, in order to strengthen the supplier and improve the relations, performance as well as strengthen the competitiveness, both for suppliers and the buying firm.

This development in the industry has led to procurement activities increasing in their importance. In many industries the procurement activities can account for 60 to 80 percent of the variable costs, which means that purchasing activities has been given great focus. Though, it has been proven that the relation towards the suppliers must be viewed from a broader perspective than just purchasing

¹ Persson & Virum, 1996

of material and components of good quality and low price. Today the companies also must focus on the supplier's ability to provide an excellent delivery precision, flexibility, service level and the ability to co-operate.

When it comes to the suppliers' delivery service, the main issues are time and place. If a factory doesn't get its materials at the agreed time, it may cause a production stop. The commodities also have to be in the right place. If the commodities aren't in the right place and at the right time, this problem has to be solved through expensive express deliveries. These occurrences are processes or flows, both internal and external, which have to be controlled to not affect the efficiency and the profitability in the materials management chain. The reasons why these processes or flows do not work could of course be many. It could be lack of knowledge, time, management or even an organisational problem. To be able to survive in the long run the companies must learn how to handle these processes in a way that is value creating for both the supplier and the customer.

All in all, this means two changed prerequisites. Totally new claims will be charged on the procurement department. Further, the relations to the company's suppliers' will change. This means that the procurement department will get a major strategic significance. To be able to handle these new demands, it is absolutely necessary to create excellent relations with the suppliers and develop methods of measurement in order to evaluate and develop superior supplier performance.²

Earlier this year the Purchasing Manager Lennart Tillqvist, at the interior system division (MOD), Lear Corporation contacted us. Mr Tillqvist explained the situation at Lear regarding the delivery service and that they would like to have a plan for measuring and developing their supplier relations. We were asked if we could investigate how to measure some parts of Lear's suppliers' delivery service and then in the extension propose ideas for a common routine for supplier evaluation and development. Today there exists no common routine for measuring, evaluating and developing the suppliers' ability to deliver a high delivery service.

1.2 Problem Statement

The main reasons why this task was given to us were first of all that the general opinion within Lear is that their suppliers have a low delivery service, which in the long run can lead to production stop and affect the profitability. Second, that Lear Corporation is certified by QS-9000, which demands supplier measurement and development of delivery and transport precision. We assume

² Storhagen, 1995

that Lear's suppliers' delivery service today is low, since this task was given to us.

A large multinational company like Lear Corporation can be assumed to have great power over its suppliers. In order to utilise this power in the best way Lear Corporation must by any means avoid confusion among the different suppliers. This means that different factories and departments must treat and act against the suppliers in a common way. Another problem is that if the suppliers do not get any feedback of their performance, it is not sure that they know they have a problem.

Our first thought was that the problem dealt with the fact that Lear Corporation did not have any common procedure regarding the measurements and development of the supplier's delivery service and that they were forced to measure this since the QS-9000 demanded it. After a thorough analysis we can define the fundamental problem as:

- Lear Corporation's suppliers have a low delivery service performance and one of the probable reasons for this is that there exists no common procedure to measure, evaluate and develop the suppliers' delivery service.

1.3 Purpose

The main purpose with this thesis is to develop a common general process in the form of a recommendation of how to improve the essential parts of Lear Corporation's suppliers' delivery service performance. In order to fulfil this main purpose we need to develop a routine to measure, evaluate and develop Lear Corporation's suppliers concerning some parts of the delivery service.

1.4 Limitations

Our limitations are first of all that we only will give general recommendations and will not consider the practical implementations of our recommendations. The recommendations will be based on observations obtained through a pre study at one factory recommended by Lear. We consider this factory representative for all other concerned units.

1.5 Disposition

Chapter 2

The Method chapter describes how we have approached the problem and the strategy used to solve the problem.

Chapter 3

The Company Introduction chapter will present Lear Corporation and the result of our pre study.

Chapter 4

The Theoretical Framework chapter explains different logistic concepts and research important to solve the problem.

Chapter 5

The Empirical Studies chapter will present the findings of our benchmarking study of the five chosen companies.

Chapter 6

The Analysis chapter will analyse the investigated companies against the theoretical framework.

Chapter 7

The Recommendation & Conclusions chapter will finally present our recommendation and conclusions that will solve the problem.

2 METHOD

In this chapter we will describe how we will approach the problem and the strategy used to solve the problem.

One important factor that influences the research is our knowledge and understanding of the problem we are to solve. Gummesson emphasises the importance of preunderstanding. Preunderstanding is defined in the following terms: “In response to frequent and everyday occurrences, individuals have developed a preunderstanding in order to avoid having to bother themselves with the interpretation of these events. Sense impressions, interpretations, understanding and language merge instantaneously, making it possible to identify separate phases”.³

Figure 2.1 shows some essential factors, which contribute to the growth of preunderstanding. The individuals own personal experiences from both private and working life are shown on the left-hand side of the figure. The knowledge that has been obtained via intermediaries appears on the right hand side of the figure. The combination of one’s own and other people’s experiences constitute a store of knowledge that represents the individual’s preunderstanding at the start of a research project.⁴

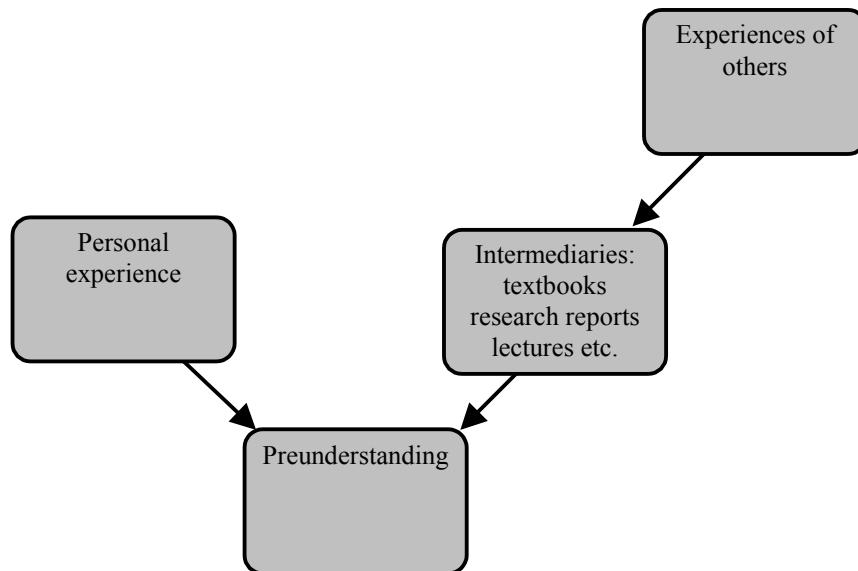


Fig. 2.1 Preunderstanding, Gummesson, 1988, p 60

Our own experiences outside the academic world are limited, hence our preunderstanding is primarily formed on the right hand side of the figure. The experiences of others have been communicated to us through books, lectures

³ Gummesson, 1988, refers to Ödman, 1979

⁴ Gummesson, 1988

etc. Gummesson refers to this kind of preunderstanding as “preunderstanding at second hand”. This kind of preunderstanding can take two forms, one containing positive features and the other, negative features. The positive feature is that knowledge by description can enable us to pass beyond the limits of our private experiences. One negative aspect of learning through intermediaries is that we may run the risk of misunderstanding the information communicated by others.⁵

When we don’t immediately understand the reality we’re part of, i.e. when the preunderstanding is not enough, we use interpretations. These interpretations are subjective and the phenomenon that is interpreted can be viewed from different perspectives.⁶ Our experiences and knowledge as well as our values are the basis of our interpretations of the observations and interviews conducted within the study.

Wiedersheim & Eriksson define three different research strategies: exploring, descriptive and explanatory.

In the first phase of our thesis we work according to an exploring strategy. Through literary research and interviews/observations (the pre study) we achieve an understanding of that process we were requested to investigate. From this understanding we construct the theory, which is the foundation for the study.⁷

Andersen on the other hand distinguishes between four different types of investigations: descriptive, explanatory, predictable, critical-diagnosing together with investigations with a focus on change.⁸

Investigations focused on change refer to investigations where the participants themselves perform concrete actions. The purpose of these actions is to change conditions within the area that is investigated. Our investigation is an investigation with a focus of change in that sense that we aim to develop a “routine” where Lear can measure, evaluate and develop their suppliers. By implementing this “routine”, Lear will be able to develop their suppliers and increase their delivery service i.e. improve the “process”. The procedure we are describing is also often called action research.⁹

⁵ Gummesson, 1988

⁶ Ödman, 1979

⁷ Wiedersheim & Eriksson, 1991

⁸ Andersen, 1994

⁹ Ibid

To be able to apply action research Gummesson states that there have to be three interested parties: the client, the researcher/consult and the science and further the work must be able to be reported to others than the client.¹⁰

In action research the essential purpose is to establish changes of undesired conditions. One major part of the control lies with the investigated parties themselves.¹¹

Action research means that the researcher participates in solving of the practical problem, together and in co-operation with the client.¹²

One problem with this type of investigations is to get enough information to be able to understand the process. As an outsider observer is it hard to achieve that understanding it takes to create improvements. Gummesson uses the concept access to describe these difficulties.¹³ Access refers to the possibility of the researcher to get hold of enough information on the subject of investigation. According to Gummesson, the researcher often has insufficient access to the processes he is to study or improve.¹⁴

Gill & Johnson describe an additional problem. They focus on the difficulties that arise from the inherent need for close collaboration between the parties. Close collaboration between the distinctive and very different cultures of the managerial and academic worlds gives rise to issues about whether the aims of the work will be concerned primarily with problem solving for the particular organisation, or with producing theoretical generalisations for the wider community.¹⁵

The combination researcher can involve very different roles and ways of working. Gummesson specifies seven fundamental roles.¹⁶ Our role can be seen as a combination of investigator and project participator.

As an investigator, the researcher often has no greater possibilities than the traditional researcher to study a strategic or organisational process of change. In project work the researcher is given the opportunity to meet company employees and to some extent see them in action.

¹⁰ Gummesson, 1985

¹¹ Halvorsen, 1992

¹² Andersen, 1994

¹³ Gummesson, 1985

¹⁴ Ibid

¹⁵ Gill & Johnson, 1997

¹⁶ Gummesson, 1985

2.1 Business Process Improvement (BPI)

Business Process Improvement or BPI is a systematic methodology developed to help an organisation make significant advances in the way its business operates. It attacks the heart of the problem by focusing on eliminating waste and bureaucracy. It provides a system that will aid the company in simplifying and streamlining its operations.

The model, which is illustrated below, illustrates how a company practically can improve a process. The reason why we chose to describe this is that our investigation should be seen as a part of a greater whole. We act together with Lear to solve a problem. Lear has the responsibility for some activities in every phase, whereas we are responsible for suggesting others. We will mainly be involved in the development of a general model for measuring and controlling and conducting benchmarking studies, which then will be the basis for a continuous improvement.

Our investigation aims foremost to give a general strategy to improve the process. Our task is solely to, from a number of activities, create a recommendation, which then is up to Lear to implement.

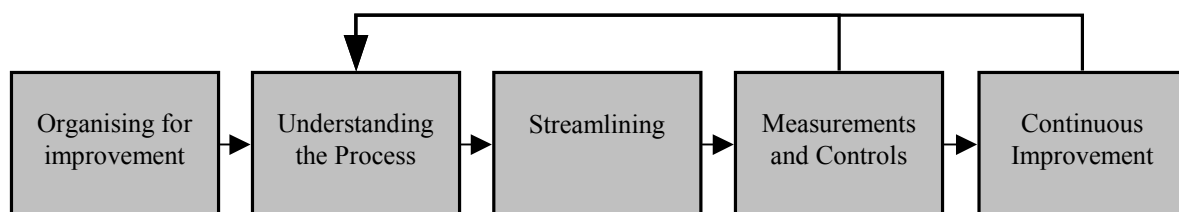


Fig 2.2 Business Process Improvement, Harrington, 1991, p 23

The objective of the first phase of BPI is to ensure success by building leadership, understanding and commitment. In this phase the company must organise a team to oversee the improvement effort and the process improvement team.

The objective of the second phase is to understand all the dimensions of the current business process. One common technique and key tool for this is flowcharting, which is the basis for analysing and improving the process. Flowcharts serve one main purpose: to document a process in order to identify areas in need of improvement.

The objective of the third phase is to improve the efficiency, effectiveness and adaptability of the business process. Streamlining suggests the trimming of

waste and excess, attention to every minute detail that might lead to improved performance and quality.

The objective of the fourth phase is to implement a system to control the process for ongoing improvement. Feedback systems are very important. It is clear that if you cannot measure an activity, you cannot improve it. Without the interaction between measurement and feedback the company cannot open the door to improvement.

The objective of the fifth phase is to implement a continuous improvement process. One step in this continuous improvement phase is to benchmark other companies, which means that the company needs to systematically define the best systems, processes, procedures and practices outside its own location. The purpose is to understand what others are doing and to use this combined experience and knowledge to help develop the company's processes even further.

2.2 Benchmarking

Benchmarking is a continuous process of evaluating current performance, setting goals for the future, and identifying areas for improvement and change.¹⁷ Benchmarking is foremost a process to set up goals. Even more important is that it is a tool to discover and understand the working methods needed to achieve new goals.¹⁸

Benchmarking should be viewed as one of many tools to achieve improvement and could be seen as a part of the business process improvement. A benchmarking study must therefore be connected and become an integrated part with the other ongoing quality work, inside a company.¹⁹

Benchmarking is foremost a methodology for improvement by comparison with other companies. One can compare the company as a whole or one can compare processes, functions, products etc. We consider our type of benchmarking as a comparison of processes. Process benchmarking is a comparison of methods and praxis of the execution of the operation processes, with the purpose of learning from the best.²⁰

Spendolini differs between three types of benchmarking: internal, competitive and functional.²¹

¹⁷ McNair & Leibfriend, 1992

¹⁸ Camp, 1993

¹⁹ Andersen & Pettersen, 1997

²⁰ Ibid

²¹ Spendolini, 1992

Functional benchmarking, which we will use involves for example the identification of processes in organisations that may or may not be direct competitors. The objective of functional benchmarking is to identify best practice. Best practice benchmarking focuses on the measures, practices and processes of a similar organisation.

The advantages of functional benchmarking are many: it is easy to identify similar functional areas in many organisations and confidentiality is not usually an issue.²² It is further easy to establish connections and the problems are often similar for companies within the same industry.²³

The disadvantages with benchmarking can for example be that companies can be afraid to reveal competitive advantages by sharing information.²⁴ According to Spendolini, benchmarking should not be seen as a one-time event but a continuous process. Benchmarking does not provide the organisation with prepared solutions. New ideas have to be implemented in to one's own organisation and considerations have to be made to the organisation's own prerequisites.

2.3 Practical Procedure

In an investigation one can either collect new data (primary data) or use accessible data (secondary data). In most investigations one use both primary and secondary data.²⁵

To be able to understand the process we conduct a pre study. This pre study is conducted through observations and interviews at one of Lear's plants. The difference between observations and interviews is that in an interview we ask direct questions and get a verbal answer. In observations we can see the problem with our own eyes.²⁶ The purpose of the pre study is to achieve an understanding of the problem and map the process in a flow chart.

Observations are above all usable when we collect information within areas that concern behaviour and processes in natural situations. Observations are mainly used in exploring investigations. The knowledge one then obtains through observations is then the foundation for further studies with different techniques for collecting information.²⁷

²² Bendell et al, 1998

²³ Andersen & Pettersen, 1997

²⁴ Ibid

²⁵ Halvorsen, 1992

²⁶ Andersen & Pettersen, 1997

²⁷ Patel & Davidson, 1994

Patel & Davidson differ between structured and unstructured observations.²⁸ In our study we will use structured observations since our problem is so well defined that it is given which situations will be a part of the observation. We here for example observed the delivery department and the quality department.

At the pre study at Lear we used a standardised questionnaire as a basis. The interviews got however also elements of conversation. According to Wiedersheim & Eriksson conversations can be used instead of interviews. In a conversation the interviewer does not have the initiative or ask questions all the time. Instead the conversation can be described as a balanced exchange of knowledge and experience. Through conversations the investigator can obtain new and unexpected aspects of the investigation area.²⁹

With the understanding achieved from the pre study we conduct literature studies together with studies of previous research in the field to obtain a deeper understanding of the terminology and get ideas of how to approach a solution to the problem.

Secondary data concern studies of documents, i.e. such information that has been written or printed. This type of data can be used to answer questions about actual conditions and actual processes.³⁰

Literature and previous research are important sources of information in our thesis. Together with the benchmarking study, it constructs the foundation for our recommendation to Lear. Secondary data, in this case literature and previous research, is used with the purpose of illustrating theoretical procedures.

As a complement to the secondary data and the previously gathered primary data we will collect new primary data through a benchmarking study of five different companies. Primary data is new data that the researcher himself collects by using one or several data collection methods. Here one often differs between quantitative and qualitative data. Data is quantitative if it can be expressed in numbers or other quantity terms – so called hard data. Qualitative data is data, which tells us something about the qualitative (non-measurable) characteristics of the subjects of the investigation.³¹

²⁸ Ibid

²⁹ Wiedersheim & Eriksson, 1991

³⁰ Patel & Davidson, 1994

³¹ Halvorsen, 1992

The purpose of qualitative investigations is to obtain a different and deeper knowledge than that which often is obtained when one uses quantitative methods. The ambition is to try to understand and analyse the whole.³²

In the benchmarking study we use standardised interviews. We ask similar questions to every interviewee. Completely standardised interviews are often used in situations where one wants to be able to compare and generalise. The interviews are completely unstructured, which means that the questions lack answer alternatives. This gives the interviewee maximal room to answer.³³ The purpose with the interviews in the benchmarking study is to study the chosen companies to understand their process of measuring, evaluating and developing their suppliers' delivery service.

Our selection of companies is completely subjective; i.e. we have together with Lear selected the companies on the basis of our judgement of how typical they are for the whole population/line of business.³⁴ We chose these companies since they can be assumed to have a well-developed routine for measuring, evaluating and developing their suppliers.

The pre study and studies of literature together with previous research and the results of the benchmarking study then constitute the foundation for our recommendation to Lear.

2.4 Reliability and Validity

Reliability means that the results of a study should be reliable. If nothing changes in a population, two investigations with the same purpose and the same method should give the same result.³⁵

In our investigation, reliability is primarily influenced by the circumstances that can disturb the interview process. It is easy to obtain subjective information from the interviewees since different individuals interpret and conceive a certain situation in different ways. Other variables that can disturb the interview process are that it can be difficult to get honest answers to our questions. The companies might not want to reveal all their information to competitors.

More generally our investigation is influenced by how we as researchers interpret the information from our theoretical studies as well as the interviews and observations. Due to our limited preunderstanding and lack of practical

³² Patel & Davidson, 1994

³³ Ibid

³⁴ Halvorsen, 1992

³⁵ Svenning, 1996

experience in the field of research, the handling of this reliability problem is crucial to our investigation.

The reliability problem of our thesis can't be eliminated completely, but we can reduce the effects. We record all interviews on tape. This allows us to return to the interview situation as often as we want. We also chose to conduct the interviews face-to-face. This enables the companies not only to answer our questions verbally but also to use alternative ways of presenting their solution to the problem, such as pictures, flowcharts etc.

Within the concept of validity one differs between internal and external validity. Internal validity deals with the investigation itself and the direct connection to theory, more concretely that we ask the questions to the right group of people. External validity deals with the project's anchorage within a wider framework and the possibilities to generalise from a specific study.³⁶ The validity is usually high within qualitative investigations.³⁷ Our investigation has a strong connection to existing theories and concepts within our field of research. We choose to interview persons that work with the specific process in their respective company and therefore can be assumed to have good knowledge in the area. Since we chose to conduct interviews with a relatively large number of companies we assess the possibility to generalise to be fairly high. The conclusion is that the internal validity in our investigation is high while the external validity is somewhat lower.

³⁶ Ibid

³⁷ Jensen, 1995

3 COMPANY INTRODUCTION

In this chapter we will present Lear Corporation and the result of our pre study.

Lear Corporation is one of the ten largest independent automotive suppliers in the world. They are the leading supplier of automotive interior systems in the estimated \$52 billion global automotive interior market. They are the largest seat system suppliers and the third largest supplier in the global automotive electrical distribution systems market. Lear has grown substantially over the last five years as a result of both internal growth and acquisitions. Lear's sales have grown from \$3.1 billion in 1994 to \$12.4 billion in 1999. Lear offers their customers fully integrated modules, as well as design, engineering and project management support for the entire automotive interior, including electronics and electrical distribution systems. The ability to offer automotive interiors with integrated electrical distribution systems is the most important competitive advantage over their competitors.³⁸

Lear's present customers include every major automotive manufacturer in the world. These customers include Ford, General Motors, Daimler Chrysler, BMW, Fiat, Honda, Peugeot, Renault, Saab, Volvo, Toyota and Volkswagen. Lear Corporation has established in-house capabilities in all five principal segments of the automotive interior market: seat systems, flooring and acoustics systems, door panels, headliners and instrument panels.³⁹

The company is today represented in 33 countries where 300 units employ over 100 000 employees. Lear Corporation's main office is situated in Southfield, Detroit and the company is since 1995 noted on the NYSE.⁴⁰

Lear Corporation Sweden AB established in 1991 and the turnover was, in 1999, 5 billion SEK. The main office is situated in Trollhättan where 800 of the total of 3200 employees are employed. Lear Corporation Sweden AB is divided into three different divisions. The first division, FORD delivers seats, instrument panels and door panels to Volvo-Ford. The second division, GM deliver seats and interiors to Saab-GM, and the third division, MOD manufactures interior parts and delivers to the seat plants but also directly to Volvo and Saab. Each of the three divisions has its own central purchasing

³⁸ Lear Corporation Annual Report, 1999

³⁹ Ibid

⁴⁰ Carina Sjöstrand, Lear, 2000

department. This thesis will only focus on the MOD division, which has production facilities in Tanum, Färgelanda, Gnosjö, Tidaholm and Ljungby.⁴¹

3.1 Pre Study

This pre study is done in order to gain better understanding of how one of Lear's materials management flows works. Lear chose a best practice plant and according to the Purchasing Manager, Lennart Tillqvist this plant, which is situated in Tanum, already has a routine for measuring parts of the delivery service. This routine works to some extent and can give us a good idea of how to develop a common routine for increasing the suppliers' delivery service to the MOD division at Lear Corporation Sweden AB.

Our first thought was that a number of key variables for measuring the delivery service must be developed. In order to do that we must gain better understanding of how the plant works. We must get an understanding of the materials management flow from the beginning, when the order is placed, to the end when the article is delivered, controlled and passed further in to the production cycle.

Lear Corporation Tanum

In the factory in Tanum mainly door panels to passenger cars are manufactured. The plant delivers to Lear Corporation in Torslanda, AutoNova in Uddevalla and Volvo in Gent. The number of employees in the factory is 270 persons and the yearly turnover is approximately 200 million SEK.

In the beginning of a supplier relationship the central purchasing department at the head office in Trollhättan negotiates with the supplier and places the initial order. Lear Tanum as well as Lear Corporation Sweden AB uses only one supplier for one product and the total number of suppliers at Lear Tanum is 55 and approximately 20% of the suppliers account for 80% of the volume. The initial order is regulated by the general conditions of purchase where price, quality, deliveries, etc. is stated. A copy of this initial order is sent out to the different production facilities.

Since the production at Lear Tanum is customer oriented the materials management flow starts with a customer order of for example a door panel. When a customer order is generated the factory's MPS system is activated and the different inventories are checked and a delivery schedule is planed. The delivery schedule shows the plant's demand of supplies for a period of time and is updated and sent approximately every week to the supplier. This is since the

⁴¹ Ibid

customer order can be updated once every day. For those suppliers that use EDI communication, the delivery schedule update is once every night, but the order cannot be changed when it's less than three days to delivery. The delivery schedule states the type, amount and on which date the goods are to be picked up at the supplier's plant. Most of the transportation to Lear factories is transported on milk runs. In the near future Lear Tanum will introduce this method as well.

After the goods have been transported and delivered, the initial check is to control if the numbers of goods units match the consignment note. It is extremely seldom that a mismatch appears since the transporter has the responsibility for the consignment note and this is the base for their payment.

The next step in the materials management flow is to transport the incoming goods from the unloading dock to the delivery department and finally to the inventory. At the delivery department a more rigorous check is performed. The check begins with matching the identification code on each goods unit with the identification code on the delivery note. This is done to ensure that the correct article and amount has been delivered. The second step is then to type in the delivery note into the data system, which provides the MPS system with current information regarding the inventory level. When the data is fed into the MPS system the goods unit will get a new identification note, which states that the goods unit is registered and is given a certain location in the inventory, which uses a FIFO method. The identification note, which shows volume and article and is attached to the goods unit, is regarded as true information, which means that no further control is performed. After the registration the person who works with delivery follow-up gets a confirmation that the order is delivered. If a goods unit isn't registered and delivered the MPS system creates a report of all orders that are not received. This report is then every night sent to the delivery-follow-up department.

After the registration the delivery note is given to the financial department, which saves it in order to match it against the incoming invoice. The financial department also matches the price on the invoice with the negotiated price, which is given by the central purchase department. According to the financial department at Lear Tanum, the biggest problem regarding the invoices is that the price that is stated on the invoices doesn't match the negotiated price reported from the purchase department. The supplier does not create this error, instead it is a communication problem that the purchase department doesn't report to the financial department at the different plants when a change in price has occurred. When there is an error in the invoice only an informal report is constructed. This is often reported by a telephone call and no documentation is done, which makes it hard to measure.

If the supplier delivers to Lear Tanum for the first time, the quality department needs to check the quality of the product before it goes in to the production. This is done with the three to five first deliveries. Also, if the production has encountered some problems with articles from a certain supplier the deliveries will be stopped and checked before they go in to the inventory and then finally into the production. If the quality department finds a problem, a reclamation report called 8D (see appendix 3) will be sent to the supplier. This routine is common and there also exists a letter that Tanum use when they contact suppliers that have a weak performance. The 8D report is the only common action taken, when it comes to supplier development but is mainly used for product quality issues. When a quality problem occurs, Lear Tanum can choose to either send the whole delivery back to the supplier, demand that the supplier comes to Lear Tanum and fixes the problem or fix the problem themselves and bill the supplier.

The last step in the materials management flow is that the first line in the production orders needed materials from the inventory and the production process has then started.

In order to visualise the flow from the pre study analysis, we will in model 3.1 below show the materials management flow.

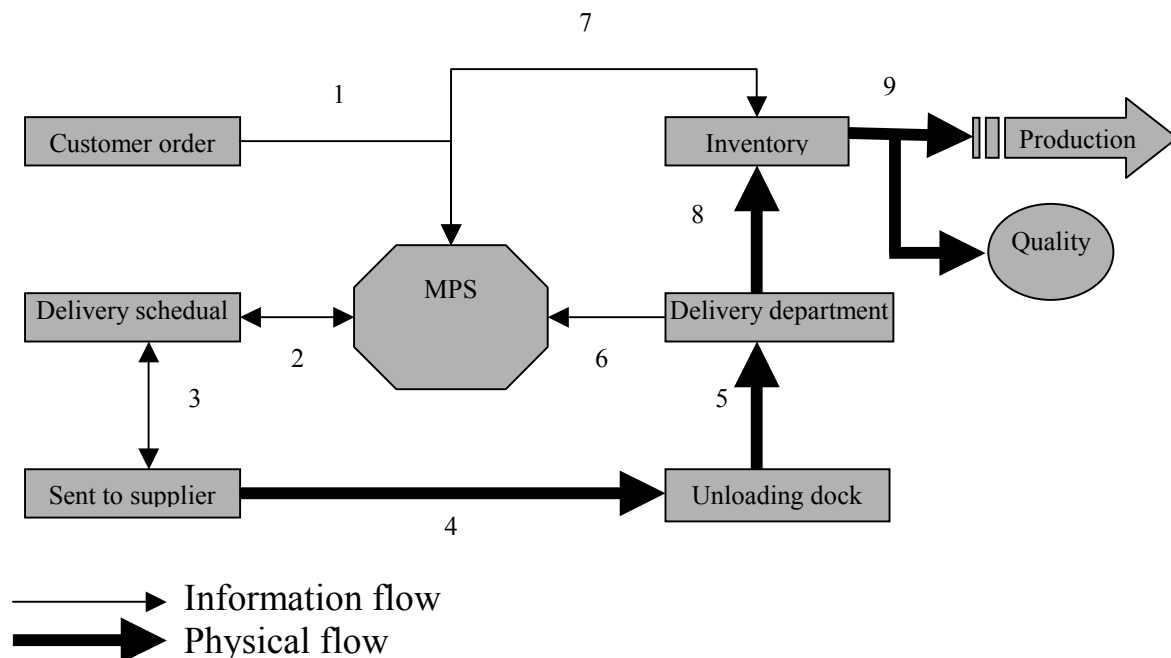


Fig 3.1 Materials Management Flow

1. A customer order activates the MPS system.
2. The MPS system checks the inventories and plans the delivery schedule.

3. The delivery schedule shows the plants demand of supplies and the schedule is sent to supplier.
4. The supplies are transported to the buyer and the consignment note is checked.
5. The goods are taken to the delivery department and the delivery note is checked.
6. The delivery note is typed into the MPS system.
7. The MPS system updates the inventory.
8. The goods are moved to the inventory.
9. The goods could be checked before being sent to production.

The objectives for delivery precision at Lear Tanum are at the moment 85 percent. Today, the delivery precision is measured on each supplier. These figures are based on when the goods leave the suppliers and not when they arrive. This since Lear almost always is responsible for the transport. Lear Tanum compares the print out date on the delivery note with the delivery date given by the delivery schedule. The key variables that are measured are number of articles delivered too early, number of articles delivered on time and number of articles delivered too late. A ratio is then calculated for each supplier with the basis of total numbers of articles delivered. These statistics are then presented to each single supplier every month in the form of a box diagram that indicates their performance the recent month. This is at the moment the only feedback they get on their delivery service.

One problem according to Arne Alfredsson, logistic manager at Lear Tanum, is how to act on these figures. He would like to have a common policy throughout the company so that the different plants can act in a common way. This is since many of the plants have the same suppliers and it could cause confusion if Lear Corporation doesn't act in the same way. Another problem is that if the suppliers don't get any feedback, it is not sure that they know that they have problem.

4 THEORETICAL FRAMEWORK

In this chapter we will present the theory that is essential for understanding and solving the problem of the thesis. We will start by explaining some general terms and give you the business logistic definition, which leads to materials management. After this presentation we will present the delivery service concept and various relevant management/quality systems. Finally we will explain the supplier performance improvement theory, which is the part of the theory chapter that more significantly will contribute to solve the problem.

4.1 The Business Logistic Definition

Few areas of business operations involve the complexity or span the geography typical of logistics. Logistics is concerned with getting product and services where they are needed when they are desired. Modern logistics is also a paradox. Logistics has been performed since the beginning of civilisation and is therefore hardly new. However, implementing best practice logistics has become one of the most exciting and challenging operational areas of business management.⁴²

The business logistics concept has in Sweden developed from American research and application of logistics. Originally logistics can be derived from military applications where logistics was associated with the support of the right materials and supplies in the right time and place. After the Second World War the military concept of logistics started to be used in business. Business logistics was however not especially noticed until the beginning of the 1960s. The first definition of business logistics concentrated on the movement and handling of goods from the point of production to the point of consumption. From this originally narrow idea of logistics, which almost exclusively treated the physical distribution of finished goods, the idea has been changed to a wider concept. The change is obvious, especially in two aspects. First, business logistics tend to focus more on the administration than on handling and transportation. Second, at the present time the whole flow, from supplier to end user of raw materials and finished goods is defined as business logistics.⁴³

One of the current definitions of logistics produced by the Council of Logistics Management, which is the most influential American organisation in this field, is as follows:⁴⁴

⁴² Bowersox & Closs, 1996

⁴³ Storhagen, 1995

⁴⁴ Persson & Virum, 1996

"Logistics is the process of planning, implementing and controlling the efficient, effective flow and storage of raw materials, in-process inventory, finished goods, services, and related information from point of origin to point of consumption (including inbound, outbound, internal, and external movements) for the purpose of conforming to customer requirements".

The terms physical distribution, production control and materials management form together the expression business logistics. Physical distribution is used to describe the product flow, and then foremost the administration of the outgoing flows from the company. Materials management is used in a similar way to describe the inflow of material. Production control deals with specific production issues and is the third part of the concept business logistics.⁴⁵

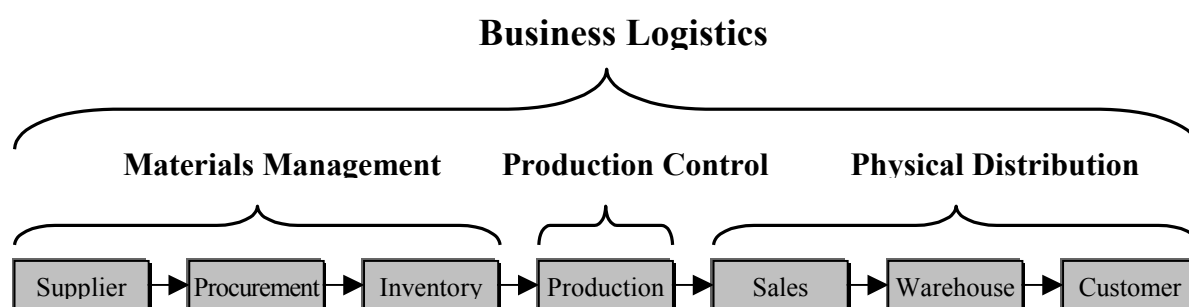


Fig 4.1 The relations between supply, production, distribution and business logistics. Storhagen, 1995, p. 26

Business logistics is as previously mentioned the comprehensive designation of the concept and principals with which one strives to plan, develop, organise, co-ordinate and control the material flow from raw material supplier to final consumer. For a single company this means that you are interested in in- and outflows as well as the internal flow of material, components and finished products. The main purpose with business logistics in an organisation is to improve the efficiency in the material flow, either through a cost decrease or a revenue increase, which is caused by an improved delivery service. A more efficient material flow can be achieved through a relevant and a material flow adapted change in the organisational structure, through further development of the existing plan and control system and through a change in the material flows itself.⁴⁶

4.2 Materials Management

In this thesis we will focus on the part of business logistics called materials management. The concept materials management refers to the material flow in the company, from the supplier to the consuming unit and activities around this

⁴⁵ Storhagen, 1995

⁴⁶ Ericsson & Persson, 1981

flow.⁴⁷ Materials management roughly consists of the three parts: supplier, procurement and inventory of raw materials. We will start by defining the supplier process and then go further into the procurement process and finish off with the delivery process.

4.2.1 Supplier Process

The concept supplier is by no means no unambiguous concept. A supplier can be seen as somebody who delivers and supply goods. But it can also be seen as somebody who delivers and supply services.⁴⁸ Another definition is that the supplier is the process or organisation that supplies the process with input. Sometimes it can be hard to identify the supplier since it both can be an external organisation or an internal part of the organisation.⁴⁹ In this thesis this means that the transporter should be viewed as a supplier of services.

4.2.2 Procurement Process

Procurement is today per definition all those activities that are included in the work process of providing goods and services to the production units. Traditionally the procurement comprises of the whole buying process. This involves identifying demands, supplier selection, price negotiation, contract or order development along with follow-up to be sure that the deliveries are conducted according to the agreement. Historically the price has been the most significant measurement of procurement. But since 1970s, when Just-in-Time became a vital concept in connection with production, the price has not been the only decisive factor. With the implementation of JIT thoughts of zero inventories, zero adjustment time and delivery after demand, the companies were forced to focus on delivery time, quality, delivery flexibility, delivery precision, service level and the suppliers ability to co-operate. Earlier the companies often accepted those delivery times that the supplier offered and the only real negotiation was about the price. Today the price is only one of many decisive factors when it comes to supplier selection. This has resulted in the procurement function increasing its importance.⁵⁰ Manufacturers are now again fixing their sights on procurement as the Promised Land of operational efficiency. This is since the cost of procured raw materials, parts and services easily exceed 50 percent of the annual revenue. Leading edge manufacturers are however pursuing a two-sided approach that addresses not only the prices of goods and services but also the internal processing and transaction costs associated with the procurement process.⁵¹ The company's competitiveness

⁴⁷ Aronsson et al, 1988

⁴⁸ Lilliecreutz, 1996

⁴⁹ Rentzhog, 1998

⁵⁰ Persson & Virum, 1996

⁵¹ Polsonetti, 2000

depends to a great extent on how well it performs the procurement activities and the company will never get any better than their suppliers.⁵²

During recent years, we have seen a change that will have great consequences for procurement development. The purchase of goods will be more and more complicated because of the extended product range, geographical dispersion, technical complexity and the increased economic/delivery risk. These changes cause displacement from stock order production to customer order production and increase the use of JIT and similar MPS methods.⁵³

4.2.3 Delivery Process

The delivery process (as we define it) starts when the goods are transported from the loading dock at the supplier's plant and delivered at the unloading dock at the customer's plant. This is the last step in the materials management process and is also the beginning of various activities. In the delivery process the goods are unloaded, inspected and stored in the right place of the inventory. This is also the process where the quality and the delivery service should be controlled.

One problem between the supplier, procurement and delivery processes are according to Randy Moore, director of contracts at Kaman Aerospace that buyers want to ensure that their companies are getting what they pay for, and thus monitor suppliers to ensure they are meeting cost and quality objectives. Suppliers, on the other hand, while ensuring that customers' requirements are satisfied, want to minimise the cost of performance.⁵⁴

4.2.4 Delivery Service

To increase market shares through good product characteristics becomes constantly harder and harder. During the last ten years the demand for good products has become a prerequisite in all lines of business. The companies tend to focus more on the customer receiving an appreciation in value in addition to the physical value of the product. The appreciation in value can for example be obtained through customer service, marketing or the quality of the goods or services.⁵⁵

Customer service includes the quality in all relations between a company and its customers, observed from the customer's viewpoint. The concept customer service can be divided into several main components. One of these is delivery

⁵² Persson & Virum, 1996

⁵³ Storhagen, 1995

⁵⁴ Avery, 2000

⁵⁵ Persson & Virum, 1996

service, which is a summary of the buying companies perception about the quality of the supplier's logistic activities. Furthermore the service demand varies between different parts of the market and between different times. One of the most important missions of the business logistics is to develop the delivery service in a way that all parts of the market feel that they not only get a product with the correct characteristics but also an appreciation in value by buying from a special supplier. For the supplier this means that in the long run the market shares will increase, possibilities for increases in efficiency and that the investors obtain an appreciation in value and receive a greater return on their investments.⁵⁶

Delivery service is the revenue creating part of business logistics. This is a comprehensive concept and deals with the company's performance against their customers.⁵⁷ There is a strong relationship between marketing and logistics. In a simplified way you can say that marketing creates business and logistics makes the business work. This can also be explained by saying that marketers often use the word customer service, which includes everything, that has to do with the relation to the customer and the delivery service is the part of customer service that includes the physical flow.⁵⁸

Delivery service is first of all an external concept and consists of a number of components that together are used for satisfying the customers' needs and/or the internal co-operation between different activities e.g. procurement and production in the material flow.⁵⁹ A high delivery service affects, at least in the long run, the revenues. Delivery service is as mentioned previously seen as a revenue-creating element in the material administrative activities. The difficulty with measuring the delivery service is to quantify the part of the delivery service, which contributes to the revenue.⁶⁰ To only establish that the delivery service is high or good is not enough. An additional specification must be constructed. A high delivery service could be everything from that the company being prompt on deliveries or always keeping to what is agreed upon, or that the distribution is that reliable that no transport damage ever occurs.⁶¹

In this thesis we will look at delivery service from another viewpoint than the traditional. We will investigate the suppliers' delivery service instead of investigating the companies' own.

⁵⁶ Ibid

⁵⁷ Lumsden, 1998

⁵⁸ Ibid

⁵⁹ Aronsson et al, 1988

⁶⁰ Ericsson & Persson, 1982

⁶¹ Lumsden, 1998

To be able to measure or derive the delivery service it must be broken down in different measures or components. There are many components, which together form the delivery service concept, but here we only will explain those we actually are going to measure. Which service components are significant vary depending on the line of business and competitors etc, and it should be stressed that these below not are the only ones.⁶²

- Delivery Reliability

Delivery reliability means the capacity to deliver at the promised time. This concept has gained more and more focus over the years. The reason for that is the industry's increased application of JIT systems. There is a very distinct development of the fact that the concept delivery reliability becomes more important at the cost of delivery time.⁶³

- Delivery Security

Delivery security, which is one of the main focuses of this thesis, is to deliver the correct product in the right quantity.⁶⁴ This concept embraces the risk of deviation from the operational routines and examples of conditions that influence the delivery security are administrative errors, delivery errors and product damage during transport.⁶⁵

In this thesis we will mainly focus on the delivery service parts regarding delivery reliability and delivery security, which together form the concept delivery precision. This part will then further be seen from two different aspects, supplier delivery service as well as transporter delivery service.

4.2.5 The Importance of Logistic Quality

Earlier quality was a concept, which mainly was associated with products and finished goods. Today the concept has a much wider meaning. The quality expert Philip Crosby has formulated the following about quality:⁶⁶

- Quality is something that must be in accordance with predetermined demands.
- Quality is achieved via prevention, not via control or sorting out.
- The operational standard for quality is zero error, not acceptable levels of quality.

⁶² Lumsden, 1998

⁶³ Storhagen, 1995

⁶⁴ Ibid

⁶⁵ Persson & Virum, 1996

⁶⁶ Ibid

- Quality is measured via the costs that originate when the demands not are fulfilled.

The cost of quality (the cost of not offering the right quality) estimates represent approximately 20-25 percent of a production company's turnover. The cost of quality can be divided into two main groups. The first group, which the company can accept, embraces the costs of preventing errors. The costs are tied to the process, which produce the product or service and are used to improve the same. The second group embraces the measures to reduce the effects when an error has occurred. Typical examples are cost for express deliveries when the original delivery is delayed, produce replacement products, and paying compensation for product errors, lost sales and goodwill losses. While the first group can be viewed as positive, as they strengthen the company's long-term competitive situation, the second group is negative and should be reduced to be able to maintain the company's competitiveness.⁶⁷

The concept of logistic quality is new and the principal parts are communication between customers and suppliers especially when it comes to inquiries, making offers, order handling, deliveries and communication at the right time and without errors. To obtain a high level of logistic quality the company must understand the customer's demands and expectations on delivery service and have a strategy to facilitate these. Furthermore the company requires a system and methods to measure the quality together with knowledge to improve the process.⁶⁸ To be able to control and improve the logistic quality, a TQM process can be useful.

4.2.5.1 Total Quality Management

Total Quality Management (TQM) is a management philosophy that involves everyone in the company and has a focus on quality improvements all over the organisation. TQM has had a great impact in the purchasing process concerning the supplier relationship. In a TQM environment buyers and suppliers work in a partnership. Suppliers are considered experts in the commodity they supply and the buyer's focus is "what can we do to help you become a better Supplier". The old tendency, when problems with a supplier's product arose, to blame it on the supplier is now gone. With TQM the approach is to find out a way to improve the performance.⁶⁹ The definition of TQM is:⁷⁰

⁶⁷ Persson & Virum, 1996

⁶⁸ Ibid

⁶⁹ Cali, 1993

⁷⁰ Frid, 1997, p 40

" to create a genuine customer focused organisation that constantly works with improvements in a conscious and effective way with all employees involved".

There exist many different definitions of what TQM is in the literature. But three different cornerstones can be identified that most of the definitions contain.⁷¹

- *Customer focus* is the most important part and deals with the concept that someone demands what the company is offering and that is why the company exists. The part of the expression "Total quality" means that when the company are offering a product or service of superior quality, they are competitive.
- *Improvements* are the most discussed. Constant improvements are a condition for the organisation's survival and growth. By working with TQM the company will have constant focus on improvements and never stop improving various processes in order to achieve an even better competitive advantage.
- *Involvement* is the last cornerstone and is very essential. This part is rarely mentioned and is also probably one of the reasons why TQM in the long run often fails and works inefficiently. The importance of getting everyone in the company involved is essential. A condition to improve and keep a high customer focus is to involve everyone within the organisation.

4.2.5.2 Just In Time

The concept Just In Time (JIT) has not developed to be a strict method that is theoretically and practically well defined in quantitative measures. It is more like a philosophy, leading to essential and continuous improvements like TQM.⁷² One fundamental condition with using JIT is to eliminate everything that is unnecessary, especially inventory. This means a higher demand on the procurement department to sign contracts that guarantees tight, regular and safe delivery. And this also means that the demand for excellent quality on purchased goods becomes even higher, since the room for disturbance becomes smaller.⁷³

JIT also focus to some extent on the previously mentioned TQM cornerstones. According to Agaueus & Norin focus both TQM and JIT on constant improvement and quality processes. The involvement is important in TQM and

⁷¹ Frid, 1997

⁷² Lumsden, 1998

⁷³ Storhagen, 1995

JIT but TQM is more focused on involvement all over the organisation. When it comes to the supplier relations, JIT have a greater focus than TQM. The conclusions were that JIT give priority to supplier relations more than TQM. But when customer focus was discussed the conclusion was that TQM to a higher extent gives priority to customer focus. Companies that implement TQM and JIT together gain higher revenue than those who implement the concepts by themselves.⁷⁴

4.2.5.3 *Quality Systems Requirements*

While discussing TQM and other quality/management philosophies this takes us naturally into Quality Systems Requirements (QS-9000). QS-9000 is a branch interpretation of the International Organisation for Standardisation (ISO) and was developed by Chrysler, Ford and GM in the USA.⁷⁵ The purpose with QS-9000 is to create a quality security system that helps the suppliers to fulfil the demands from the car manufacturers. The definition is:

*"An organisational structure with responsibility, routines, processes and resources to be able to manage and control an organisation with focus on quality."*⁷⁶

QS-9000 is based on ISO-9000 but is supplementing, specifying and elucidating its demand for the suppliers within the car manufacturing industry. The purpose, target group and the application are different for the both standards. ISO-9000 is mainly an evaluation of quality in a contract situation between two parties and is more generally applicable. QS-9000's purpose is to co-ordinate demands and increase the efficiency within the car manufacturing industry.⁷⁷

QS-9000 is product oriented, with concern for failure rates and focus on areas that are important for the vehicle industry. QS-9000 is also more modern, with customer focus and process thinking.⁷⁸

Within the QS-9000 regulations there exists a part concerning the area of delivery service and supplier development. We will now investigate the requirements stated by QS-9000 in this field. Below follow some of the specified recommendations in the delivery service area that QS-9000 demand from the certified companies.

⁷⁴ Agaesus & Norin, 1997

⁷⁵ Bergdahl, 1996

⁷⁶ Frid, 1997

⁷⁷ Kinde & Lindström, 1999

⁷⁸ Zuckerman, 1997

The quality and the delivery precision on incoming goods affect the buying companies' power to deliver high qualitative products. It is therefore the responsibility of the buyer to develop its supplier and it is the responsibility of the supplier to deliver faultless commodities on time. It is the responsibility of the procurement department to provide the supplier with the right conditions for accurate deliveries. In meantime the buyer shall demand 100% delivery precision. The supplier is recommended to constantly evaluate and revise the delivery precision. The buying company shall also keep track of the suppliers' delivery service. This track record shall be evaluated in the certificate follow-up and if necessary attended to.⁷⁹

The buying company shall develop its suppliers in order to make their quality system fill the fundamental requirements of QS-9000. The buying company can even demand that a supplier gets certified by QS-9000 or that the supplier fulfils a certain part of QS-9000. Depending on the type of supplier, a grading concerning the supplier's ability to adopt the QS-9000 should be performed. To be able to reach constant improvements it is important that the buying company transfer its demand to the supplier and that they together reach consensus in what parts to focus on.⁸⁰

4.3 Supplier Performance Improvement

Manufacturing firms are increasingly focusing on their core competencies and consigning to suppliers the design, development and delivery of innovative, competitive, high-quality components and subassemblies. However, these transfers result in increased dependence on suppliers and place more of the responsibility for supply chain performance on suppliers. Moreover, buying firms' representatives have, to be able to compete in their respective markets, reported the need for supplier improvements in the areas of quality and delivery etc.⁸¹

4.3.1 Supplier Relations

The overall objective with supplier relations is to create a relationship with a supplier that assures that the product will meet fitness for-use needs with a minimum of incoming inspections or corrective actions.⁸² Since both customer order system and JIT increases the demand of co-ordination between the supplier and the buying companies, the companies will use fewer suppliers with whom they sign thorough co-operation agreements. This means that the suppliers will establish closer connections with the buying company. We can

⁷⁹ Kinde, 1999

⁸⁰ Ibid

⁸¹ Krause et al, 2000

⁸² Juran & Gryna, 1988

according to Storhagen recognise a transition from multi sourcing towards single sourcing with elements of even dependent sourcing.⁸³

The selection between single sourcing and multiple sourcing is a classical procurement problem. The established characteristic for efficiency has often resulted in multiple sourcing since the competition between different suppliers has been given priority. With multiple sourcing the buying company is expected to achieve a better control of the price level as well as the delivery reliability through risk dispersion.⁸⁴

Today the trend is to reduce the total number of suppliers, i.e. single sourcing. According to an article in Affärsvärlden, the number of direct suppliers at Volvo Trucks in five years has decreased from 2100 to 1500. A statement made by the procurement manager declares that within five years the total number of suppliers will be reduced to 700. Single sourcing is today considered to lead to an increased security in the materials management since the buying firm can increase their focus on the chosen supplier.⁸⁵

4.3.2 Importance of Measurement

“If you cannot measure it, you cannot control it. If you cannot control it, you cannot manage it. If you cannot manage it, you cannot improve it.”⁸⁶

4.3.2.1 Why it is important to Measure

Scientific research conducted by Andersson et al shows the industrial requirements of business logistics measures and methods of measurement. The most important was the need for measures and methods of measurement to control the physical flow of materials and products. Today’s way of measurement hardly satisfies this need since it is a form of passive measurement, which means that it is focused on making a diagnosis and establishing where the company are. Instead the company should measure actively, which means that they should measure to receive knowledge to control and manage the business in desired direction.⁸⁷

Long term, purchasing and suppliers have different views of performance management. Suppliers want to manage the relationship with purchasing, while buyers want to manage supplier performance.⁸⁸ According to an interview with Gerald Colella, vice president at MKS Instruments, the best reason for

⁸³ Storhagen, 1995

⁸⁴ Gadde & Håkansson, 1996

⁸⁵ Affärsvärlden, *Svenskarna blir underleverantörer*, 11 mars 1998

⁸⁶ Harrington, 1991, p 82

⁸⁷ Andersson et al, 1988

⁸⁸ Avery, 2000

measuring supplier performance is that good supplier measurement systems create opportunities to improve competitiveness. For example, rigorous programs for measuring supplier quality permit companies to eliminate inspection and allowing rapid, uninhibited movement of materials from suppliers directly to stock or manufacturing. Ultimately the rigorous measurement of supplier quality allows companies to dramatically shrink both order cycle times and inventory levels.⁸⁹

Measurement is important for improvement for several reasons:⁹⁰

- It focuses attention on factors contributing to achieving the organisation's mission.
- It shows how effectively the organisation can use its resources.
- It assists in setting goals and monitoring trends.
- It provides the input for analysing root causes and sources of errors.
- It identifies opportunities for ongoing improvement.
- It provides a means of knowing whether the company is winning or losing.
- It helps monitor progress.

On a very high level it can be possible to relate a company's total profitability to certain achievements of the business logistics. Likewise there is a possibility on an operational level to measure some parts of the business logistics, for example stock turnover rate. However is it hard to measure the whole material flow to receive a complete picture. A gap exists between methods of measurement of detailed data and methods of measurement of overall data. These obstacles must be seen in relation to the fact that the demand for methods of measurement constantly increases. The demand increases mainly due to three reasons. First, business logistics expects to a greater extent to contribute to the company's profitability, which demands that the contribution to the total result must be measurable. Second, the different measurements are an important support in the business logistics development and third, a quicker change rate demands more flexible methods of measurement.⁹¹

A good supplier measurement system also allows companies to earn QS-9000 or other recognised standards for quality management philosophies, concentrate business with high-performing suppliers and shift people away from non-value-adding activities. Good measures further lead to proactive communications and problem-solving sessions between customers and suppliers.⁹²

⁸⁹ Anonymous, 2000

⁹⁰ Harrington, 1991

⁹¹ Aronsson et al 1988

⁹² Anonymous, 2000

4.3.2.2 *What shall be Measured*

According to Colella there are several issues companies must tackle to ensure accuracy and fairness in their measurement systems. As a company moves forward with its program to track supplier performance, it needs to make sure its own house is in order. Buyers must realise the role they play in affecting supplier performance. Many times quality rejections are the result of unclear specification, drawings and inspection processes. Specifications and methods of acceptance should be quantifiable, communicated and fair. Proper purchase order maintenance by buyers is also necessary to ensure that suppliers are not penalised for late or early delivery, when dates have not been properly maintained on purchasing orders. Keeping lead-times realistic, knowing suppliers' capabilities and negotiating, versus heavy-handed practices, can improve supplier performance significantly. Further the communication needs to be constant and honest.⁹³

Colella further says that two of the most critical measures of supplier performance are delivery reliability and security, e.g. delivery precision. In terms of delivery service, supply management organisations can measure anything their companies consider important to advancing their success. Supplier measures need not be complicated, but they must be tightly defined and communicated to suppliers. Both quality and delivery precision performance can be calculated by dividing total lots and goods meeting the defined delivery schedule by total lots or goods received. The important factor is defining relevant parameters. For example, in designing a delivery precision measure, a company might decide that they will tolerate only whole shipments, and if not all the products are delivered on time the whole consignment is considered late. They might also establish a window for on time such as five days early and zero days late. Once these parameters are defined, they need be documented and communicated to suppliers.⁹⁴

4.3.2.3 *How to Measure*

The major problem with most business processes is that performance is measured only at the end. In most cases, this provides little relative feedback about individual activities within the process or, when it does it is too late. Instead the company should measure as soon as the activity has been completed and the best person to do the measuring is the person performing the activity. In this way there is immediate feedback to the person who should have the best understanding of the job.⁹⁵

⁹³ Ibid

⁹⁴ Ibid

⁹⁵ Harrington, 1991

To find the right balance between precision and simplicity in the measures is not an easy task. In operative activities it is however more important that the measures are easy to understand and easy to mediate than that they are completely correct down to the last detail. Storhagen means that there is not a problem if measures are slightly wrong, but measures that are in conflict must be changed.⁹⁶

To be able to control, compare, evaluate and analyse activities in a company a key variable is a good tool. A key variable can be constructed in many different ways and purposes. It is important for every company to construct and use the key variables that suit their specific business structure and need.⁹⁷ A definition of key variables can be expressed like a small number of figures that are expressing essential information. The criteria are that it is a number and it shows concentrated information. The key variables are usually preceded by other measures and are the result of aggregated information. The reason why key variables are used is to present the result of measurements that for some reason have been carried out. The key variable role is then to reduce the information and make it easier for the managers to take a decision.⁹⁸

Key variables can be divided into two main areas. First, flow related measures, which are mainly used for measuring and controlling the physical flow and second, economic measures, which are used for economic control and are closely connected to the companies internal accounting system.⁹⁹ In this thesis we will only focus on the flow related key variables, which concentrate on the physical flow of the material. The key variables, which will be used in this thesis, could then be defined as a number of flow related measures with a goal comparing follow up purpose.¹⁰⁰

4.3.2.4 Feedback

Every experienced manager knows that providing performance feedback to every employee or supplier is an essential part of any improvement process. In-process measurement provides windows through which the process can be observed and monitored. These windows must be dependable and provide a continuous view of the process. Without dependable measurement, intelligent decisions cannot be made.¹⁰¹

⁹⁶ Storhagen, 1995

⁹⁷ Segerstedt, 1997

⁹⁸ Ibid

⁹⁹ Andersson & Aronsson, 1989

¹⁰⁰ Ibid

¹⁰¹ Harrington, 1995

Feedback systems are very important. It is clear that if you cannot measure an activity, you cannot improve it. But measurement without feedback is worthless because you have expended the effort but not provided the supplier with an opportunity to improve. Without the interaction between measurement and feedback, the company cannot open the door to improvement. The best type of feedback is direct feedback, where the subjects of measurement see the errors they have made and can correct them themselves. Although effective, such feedback often gets lost in the daily routine. Consequently, the company should develop a reporting system that provides trend information so that the subjects can measure their progress. One way is to develop a process improvement chart, PIC, on which the selected measures are displayed. The PIC should be posted where the members of the process can see them and the indicators should be kept simple and large enough to read from a distance. Each chart should show at least 6 months of data and include a business target performance level. A few well-placed PIC indicators can significantly impact performance, increasing awareness and productivity among employees and managers alike. Once the PIC indicators are in place, it is critical to update them. Few things can be more demoralising to a team than to have a performance indicator that is out of date.¹⁰²

Once supplier performance data exist, companies should use their results to manage and control their supply bases. The utmost objective of any supplier measurement program should be to support supplier improvement. Data should be tracked and analysed to enable suppliers to focus on the right issues, facilitate root cause analyses and implement final and lasting corrective actions. Business placed with responsive and responsible suppliers will significantly improve materials management in the company. Well-run supplier management and measurement programs will yield excellent supplier performance, enriched and satisfied buyers, limited frustration and lower costs for all.¹⁰³

4.3.3 Supplier Development

Supplier development may range from limited efforts, such as informal supplier evaluation and a request for improved performance, to extensive efforts, such as training of the supplier's personnel and investment in the supplier's operation. Firms may use a variety of activities to develop suppliers' performance and/or capabilities. These activities include introducing competition into the supply base, evaluating the supplier as a prerequisite to further supplier development activities and raising performance expectations. Other activities are recognising good supplier performance, promising future benefits, training and educating the suppliers' personnel, exchanging personnel

¹⁰² *ibid*

¹⁰³ Anonymous, May 4, 2000

between the buying firm and the supplier, and investing directly in the supplier.¹⁰⁴

One definition of supplier development is: “Supplier development is where buyer and supplier develop such a close and long-term relationship that the two work together as partners. It is not philanthropy; the aim is to secure the best possible commercial advantage. The principle is that teamwork is better than combat. If the end-customer should be best served, then the parties to a deal must work together and both must win. Supplier development works because both parties have an interest in each other’s success”.¹⁰⁵

Supplier development is not an absolute solution. It is an approach to purchasing which recognises that the competitiveness of most purchasers is dependent on their suppliers being competitive.¹⁰⁶ Generally speaking, supplier development refers to an organisation’s effort to create and maintain a network of competent suppliers. From a narrow perspective, it can be defined as identifying new sources of supply where no adequate ones exist. Defined more broadly, however, supplier development also involves a long-term co-operative effort between a buying firm and its suppliers to upgrade the suppliers’ technical quality, delivery, cost capabilities and to foster ongoing improvements. The ultimate goal of these programs is to form a mutually beneficial relationship that will help both firms compete more effectively in the marketplace.¹⁰⁷

According to Quayle, the elements of successful supplier development are:¹⁰⁸

- A long term commitment
- Both customers and suppliers to be proactive
- Both parties to integrate key functions and activities
- A commitment to developing and maintaining co-operative and close relationship.
- A clear and well-structured framework for determining cost, price and profit for both sides.
- A win-win philosophy both parties must stand to gain from the supplier’s development approach.
- Continuous improvements in all spheres of their activities.

¹⁰⁴ Krause, 1997

¹⁰⁵ Quayle, 2000, p 125

¹⁰⁶ Quayle, 2000

¹⁰⁷ Watts & Hahn, 1993

¹⁰⁸ Quale, 2000

4.3.3.1 Supplier Development Practices

A study of 500 companies conducted by Watts & Hahn shows that more than 75 percent of the respondents reported that they evaluate suppliers regularly. However, more than 50 percent answered that they only evaluate their suppliers once or twice a year. Although the majority of companies surveyed evaluate suppliers in some way, the methods they use differ significantly among formal and informal evaluation procedures. For both the informal and formal groups, the most commonly cited standards against which suppliers are measured are quality, delivery, price and service. 63 percent of the sample companies had some sort of supplier development program but it could be called anything from Partners in Progress, Co-operative Action Team, Total Quality Assurance, and Supplier Quality Improvement etc. An assessment of how supplier development programs are organised and assigned to individual buyers reveals that approximately one third are assigned on a product basis, one third on a supplier basis and the rest used a variety of methods. In addition to the diversity of methods used in assigning supplier development projects, a broad spectrum of functional areas also participates in the programs. Although purchasing is the main department involved, other functions like quality control and engineering participate.¹⁰⁹

The survey also revealed that companies have implemented these programs at different levels of the organisational structure. But the highest percentages of respondents operate their program at divisional level. The survey further shows that the main objective of implementing a supplier development program is to improve product quality. But in second place, which is important to this thesis, came the importance of improving the suppliers' delivery.

In summary we can say that the survey indicates that supplier development efforts are in fact improving supplier performance, but not to the level desired. This can depend on the fact that buyers tend to focus their supplier development efforts on short-term benefits with an emphasis on product rather than capability improvements. Those companies that have implemented a supplier development program are also more likely to evaluate their suppliers on a regular basis and are also more likely to use formally established guidelines and procedures rather than ad-hoc methods. The survey also produced two key conclusions for purchasing managers. First, it is critical to establish clear goals and objectives for a supplier development program. Second, the supplier evaluation is vital to the success of the supplier development program when it is used to guide the supplier development

¹⁰⁹ Watts & Hahn, 1993

program efforts and to identify the suppliers and the performance elements needing the most improvement.¹¹⁰

According to a research study conducted by Krause et al the ability to coordinate internal activities with external supplier networks is one of the most critical strategic weapons for many of today's successful organisations. Suppliers have a direct impact, positively or negatively on many competitive dimensions i.e. costs, quality, technology, delivery, flexibility, service and profit. However many buying firms report a serious need for improvements in areas like delivery, quality, cost, innovation and product development. Buying firms indicate that suppliers' future capabilities may not meet the future needs and expectations of buying firms without some type of buying firm intervention.¹¹¹

4.3.3.2 Development Strategies

Buying firms use various supplier development strategies to improve supplier performance i.e. supplier assessment, providing suppliers with incentives for improved performance, insisting on competition among suppliers or direct involvement of the buying firms personnel with suppliers through activities such as training of suppliers' personnel. No empirical research has established the relationship between the various development strategies and the outcome of such efforts. The questions is, are these strategies individually effective in achieving improved performance or are they more effective when they are deployed collectively? Is one or more of these approaches an enabler of the other approaches, or are they equally effective as standalone strategies?¹¹²

According to the Krause et al there are two main categories of supplier development strategies, internalised supplier development strategy and externalised supplier development strategy. Externalised supplier development means that the firm externalise or outsource those activities that are not related to their core business i.e. they make use of external markets to insinuate supplier performance improvements. Internalise supplier development strategy, represents a direct investment of the buying firm's resources in the supplier.¹¹³

Externalised supplier development strategies

Supplier assessment is one strategy, which means that a buying firm makes an in-depth evaluation of suppliers' quality in delivery, cost, technical and managerial capabilities. An important part of the assessment process is to

¹¹⁰ Ibid

¹¹¹ Krause et al, 2000

¹¹² Ibid

¹¹³ Ibid

provide the suppliers with feedback so that they know what the buyer expects and also to provide the supplier with directions for improvement. *Supplier incentives* are another developing strategy within this area. The focus in this strategy is to give the supplier extended business if they can achieve a certain goal. These market-based incentives are awarded based on a supplier's performance and designed to make the supplier perform even better. *Competitive pressure* is the third strategy and is applied by a buying firm to its suppliers when it is using more than one supplier. The aim is to buy from the supplier that is most competitive on the market and much focus is on low prices.¹¹⁴

Internalised supplier development strategy

Direct involvement activities is when the buying firm directly involves itself in the supplier development effort and entails investments by the buying firm in the supplier through activities such as training and education of a supplier's personnel. This supplier development strategy deserves special attention because direct development efforts represent transaction specific investments in the supplier's business. These investments are non-transferrable, and the benefits of the supplier development invested are unrecoverable for the buying firm if the relationship is dissolved, thus the direct involvement is a high risk for the buying firm.¹¹⁵

Regardless of model form, the research result conducted by Krause et al suggested that supplier assessment and supplier incentives are key enablers of supplier development strategies. Supplier incentives motivate suppliers to improve by sending a message that improved performance is rewarded with increased business. Supplier assessment allows buying firms to evaluate a supplier's performance, and compare to others. However, direct involvement is important to make the development strategy work in the long run. The involvement that the buyer provides makes the supplier act in a more serious way and they are more or less forced to perform what the buyer demands. Competitive pressure was not a major factor in improving supplier performance. This does not necessarily mean that competitive pressure doesn't play a role in overall supply chain management strategies. In some business it may be very effective, but rarely as a stand-alone strategy. A combination of some suitable development strategies, depending on the type of business will be the most effective way to go.¹¹⁶

¹¹⁴ Ibid

¹¹⁵ Ibid

¹¹⁶ Ibid

Another study conducted by Krause reveals that the responding firms participate more often in activities such as supplier evaluation and feedback, site visits, requests from improved performance, and promises of increased present or future business, than in activities such as training/education of suppliers' personnel or investment in suppliers' operations. The respondents attributed much of their suppliers' increases in on-time deliveries as well as decreases in incoming defects, to their supplier development efforts.¹¹⁷

4.3.3.3 *Supplier Association*

Supplier association is often a result of supplier development strategies. A supplier association can be defined as a mutually benefiting group of a company's most important suppliers brought together on a regular basis in order to achieve strategic and operational improvements. The spread of supplier associations over the years has accelerated and can now be found all over Europe. Different approaches and models have been developed in order to suit the certain business that the association works in.

The structural model consists of a customer company setting the basic arrangements involving the company and 8-12 suppliers. The suppliers are benchmarked against the best in class and an action plan for each supplier is then formed. The buyer will then put together an appropriate team to work with the specific supplier in order to reach the action plan goals.

The value stream model covers both the internal and the external supply chain. The buyer sets internal performance measures for the teams managing the suppliers. The team decides how to best achieve the required performance level and then works with the relevant group of suppliers in order to help them meet the internal performance requirements and help the suppliers to achieve the standards required to meet the internal performance requirements. This is a multi-tying structure involving direct suppliers and their vendors. It is a model for awareness raising, education, training and improvements.¹¹⁸

4.3.3.4 *Problems with Supplier Development*

According to an interview by Avery, the reason why many supplier development programs fail to attain potential results is that the company is unsuccessful in tying buyer and supplier objectives together. Therefore buyers are recommended to move from contract to program, gain commitment to programmed improvement, and move commitments to contracts.¹¹⁹

¹¹⁷ Krause, 1997

¹¹⁸ Quayle, 2000

¹¹⁹ Avery, 2000

The perception between supplier and buyer in the question of supplier development practice can be substantial. The buyers consider the quality more important in selecting suppliers than suppliers thought they did. Buyers often rely on a few dependable suppliers while suppliers are not convinced this is the case. On the other hand, the suppliers value the clarity of customer specifications higher than the buyers know. It seems unlikely that the differences in perception are due to a lack of awareness by suppliers. More likely, differences in perception are due to differences in understanding the priorities, motives and methods underlying the administration of the suppliers development program.¹²⁰

It is one thing to have a well-designed supplier development program and it is another to assure that the program is well communicated and understood by the supplier. Any misunderstanding of the intent of the supplier development program will make it less effective. Continual checks on the perceptual agreement between suppliers and buyers will direct efforts to where they will be the most productive. The customer may be able to verify and clarify the causes of the difference through third parties or through open-ended question for supplier feedback.¹²¹

If perceptual differences are substantial between a buyer with very close relations to the supplier, it is likely that the understandings are less congruent and the relationships less effective. With the transition to integrated supply chain management, the benefits of investing in supplier development to improve supplier quality performance becomes greater as does the risk of not investing.¹²²

4.3.3.5 Strategic Supplier Development Process

*This part of the chapter is founded on Krause's et al extensive research of how 84 international companies' deal with the subject supplier development. By analysing the respondents, the researcher offers a validated model of the supplier development process that includes steps critical to supplier development activities.*¹²³

Once supplier performance is measured and assessed, a supplier performance database identifies those suppliers that consistently are unable to perform. To further improve the performance and capabilities of their supply bases the respondent firms engage in supplier development.

¹²⁰ Forker et al, 1999

¹²¹ Ibid

¹²² Ibid

¹²³ Krause et al, 1988

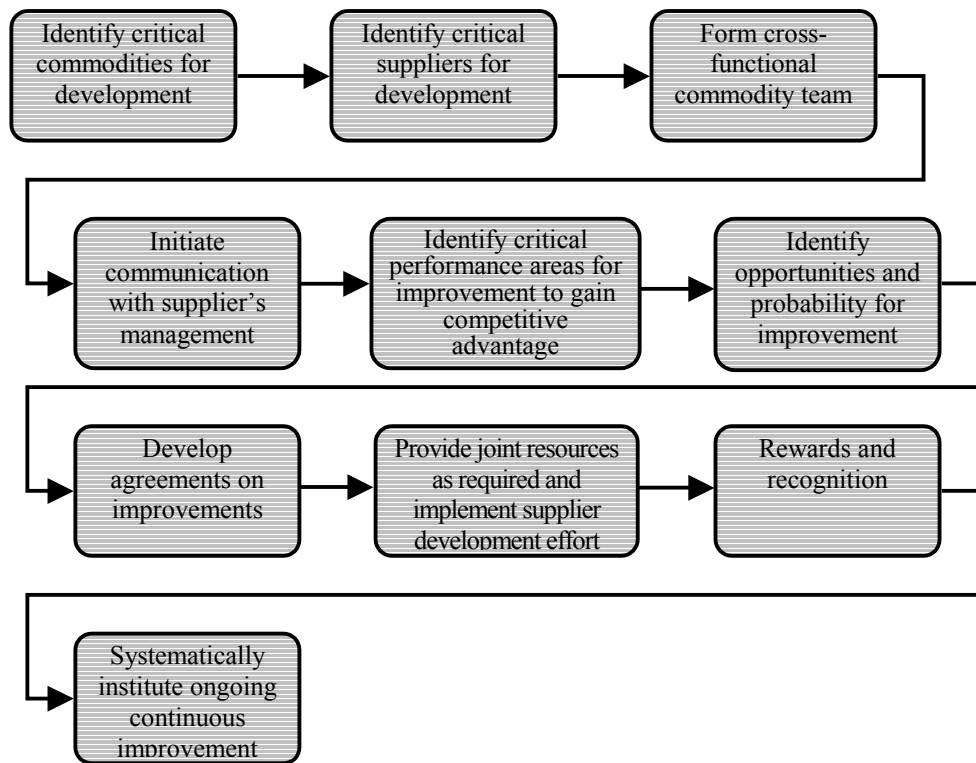


Fig 4.2 Strategic Supplier Development Process, Krause et al, 1998, p 44

Identify critical commodities for development

Firms that had implemented the strategic approach to supplier development typically utilised a corporate-level executive committee to assess the relative importance of the goods and services purchased by the company or business unit. The result of this assessment was a “portfolio” of commodities that were essential for success in the targeted industry segment. Several companies used a “purchasing portfolio analysis”, which for example separates low-risk commodities from high-risk commodities, and low-volume purchases from high-volume purchases.

Identify critical suppliers of strategic commodities

A majority of the companies that employed a strategic approach to supply base development did not only identify candidates for improvement by their poor performance. They also instead often used a formal process where they analysed supplier performance, using a variety of different methods. One example was when a buying company benchmarked supplier performance to world-class performance expectations. If any performance gaps were identified, these suppliers were identified as supplier development prospects.

Form cross-functional supplier development team

The research states that it is important to use cross-functional teams to drive the supplier development effort. Core team members were often assigned on long-term or permanent basis, and included quality, procurement, operations and design personal. An alternative is to form ad hoc cross-functional teams to correct specific problems as they occur. A risk with the latter solution is that company might lose the long-term benefits.

Initiate communication with supplier's management

The respondents indicated that the next step in the supplier development process involved approaching suppliers and arranging a meeting of the buying firm's cross-functional team with top management at each of the suppliers. Here matters like improving the flow of materials, services and information between the supplier and the buying firm should be discussed to achieve mutual benefit.

Identify critical performance areas for improvement to gain competitive advantage

At meetings with each supplier's top management team, areas for improvement were identified along with a specific measure for each area and in this phase the objectives for improvement were set. In some cases, these objectives were driven by the buying firm's customers' expectations. In other cases, companies shared technology road maps to identify opportunities for joint development of new technologies.

Identify opportunities and probability for improvement

Respondents indicated that once potential supplier development opportunities had been identified, they were evaluated in terms of feasibility, resources and time required to carry out the project, and potential return on investment. Some of the criteria used by the companies to evaluate opportunities included cost-benefit analysis and willingness and ability of supplier to implement changes.

Develop agreement on improvements and performance metrics

Once a feasible supplier development initiative has been identified, the parties must come to an agreement on the specific metrics that will be employed to measure the success of the agreement. One measure used that is important to this thesis is percent of delivery improvement. The agreement should also

specify the role of each party, that is responsible for the success of the project, and the manner and timing for deploying allocated resources.

Deploy resources and implement development effort

Once companies reached agreement with suppliers on performance metrics, the development effort was put into motion. The companies emphasised that supplier development requires joint improvements by both parties, not just improvement on the part of the supplier. Moreover there must be mutual deployment of resources, whether in the form of facilities, training, personnel, information, capital, and technology in order to sustain a successful development effort. The respondents indicate that a supplier is unlikely to fully embrace a set of changes required for improvement, unless there is tangible evidence that the purchasing organisation will support their efforts with matched resources.

Rewards and recognition

Many of the researched companies used supplier recognition programs to foster the suppliers to continued performance increases after the supplier development effort is finished. These programs varied from recognition in company newsletters to more formal and public recognition in the form of supplier award banquets and supplier council meetings. Further many of the companies indicated that if progress toward continuous improvement was not evident in supplier performance evaluations, corrective action might be taken, including reducing or disqualification of the supplier's share of business. This outcome contrasts markedly with successful suppliers, that might be rewarded with repeat business, increased sales and profitable growth.

Institute ongoing continuous activities

Once a supplier development project has been completed, the supplier's continued progress must be monitored and tracked over time. Ongoing exchange of information is needed to maintain momentum of such projects. The researched companies indicated that this momentum could be sustained by creating visible milestones for objectives, updating goals, open communication, and adopting continuous improvement strategies.

4.4 Theoretical Summary

In this thesis we focus on the material management part of the business logistics. Materials management refers to the material flow in the company. Materials management roughly consists of the three parts: supplier,

procurement and inventory of raw materials. One of the most important missions of the business logistics is to develop the delivery service in a way that all parts of the market feel that they get appreciation in value by buying from a special supplier.

Delivery service is a summary of the buying companies' perception about the quality of the supplier's logistic activities. It is one of the main components in the customer service concept, which is defined as the quality in all relations between a company and its customers, observed from the customer's viewpoint.

To be able to measure or derive the delivery service it must be broken down into different measures or components. Those components are then transformed into key variables, which constitute the base for the measurements. With the help of the key variables the company will be able to control, compare and evaluate the various activities.

When the measurements and evaluation have been discussed, we investigate the area of supplier development. The aim with supplier development is to find a development strategy that both strengthens the relations and develops the suppliers' performance. In the theory chapter we have discussed both externalised and internalised development strategies that can be used both together or as stand-alone strategies in order to strengthen the suppliers' performance.

5 EMPIRICAL STUDY

In this chapter we will present the findings of our benchmarking study of the five chosen companies.

5.1 Volvo Car Corporation

5.1.1 Corporate Information

Volvo Cars manufacture one of the safest cars in the world. The business idea is to create the safest and most exiting car experience for modern families. The vision is to be the world's most desired and successful premium car brand. Volvo Cars have a broad geographical spread, selling cars in more than a hundred countries. Today Volvo produces eight different models. The market share for Volvo Cars worldwide is approximately 1.1 percent and the largest markets are USA, Sweden and Great Britain. Volvo Cars factories are found in Sweden, Belgium, Netherlands, South Africa, Thailand and Malaysia, but Volvo Cars head office is situated in Torslanda, Sweden. Volvo Cars have 25 400 employees and have a yearly turnover of approximately 77 billion SEK. Volvo Cars is also certified by both ISO and QS-9000.¹²⁴

5.1.2 Supplier Performance Development

The logistic department at Volvo Car Corporation is involved in every purchasing project. In these projects the purchasing department and purchasing engineers also participate and form a team that handles the direct contact with the suppliers. Volvo as a group can use several suppliers for the same product but one Volvo unit only uses one supplier per product, i.e. single sourcing.

Volvo demands that their suppliers should have 100 percent EDI communication, which means that the supplier should be able to receive a delivery plan directly in to their MPS system. The delivery schedule is then the foundation for the supplier's production planning. One to four times a week the supplier gets a call-off that indicates what and when the supplier are actually going to deliver. 100 percent EDI communication further means that the supplier shall send an electronic notification, so called AVIEXP. The AVIEXP specifies what and when the supplier has sent the goods and is then automatically controlled against the call-off. Further, a physical control is performed when the goods arrive. This is done by reading the load units' odette flag and comparing this against the AVIEXP and then finally updating the

¹²⁴ Volvo Car Corporation, Annual Report, 1999

system on the fact that the goods have arrived. Volvo also demands that the invoice is being electronically dispatched.

Today Volvo measures delivery precision and defines this as correct article and quantity in correct time. Volvo demands that the service level should be 100 % which means that delivered quantity should be equal to requested quantity and delivery date should be equal to requested date. If something in the call-off is incorrect, the whole call-off is considered incorrect and further, if too much is delivered or if it is delivered too early, the call-off also is considered incorrect.

Volvo also measures administrative errors like incorrect delivery note, incorrect article in load unit and incorrect labelling and measures this per load unit and supplier. If any administrative errors appears, an established fee is charged per incorrect load unit that then is deducted from the invoice.

The separate business units are responsible for the measurements and these are registered and read off in the goods receiving department and are then finally calculated automatically by the computer system. The service level is calculated per supplier with daily precision on a weekly basis and is monthly reported by means of a performance report. But there is no automatic feedback from the Torslanda unit to the supplier of the supplier performance. This is since it is considered that the supplier should have control over its own business.

Volvo is responsible for the transport from the supplier to Volvos units and operates this through Volvo Transport. The transporter performance is measured by the fact that the transport must arrive within a certain time-window. To separate the transporter performance from the supplier performance, Volvo measures the transporter based on when the goods arrive at the Volvo unit. The supplier performance is instead measured when the supplier sends the AVIEXP.

If a supplier doesn't take care of its obligations and a unit thinks that they have "nagged" the supplier enough, they request help from the central purchasing department. The purchasing department then requests a scorecard, which shows the supplier's performance one-year back. The supplier's performance in logistic activities and quality is then discussed in a steering committee called quality review meeting. In this group Volvo can decide to form a working party containing purchasers, engineers and logistic personnel.

The most important method to find the root cause to the problem is considered to be informal communication between Volvo and its suppliers. Volvo also investigates the internal communication at the suppliers to see if all the parties

concerned receive the essential information. Volvo can also move forward and suggest that the supplier carry out some form of benchmark study at other suppliers to obtain new insights and experience. Volvo can further choose to execute a logistic audit at the suppliers' themselves. This is in order to find the root causes to the problem and then advise the supplier to take some actions. In this audit Volvo for example investigates how the supplier deals with information, how the supplier orders material and how the supplier works with internal material co-ordination. Through the audit the supplier is graded on a three-graded scale from A to C and this grade directly shows how the supplier is doing. Is the supplier below A, he must immediately try to fulfil the demands for an A-supplier. Volvo can advise the suppliers but the suppliers must themselves establish an action plan. The suppliers' continued performance is then closely monitored and discussed on the quality review meeting where high representatives from the supplier participate. Supplier is here also given the opportunity to request what they need from Volvo to solve the problem. After six months the supplier must show results and after 12 months he must show a permanent improvement. The improvement is often in the first phase extremely time-consuming. This since a certain level of trust for Volvo's employees must be built up. If no results are apparent or the desire to improve is lacking, the steering committee can recommend the purchasing department to place a purchasing stop. But Volvo doesn't only punish their suppliers. Volvo also rewards their supplier with new orders and different kinds of honours like quality awards.¹²⁵

5.2 SAAB

5.2.1 Corporate Information

Saab Automobile is a relatively small premium car producer and is to a 100 percent owned by General Motors. The business idea is to produce a safe car for the active family with focus on comfort and design. Saab also produces environmentally friendly turbo charged engines, which have become one of their brand marks. Today they produce five models. The head office of Saab in Sweden is located in Trollhättan and the production plants are situated in Trollhättan and Nystad in Finland. The largest market is Europe, USA and the Nordic countries. Saab have approximately 10 000 employees and a yearly turn over 30 billion SEK. Saab is ISO-14001 and partly QS-9000 certified and they demand that their suppliers are QS-9000 certified as well.¹²⁶

¹²⁵ Eek, 2000-10-31

¹²⁶ Saab Automobile, Verksamheten, 1999

5.2.2 Supplier Performance Development

Saab uses 535 suppliers from 26 countries and 26 percent of the suppliers are from Sweden. The largest supplier country is Germany with 159 suppliers. Saab is using single sourcing but for less complicated products like screws, multiple sourcing can be used.

Saab demands that their supplier has 100 percent EDI, which means that the supplier should be able to receive delivery schedule from computer to computer and that they have the possibility to send an advanced shipping note, called AVIEXP. Further Saab demands odette flag, EDI based invoicing and early warning, which means that if a problem should arise the supplier must contact Saab before the problem is detected at the Saab factory. Saab however emphasises the importance of not placing unreasonable demands.

The daily connection with the supplier is managed by ten material coordinators. They are responsible for there being materials to pick up at the supplier facilities and they manage no commercial issues. Instead they focus on the correct volume and correct article being delivered on time.

The vision is that the supplier should deliver with zero errors. Saab is today among other things measuring the suppliers delivery precision, transport precision and handling quality. Handling quality contains administrative errors like incorrect labelling, delivery documents and packaging. It is the individual Saab factories that are responsible for the measurements but the headquarters in Trollhättan has the co-ordinate responsibility.

The goal for the suppliers' delivery precision year 2000 is 93 percent and is measured in the way that the units should leave the supplier on the correct day and with the correct articles and amount in accordance with the delivery schedule. This is measured by electronically comparing the AVIEXP with the delivery date, volume and articles stated on the delivery schedule. If the supplier doesn't use advanced shipping note, the parameters on the delivery document is compared with the delivery schedule. Delivery precision is defined and is calculated by dividing the incorrect number of call-off with the total number of call-off. Both early and late deliveries are registered as errors. Saab considers it important to measure the shipping date since the supplier then can't blame the transporter if something is delayed.

The results of the delivery precision measurements is compiled by supplier in a box diagram and shows how many deliveries were shipped the correct day, one day late, two days early, etc. The delivery precision is also measured by

country in order to track the bad supplier countries. This is done so that purchasing departments can avoid doing business with generally bad countries.

Saab is responsible for the transport and pick up the goods at the suppliers delivery dock. To separate the transporter transport precision from the supplier delivery precision, Saab measures the transport precision when the goods arrive at Saab and the delivery precision when the goods leave the supplier. The objective for transport precision is 85 percent and is measured by a specific transport department. The traffic department is also responsible for the measurement of the handling quality.

To follow up the supplier performance, Saab twice a year conduct an MPC rating, which is a common GM system where the five parameters: delivery precision, handling quality, early warning reliability, EDI ability and flexibility are judged on a five graded scale. The different parameters are then weighted there for example, delivery precision constitutes 30 percent of the total grade. The grading scale is outstanding, good, satisfactory, needs improvement and unacceptable. The MPC rating and the box diagram which shows the delivery precision is fed back to the suppliers.

When it comes to improving or developing a supplier who doesn't reach the goals, Saab use a Supply Part Delivery Escalation Process Map. The program was introduced in 1999 and has given great results. The program is structured in a matrix in a way that demonstrates what to do and who should do it. For example when it is the material co-ordinator's responsibility to develop the supplier or when the central purchasing department should be involved.

The first step is when Saab discover that the delivery diverges from the delivery plan and is a daily routine. The responsible material co-ordinator then informally contacts the supplier's contact person, often via a phone call. The material co-ordinator asks why there exists a divergence, what the problem is and what the supplier will do about it. Here there is a subjective judgement from the material co-ordinator, can he or she accept the explanation. If the explanation isn't acceptable the program will escalate into the next step.

If no change is apparent the material co-ordinator sends a formal letter to the supplier's corporate management. The letter demands an action plan that states how the supplier will solve the problem. The letter is directly sent to the corporate management since the corporate management best can influence the situation. Saab can in this step also insist that a representative from the supplier's supply management team visit Saab and explain the situation. This is however seldom used since it is considered to be too time-consuming. In this step usually 95 percent of the problems are solved. But after the supplier has

taken care of the problem Saab, closely, during six weeks monitors the supplier. If the supplier doesn't take care of the problem or for example fails to reach the goal of a 90 percent delivery precision during this six weeks, Saab escalates the supplier into a third step.

If there still is a problem, Saab sets up a meeting with supplier's top management, for instance the C.E.O., the logistic manager and the production manager. At the meeting are the material co-ordinating department and the purchasing department present from Saab. Saab then insists on a new action plan, but can here also choose to bring in a third party. One example is when Saab use personnel from Poolia that at the supplier's expense visit the supplier in order to secure the next day's delivery and closer investigate the problem. After Saab has received the new action plan, the supplier is during another six weeks closely monitored. If the supplier still can't deliver 90 percent delivery precision the supplier is placed on a list called Saab's worst supplier delivery list. In this phase the responsibility for the supplier development transfers from the material co-ordinating department to the purchasing department. The purchasing department can then put the supplier on new business hold, which means that the supplier won't receive any new orders. The supplier will then be the subject of a new MPC rating where the grade will be sent to GM Europe that has an international supplier database and the business on hold will be valid for the whole GM group. The supplier will keep this grade until the next MPC rating is performed. Has the supplier then improved, the business on hold will be redrawn. Has the supplier on the other hand not improved, he risks being dismissed.

Every month the production department and the purchasing department have a meeting. In this meeting Saab discusses what has been done and what is going to be done with their worst suppliers. The outcome of this meeting can be a decision to change supplier. A changed purchase request is then placed. This is however a very difficult and costly process that should as long as possible be avoided. Only about 2 percent of the suppliers go this far in the process

The punishments Saab uses for suppliers that have a low delivery service are fines if the supplier cause a line stop, or if something in the production is missing and needs to be after-assembled. Fines also exist for incorrect documentation and product quality. Another punishment is that the supplier loses orders and finally is dismissed from the GM Group. Rewards can be that the supplier gets new orders.

According to Saab, the most important cornerstone in supplier improvement is communication between the buying company and the supplier. As soon as the supplier gets information stating that the supplier has a problem, it usually

solves itself. But it is important to base the complaints on measures and facts. One problem is often that the supplier doesn't measure its own supplier service and knows consequently nothing about their performance.¹²⁷

5.3 Volvo Trucks

5.3.1 Corporate Information

Volvo Trucks is one of the world's largest manufacturers of heavy trucks, with sales in 130 countries and production plants in twelve countries. Development and production take place in Sweden, Belgium, Brazil and in the USA. Volvo Trucks produce totally five different trucks and the competitive advantage is that Volvo Trucks uses a considerable component standardisation, which offers better quality and permits a more efficient service. The business idea is to provide the customer with a quality truck made for many years' use. Volvo Trucks also provide the customer with a total cost solution. The head office is situated in Tuve, Sweden and Volvo Trucks have globally more than 24 000 employees and a yearly turnover 69.5 billion SEK and is ISO 14 001 certified.¹²⁸

5.3.2 Supplier Performance Development

When Volvo Trucks choose a new supplier, the purchase department demands a logistic evaluation form the logistic department. The logistic department examines the supplier's ability to use EDI, production planning, material planning and their delivery functions.

The material co-ordinators have the ongoing day-to-day connection with supplier. Volvo Trucks often uses two suppliers for the same article with a volume distribution of 80-20 percent between the two suppliers. For a few articles, even three suppliers can be used.

Volvo Trucks measures the suppliers' delivery precision by checking that the correct articles and quantity are sent on the right day in accordance with the delivery schedule, which is updated twice a week. The delivery date on the delivery note is automatically matched with the call-off in the delivery schedule. If one of these parameters is incorrect the whole consignment is considered incorrect. This leads to a situation where there only can be one error in each call-off. If the goods arrive too early, this is also considered an incorrect delivery. Administrative errors like for example incorrect delivery note are not measured, but are controlled and communicated in a more informal way.

¹²⁷ Ekberg, 2000-11-01

¹²⁸ Volvo Trucks Company Presentation, 1999

Volvo Trucks is responsible for the transportation and pick up the goods at the suppliers' plants using different transport companies. The transport precision is measured when the goods arrive at Volvo. The time of arrival is compared to the given time window when the goods were supposed to be arriving and the goal is that 98 percent shall arrive on time.

Every separate unit is responsible for the measures, which are performed in the delivery dock and these measurements are then reported to the central logistic department. To be able to systematically follow-up the measurements from the different units, Volvo Trucks uses a system called DPM. The DPM system sums up the supplier's performance in all units and evaluates and grades the suppliers according to certain parameters where delivery precision and material shortage are important.

Volvo Trucks measures the number of errors that the supplier has made during a quarter and the different measures are then weighted and finally the supplier is given a grade. Volvo Trucks use a scale where the worst supplier is placed on alarm followed by action, monitor and no action. If the supplier is on alarm or action Volvo Trucks uses their supplier development program called "coaching".

The coaching program was started in 1996 and the program aims to achieve a faster improvement of the suppliers. The coach acts like a link between Volvo Trucks and the supplier. The program can also be used in a preventive purpose in order to keep the supplier out of "alarm".

The coaching begins with a logistic audit e.g. the coach visits the supplier and maps out the various routines. The next step is to establish an action plan in order to improve the supplier's performance and both Volvo and the supplier shall sign the action plan. The action plan is followed up with telephone meetings and if the plan runs well Volvo pays two visits during the coming year to ensure the improvements. If the plan does not run well Volvo will increase its involvement by writing a new individual action plan in order to quickly solve the problem. In this phase Volvo also increases the number of telephone meetings where at least two representatives from each party participate.

If the supplier still doesn't show any improvements, the purchase department will be informed. In this stage Volvo considers either keeping or liquidating the supplier. If they choose to keep the supplier, the supplier must pass through a case. This means that the coach allocates all the necessary employees with the desired competence and with help of special certified consultants, approved by Volvo Trucks, the case starts. The consultants will here revise all activities,

from purchase routines to production and delivery processes performed by the supplier and can often result in the supplier getting a totally new organisation.

This kind of supplier development is extremely time-consuming and expensive. The development is both carried out at Volvo Trucks and at the supplier's plant. One prerequisite for the development being a success is that the supplier stands by it with a 100 percent. If everything runs normally, the coach group has a meeting every second week. The mission with the coaching concept is to optimise the co-operation between the supplier and Volvo Trucks. The incentive for the suppliers is that they get to keep their business and the punishment is that they lose the business if they fail to perform well. If the suppliers cause interruptions in production or cause line-stop they also have to pay for the additional cost.¹²⁹

5.4 Autoliv

5.4.1 Corporate Information

Autoliv started to produce seatbelts in Sweden in 1956 and is now a world leader in car safety systems such as air bags and other inflatable safety products. The business idea is to develop, produce and sell systems worldwide for mitigation of injuries to automobile occupants and avoidance of traffic accidents. Autoliv's major products are frontal and side-impacts airbags, seat belts, seat sub-systems and steering wheels. In 1994 Autoliv was introduced on the Stockholm Stock Exchange and the name was changed to Autoliv AB. During rest of the 1990s Autoliv has continued to expand through various acquisitions in the automotive supplier market. In 1997 Europe's leading automotive safety company, Autoliv AB and Morton ASP the leading airbag manufacturer in Asia and North America, merged and the new name became Autoliv Inc. but the head office is still situated in Stockholm. Autoliv have 60 production plants in 29 countries spread all over the world and component production is concentrated in relatively few locations, while assembly plants are located close to the customers. The total market share is 30 percent in a \$12 billion market and is divided into 50 percent airbags, 30 percent seat belts and 20 percent electronics. Autoliv Inc has 22 600 employees and a yearly turnover of approximately 40 billion SEK and is certified by QS-9000.¹³⁰

5.4.2 Supplier Performance Development

The purchasing manager at each Autoliv company reports directly to their Managing Director and to the Purchasing Director for Autoliv Inc. Purchasing

¹²⁹ Anderzhon & Sköld, 2000-11-01

¹³⁰ Annual Report, 1999

in Autoliv Inc. is divided into commodity teams that are responsible for supplier selection and development.

Autoliv in Vårgårda has 149 suppliers and normally, only single sourcing is used. But when it comes to uncomplicated products like screws and nuts multiple sourcing can be used. This is since these suppliers are easier to change.

Autoliv Sweden is responsible for the Swedish suppliers when it comes to evaluation and development. Purchasing is further divided in purchasing projects, which are working with new components for new products and ongoing purchasing, i.e. work with current relations and yearly negotiations. The purchasing department only handle commercial issues and has nothing to do with the material flow. The separate logistic department runs the issues concerning the material flow on each plant and they are responsible for the forecasts, delivery calls and the day-to-day contact concerning delivery issues.

Autoliv is responsible for the transportation from the suppliers' plants to Autoliv. Nearly all products are transported on "Milk-runs" and each supplier delivers on average three times a week. Autoliv measures delivery precision and administrative errors. The transport precision is not measured on the transporter, all mistakes are therefore registered as an error made by the supplier. The logistic department is responsible for the co-ordination of the measurements.

The delivery precision is measured by the goods arriving at the goods receiving department on the correct delivery date and containing the correct volume. This information is then compared with the delivery schedule. The administrative measures consist of correct packaging, correct transport document and correct labelling. If one article is incorrect in the delivery the whole delivery is considered incorrect.

Autoliv is imparting their suppliers on a monthly basis by sending them an information letter. This letter informs the supplier about the latest total supplier delivery performance. The supplier receives the information in a box diagram, showing the results week by week. Every quarter each supplier gets an individual chart over his achievement in relation to a flexible goal. If the supplier performance in delivery precision is below 85 percent, Autoliv will automatically require an action-plan from the supplier. In the action-plan the supplier should describe what they are doing to solve the problem. Meanwhile, Autoliv accomplish a logistic rating on the basis of some supplier performance parameters. This rating is a mix between subjective measures and facts based on measurements. The rating consists of delivery precision and reliability,

which means how good the supplier is at communicating their problems. It further consists of material handling, which for example can be if they use the right packaging methods, flexibility which means their ability to change focus on request and EDI communication ability. This rating is performed on each supplier each quarter or as soon as they perform less than 85% in delivery precision and the supplier is informed about the result in every quarterly report.

The comprehensive objective for delivery service is 95%. If a supplier doesn't reach the variable goals for delivery service or quality, the supplier has to follow a certain supplier development process. The first step in this process is that Autoliv requires payment for the damages that the supplier caused and an action plan is as earlier mentioned demanded where the supplier must show what they are going to do about the problem. If the supplier has caused line-stop or the improvements stated in the first action plan have failed, Autoliv will inform the suppliers corporate management and request a new action plan signed by the C.E.O.

If this proceeding does not give any result, a third step of action takes place. Autoliv will now send its own resources to the supplier in order to supervise the supplier's delivery service and quality. In this matter Autoliv uses specially educated personnel from Poolia. Autoliv will supervise the supplier for four weeks and if the supplier has acceptable delivery service and quality during this period, Autoliv will pay the cost for this resource. If the supplier still does not reach the goal they have to pay for the supervision themselves. In this step both the purchasing department and the logistic department is involved and the supplier is followed-up each week.

In this step the responsible purchaser and material co-ordinator always participates. If the supplier is very important both the purchase and the logistic manager is involved. If this does not give any result, the case is handed over on commodity level i.e. the international purchase manager for the certain product gets involved. At the same time the supplier loses his right for extending business. If no progress is achieved during this step, the supplier will be dismissed and a new supplier must be found. This is a complicated process and must as far as possible be avoided.

To reach high supplier performance in the long run Autoliv use supplier development as preventive measure. Autoliv creates work groups consisting of 10 to 15 suppliers, not competitors but with similar production. The development program is a mix between education and benchmarking against each other in order to exchange knowledge. The objective is to gain higher average delivery service performance among the participating suppliers.

Since Autoliv has had a major expansion the last years, extending business rewards the suppliers. Another reward is the quarterly mail where the supplier of the month is appointed and gets a diploma. This diploma can be given to a supplier that for example has done the best improvement or has a constantly high performance rate etc. The punishment is paying for each complaint or line stop. Autoliv is however not charging for late deliveries.

The foundation for working with supplier development is according to Autoliv to have orderliness in your own business. You must never come to a situation when the supplier doesn't trust your figures and question your facts.¹³¹

5.5 Volvo Car Customer Service

5.5.1 Corporate Information

Volvo Car Customer Service is a part of Volvo Car Corporation and provides the market with spare parts for Volvo Cars all over the world. VCCS have 1400 employees and are divided into a technical part working with warranties and other technical issues. The second department deals with spare parts and a third department works with the logistics issues, this is the largest part with over 900 employees. The mission is that the logistic system should ensure parts availability, as defined by the market, at the lowest possible cost, by controlling the entire material flow from supplier through dealer network to the end customer. The head office is situated in Gothenburg and the spare parts are distributed all over the world from warehouses in Europe, US, Australia and Japan. There also exist a number of private owned dealers spread all over the world. The largest market is Europe followed by the US. VCCS is also ISO 9000 certified.¹³²

5.5.2 Supplier Performance Development

Within the Volvo Car Corporation there is a central purchasing organisation that places the general agreement when it comes to purchasing. The purchasers who are procuring for the new-production of cars also procure for the after-market issues. Further, the purchasing planning department on VCCS takes care of the ongoing connection with the suppliers regarding the exact purchasing volume.

VCCS has approximately 900 suppliers and stocks about 150 000 articles. Primarily only single sourcing is used, but in exceptional cases can even multiple sourcing be exercised.

¹³¹ Erdmark, 2000-11-02

¹³² Sandström, 2000-11-11

Today VCCS measure delivery precision on a weekly basis, which means that VCCS accepts if product is sent within the right week. But VCCS is within short planning to measure delivery service on a daily level. In the new system VCCS will compare the time on the supplier's AVIEXP against the delivery schedule. They will then also measure on the basis of the call-off, which will lead to that if something is incorrect in the consignment the whole consignment will be considered incorrect. VCCS is responsible for the transport from the supplier and use Volvo Transport. The transport precision is today viewed as a part of the suppliers' delivery precision, but will within short be measured separately. Administrative errors like incorrect delivery documentation is also measured by drawing up a control report if something is incorrect. Since every error generates a control report, the number of control reports is calculated per supplier. If some article is missing in the consignment, this is considered to be an administrative error. Within a limited future the supplier also will be charged a fee for these errors.

When it comes to incorrectness in the delivery documents, this is registered in the goods receiving department, but quality and volume control is performed and registered by the delivery department. This is then automatically reported into the computer system. If something is incorrect, is it then up to the purchasing planning department to take the final decision whether to take any actions. If everything runs smoothly VCCS will have a weekly follow-up, but is anything however incorrect with the notification, this will be followed-up the next day.

To avoid the suppliers mismanaging their obligations, VCCS tries to have a continuous informal dialogue with the supplier where they together try to reach an optimal solution. Due to the great number of suppliers it is according to VCCS hard to have a structured way of working with supplier development. Instead they focus more on the worst large suppliers. Has a supplier recurrent problems to fulfil its obligations, VCCS will charge the supplier its additional costs. If a supplier neglects its obligation he will be monitored and followed-up on a weekly basis. The purchasing co-ordinators can then together with the supplier develop an action plan where information is exchanged and a deadline is stated when the supplier must be able to fulfil its agreed obligations. This dialogue often gives great results.

If VCCS have severe problems with a specific supplier the central purchasing department gets involved. But if the supplier reaches this stage, it has gone far and VCCS starts thinking about dismissing the supplier. But VCCS emphasise that changing supplier is very seldom an option.

According to VCCS they often know what the problem is, but one must have dialogue about the causes of the problem and this can often be a fairly drawn out process. They then for example go in and check the contract and investigate really what the supplier has signed for. VCCS also send employees out to the supplier to investigate the root causes of the problem. These personnel also work with supplier evaluation where they with a preventive objective conduct large supplier audits, which are carried out by a complex program in which they map all the suppliers' processes.

The only reward good suppliers get is continued business with Volvo. Punishments exist though, and are in the form of charges to cover VCCS additional costs for late deliveries and express deliveries if something is missing.¹³³

¹³³ Ilvered & Johansson, 2000-11-02

5.6 Benchmarking Summary

This matrix shows fifteen of the most essential features that the investigated companies have in common or do not have in common, regarding delivery service measurement and supplier development. With help of this chart we can in an effective way form a comprehensive picture regarding the different features being used in the investigated companies.

Features:	VCC	Saab	Volvo Trucks	Autoliv	VCCS
Single Sourcing	*	*	-	*	*
Multiple Sourcing	-	-	*	-	-
Delivery Precision	*	*	*	*	*
Transport Precision	*	*	*	-	-
Administrative Errors	*	*	-	*	*
Interruption Fee	*	*	*	*	-
Grading	*	*	*	*	-
Feedback	-	*	*	*	*
Assessment	*	*	*	*	*
Rewards	*	-	-	*	-
Incentives	*	*	*	*	*
Competitive Pressure	-	-	*	-	-
Direct Involvement	-	-	*	*	-
Associations	-	-	-	*	-
QS-9000	*	*	-	*	-

Fig. 5.1 Benchmarking Summary

6 ANALYSIS

In this chapter we will analyse the investigated companies against the theoretical framework. This analysis will constitute the foundation of our recommendation.

If we start by looking at the supplier relations we can see that theory implies that the trend in the engineering industry is to move towards single sourcing. This trend has forced the buying companies to increase their control over the supplier in order to secure themselves against interruptions in the material flow. The theory even implies that single sourcing is getting elements of dependent sourcing.¹³⁴ Single sourcing is primarily used when it comes to complicated products since the buying company is more dependent on these suppliers. This trend can be seen in the investigated companies where only Volvo Trucks really use multiple sourcing. Why multiple sourcing is used is according to Gadde & Håkansson that, in this case Volvo Trucks will achieve a better control of the price level as well as the delivery reliability though a risk dispersion. But disqualifying a supplier that does not perform as expected becomes harder when companies use single sourcing.¹³⁵

Due to the fact that more and more companies follow the trend towards single sourcing the demand for measuring the supplier performance increases in order to secure the deliveries. The most important thing is the need for measures and methods of measurement to control the physical flow. It is important that the companies measure active i.e. measure to receive knowledge to control and manage the business in desired direction.¹³⁶ This is significant for the investigated companies, they all measure some parts of the delivery service to receive control. All the investigated companies are measuring delivery precision but they are measuring it somewhat differently. They define delivery precision as the correct articles and the correct quantity in the right time. The most common way to measure the delivery precision is to compare the date when the supplier has sent the consignment to the date when the supplier was supposed to send it according to the delivery schedule. When the supplier has EDI-facilities this is practically done by electronically comparing the AVIEXP with the delivery schedule. This method of measuring is valid for all companies with the exception of Autoliv, which are measuring the delivery precision when the goods arrive at the delivery dock and comparing the date on the delivery note with the delivery schedule. All investigated companies consider early deliveries as incorrect as late deliveries and if something is incorrect in the call-off, the whole call-off is considered incorrect. All the investigated companies

¹³⁴ Storhagen, 1995

¹³⁵ Gadde & Håkansson, 1996

¹³⁶ Andersson et al, 1988

further accept or are planning to accept that the consignment is sent or delivered within 24 hours of agreed date, according to the delivery schedule.

All companies except Autoliv and VCCS (VCCS are soon planning to measure transport precision) also measure the transport precision and this is contrary to delivery precision measured when the consignment is delivered at the buying companies' goods reception. The transporter has here an agreed time-window in which he must deliver the consignment. If the transporter is too late or too early, the transport precision will suffer.

One example of conditions that disturb the operational routines and influence the delivery precision is administrative errors. All the investigated companies with the exception of Volvo Trucks measure some form of administrative errors or handling quality. Examples of administrative errors are incorrect delivery note, incorrect labelling and incorrect packaging. Instead of measuring the administrative errors Volvo Trucks control and communicate this in a more informal way. We can further observe that if a supplier delivers a consignment with an administrative error or if the delivery precision causes interruptions, the supplier is charged a fee per error.

According to Storhagen there is no problem if measures are slightly wrong, but measures that are in conflict must be changed.¹³⁷ With this in mind we find it strange that Autoliv measures the delivery precision when the consignment arrives. This makes it hard to track and trace the root cause to low delivery precision. It also gives the supplier an excuse to have a low delivery precision since he can blame the low delivery precision on the transporter.

We can see that all investigated companies have rigorous programs for measuring the suppliers' delivery service, which creates opportunities to improve competitiveness. According to Harrington, measurement is important for improvement.¹³⁸ The companies are using measurements systems to set goals and monitor trends and track root causes and sources of errors. It also identifies opportunities for ongoing improvement and most important of all, it helps monitor the progress. Rigorous measurement of supplier delivery service allows companies to shrink both order cycle times and inventory level.¹³⁹ In this matter the delivery service is a revenue creating part of the business logistics. Shorter order cycle times and reduced inventory levels means today great cost reductions to many volume related and capital intensive businesses.¹⁴⁰ Delivery service is also an external concept in the question as a

¹³⁷ Storhagen, 1995

¹³⁸ Harrington, 1991

¹³⁹ Anonymous, May 4

¹⁴⁰ Lumsden, 1998

value-adding activity, creating competitiveness.¹⁴¹ All the investigated companies had a measure system built around delivery reliability and security, e.g. delivery precision, and this is according to Colella, Vice president of MKS Instruments, the two most critical measures to consider.¹⁴²

The principal part of logistic quality is communication between customers and suppliers.¹⁴³ Every investigated company also stresses this issue when it comes to finding the root cause of the problem. Supplier measures need not be complicated, but they must be tightly defined and communicated to suppliers. As a company moves forward with its program to track supplier performance, it needs to make sure its own house is in order and not place unrealistic demands.¹⁴⁴ Both Autoliv and Saab indicate this when they say that you never should put yourself in a situation where the supplier can question your measures and information.

The feedback system is an essential tool to improve supplier performance because measurements without feedback are worthless since you have expended the effort but not provided the supplier with an opportunity to improve. Without the interaction between measurement and feedback, the company cannot open the door to improvement.¹⁴⁵ We therefore find it remarkable that not all investigated companies automatically provide the supplier with feedback even if the performance isn't alarming. It is important to show the trend of the supplier performance and even if the performance is satisfactory, it could be improved. Without feedback the supplier may be kept in the dark and believe that they perform excellently and see no reason why they should improve their delivery service. All of the investigated companies are however using direct feedback when something is incorrect, which according to Harrington is the best type of feedback. He also suggests that the company should develop a reporting system so that the suppliers can measure their progress. The feedback system should provide trend information of at least 6 months and include a business target performance level.¹⁴⁶ Both Saab and Autoliv work in this way by constantly informing the single supplier about his performance level against the overall objective. The philosophy at Volvo Cars to not provide the supplier with feedback if everything runs smoothly is not supported by the theory. We find it hard to understand why they don't use this method to improve the supplier performance. Volvo Cars motivates this by saying that the supplier should have control over its own business.

¹⁴¹ Aronsson et al, 1988

¹⁴² Anonymous, May 4, 2000

¹⁴³ Persson & Virum, 1996

¹⁴⁴ Anonymous, May 4, 2000

¹⁴⁵ Harrington, 1995

¹⁴⁶ Ibid

Since we have defined supplier development as anything from informal supplier evaluation to investments in the supplier's operations, we can say that all the investigated companies are using some form of supplier development. Saab and Autoliv gave us the most detailed information about their supplier development programs and are therefore the ones that are the most valuable for this thesis.

Supplier development is according to Quayle where buyer and supplier develops such a close and long-term relationship that the two work together as partners.¹⁴⁷ The companies that significantly tried to achieve long-term partnership were Autoliv and Volvo Trucks. According to Watts & Hahn supplier developments efforts are in fact improving the supplier performance, but not to the level desired. This can depend on the fact that the buyers tend to focus their supplier development on short-term benefits. Further the buying company must establish clear goals and objectives for the supplier development program and we can see that the investigated companies used goals and objectives for their supplier development programs. The supplier evaluation is also vital to the success of the supplier development program and when we analyse the investigated companies we can observe that all the companies with the exception of VCCS use some form of grading system for supplier evaluation.¹⁴⁸

In Watts and Hahn's research most of the respondents operated their supplier development programs at divisional level.¹⁴⁹ Our investigated companies often start their supplier development program with a telephone call or a letter at functional level but if no change is visible the program often escalates and ends in the purchasing department at divisional or corporate level.

Krause et al define two main categories of supplier development strategies, internalised and externalised supplier development strategy.¹⁵⁰ Among the investigate companies we find that all of them use some kind of supplier assessment strategy, which means that they form some type of structured evaluation of the suppliers' abilities to provide the company with a good delivery service. Supplier incentives as supplier development strategy is used in all investigated companies and this takes the form of extended business when the suppliers' perform well. The third externalised supplier development strategy is competitive pressure. This strategy can really only be used by Volvo Trucks since they are the only company investigated using multiple sourcing. The aim with competitive pressure is to play off the suppliers' against each

¹⁴⁷ Quale, 2000

¹⁴⁸ Watts & Hahn, 1993

¹⁴⁹ Ibid

¹⁵⁰ Krause et al, 2000

other and use the most competitive one. We are however uncertain if Volvo Trucks use this strategy as a means for supplier development.

When it comes to internalised supplier development strategies and direct involvement from the buying firm in the suppliers' development efforts we conclude from our interviews that Autoliv and Volvo Trucks are the only companies that really practice this strategy. Autoliv is the company that utilises this form of supplier development strategy the most when they form different supplier associations. They match similar suppliers and invest in training and education within these organisations. They further let the suppliers benchmark against each other.

Research results suggest that supplier assessment and supplier incentives are the key enablers of supplier development strategies.¹⁵¹ We therefore find it remarkable that not all companies use other form of incentives than extended business. Volvo Cars and Autoliv is the only of the investigated companies that use rewards like diplomas and awards. The research further however states that direct involvement is important when it comes to making the development strategy work in the long run and that competitive pressure, as a stand-alone strategy isn't a major factor in improving supplier performance. This seems true since four of the five investigated companies used single sourcing, which makes it harder to switch supplier. We can also see that the companies always use some form of combinations of the different strategies and this is according to the research the best way to go.

If we compare the structure of the investigated companies' supplier development programs with the strategic supplier developments process mentioned in the theory, we find many similarities. First of all, all the companies identified the supplier development prospects by their poor performance but VCCS only focused on the worst and largest suppliers. The companies also formed cross-functional teams where for example production, purchasing, logistics and quality department worked together to solve the problem. As we understand it, the investigated companies form ad hoc cross-functional teams to solve the problem as they occur. A risk with this is however that the company might lose the long-term benefits. As we apprehend the situation, long-term thinking is absent in most of the investigated companies. The strategic supplier development process also stresses the importance of initiating communication with the suppliers' management, which is a method that all of the investigated companies practise. The model further emphasises the importance of analysing the suppliers' willingness and ability to implement the changes. Autoliv and Volvo Cars back up this fact when they say that the supplier must show a desire to improve. The next step in the process of

¹⁵¹ Krause et al, 2000

strategic supplier development is to reach agreements on improvement and performance metrics. The agreement should also specify the role of each party and who is responsible for the certain activity. Saab clearly specified this in their supplier development matrix. It is also important that there is a mutual deployment of resources because the suppliers' are unlikely to improve without the tangible support of matched resources from the purchasing organisation. All of the investigated companies were clearly aware of this fact.

Finally can we see that all of the supplier development efforts can be connected to both TQM and QS-9000 in their efforts to constitute ongoing improvements.

7 RECOMMENDATIONS & CONCLUSIONS

In this chapter we will finally present our recommendation for supplier performance improvement to Lear Corporation. The recommendation is divided in two main parts, delivery service measurement and supplier development. The recommendations are founded on the theory and the empirical study, but in the delivery service measurements part we also consider Lear Corporation's special requirements. The measures will be based on the most common measures used in the industry. Lear could increase or decrease the number of measures without increasing or decreasing the reliability and validity of the recommendation. Further Lear must set the goals and objectives for the measurements and development themselves.

Before the measurements start, we recommend the MOD division at Lear Corporation to perform a logistic audit. This logistic audit already exists at the Saab-GM division and is issued by Anders Karlund, Logistics manager. This audit measures the suppliers' ability in communication (EDI), material planning, production planning and deliveries. The suppliers are graded on an A to C scale, where the C supplier must improve. According to Anders Karlund this audit evaluates the suppliers' ability to have high delivery service and investigates the root causes of a low delivery service. We think this audit is a good tool for the MOD division as well, which will help the logistic departments to form an opinion regarding their supplier's logistic abilities. In connection with this audit, Lear should explain for the suppliers what they are going to start measuring and why. This should be carried out in order to inform the suppliers about new routines and standards. The suppliers should also be informed of the objectives or demands for every one of the measurements. It is also very important that the supplier understands how Lear measures. Lear must never come to a situation where the supplier doesn't trust their figures. We considered the objective for delivery and transport precision the most important. According to the theory the measurements need not be complicated but to be successful they must be tightly defined and well communicated and understood by the suppliers.

7.1 Delivery Service Measurements, Evaluation & Feedback

What to measure is an essential part of the supplier evaluation process and is based on what we can observe in the empirical study and what is recommended by the theory. It is also based on the demands for supplier measurement stated by the QS-9000 regulation. We have chosen to split the measurements into two different parts, measurements for supplier evaluation, which contains two essential key variables and measurement for transporter evaluation, which contains three key variables.

7.1.1 Measurements for Supplier Evaluation

The first key variable and the most essential in measurements for supplier evaluation is *delivery precision* and should be defined and calculated by dividing the number of incorrect call-offs by total number of call-off per supplier. A correct call-off should be defined as the correct articles and volume leaving the suppliers on the right date according to the delivery schedule. If one of these parameters is incorrect, the entire call-off should be considered incorrect. The delivery precision should be measured by comparing the delivery date, articles and volume in the call-off, which is based on the delivery schedule, with the delivery note's printout date, articles and volume. This should automatically be calculated when the delivery department types in the delivery note into the data system. The system must also be able to track if the delivery is too late or too early in order to be able to give a correct feedback to the supplier. Further, early deliveries should be considered as incorrect as late deliveries. When something is incorrect, it is important to update the delivery schedule in order to avoid the suppliers' delivery precision being exposed to sequence-errors. If for example too much is delivered, this must be deducted from the next call-off.

The second key variable in supplier evaluation is *delivery note precision* and is defined and measured by calculating the number of call-offs where delivery notes are missing or are incorrectly divided by the total number of call-off per supplier. This should be controlled at the delivery department by matching the identification code on each goods unit with the identification code on the delivery note. If the delivery note is missing or does not match the call-off, this should be registered in the system.

To show how these two measures relate to each other we give an example. If the delivery schedule states that the next call-off is supposed to deliver ten units and the consignment only consists of eight units when the delivery note states ten units, both the delivery precision and delivery note precision will suffer. If the consignment did not leave the supplier at the right time according to the delivery schedule, this is also incorrect, but since the delivery precision already suffers from a quantity error, this does not matter. There can only be one delivery precision error per delivery.

7.1.2 Measurement for Transporter Evaluation

The first key variable and the most essential for transport evaluation is *transport precision* and should be measured by dividing the number of late or early deliveries with the total number of deliveries per transporter according to the transport schedule. The person responsible for the delivery dock should perform this measure and must have a transport schedule so that he or she can

keep a record of those transporters that are late or early. For feedback purpose it is also important to separate the incorrect deliveries between early and late deliveries.

Consignment note precision is the second key variable and is defined as a number of deliveries with missing or incorrect consignment notes divided by total number of consignments per transporter. This measurement should also be performed at the unloading dock by controlling if there exists a consignment note and if the number of goods units matches the consignment note. If there is a deviation or the consignment note is missing this could be reported in the same record as the transport precision deviation.

The third key variable for transporter evaluation is *rate of transport damages* and is defined as the number of deliveries with damaged goods divided by the total number of deliveries per transporter. This should also be measured by the delivery dock and reported in the same record as transport precision and consignment note precision.

7.1.3 Feedback and Evaluation

According to the theory, providing performance feedback to every supplier is an essential part of any improvement process. The best way to provide feedback is direct feedback and therefore we recommend Lear to provide their suppliers with feedback on the suppliers' performance every month. Since communication is the principal part of logistic quality this feedback could be in the connection of a newsletter or monthly mail where the specific measures should be displayed in a chart, which shows the last six months performance against the objectives for the various measures. We recommend the measurements to be calculated on a monthly basis. Some of the investigated companies did however measure on a weekly basis but we think that in the beginning of the implementation, monthly measurements will be sufficient. If the supplier doesn't reach the objectives for the various key variables, they should be developed by the supplier development process, described later in the chapter.

The reason why six-month performance should be displayed in the feedback chart is so that the supplier is able to track its performance trend. Once the feedback has started it is critical to update the performance chart. According to theory few things can be more demoralising to a team than to have a performance indicator that is out of date. To be able to provide the supplier with an opportunity to improve it is also necessary to split the different measures in a way that the supplier can understand what has happened e.g.

incorrect delivery precision should be separated into too early and too late deliveries.

Supplier evaluation is vital to the success of the supplier development program when it's used to guide the supplier development program efforts and to identify the suppliers and the performance elements needing the most improvement. We therefore also would like to recommend Lear to twice a year conduct a more extensive supplier evaluation of the supplier delivery service. The material coordinator should grade the suppliers' on the delivery service measurements but we also think that some subjective attributes should be considered. These attributes could for example be flexibility i.e. the ability to make a short-notice change on request from the buying company and reliability i.e. that means how good the supplier is at communicating their problems. Lear could also measure other parameters they consider important in advancing their success. The different key variables could then be weighted where we recommend that delivery precision constitutes the main part. The different parameters should be weighted in the matter Lear finds important and a final grade for delivery service should be set. The scale could for example be, needs improvement, satisfactory and outstanding. This rating should be sent to the suppliers every six months to give a feedback on the suppliers' overall delivery service. An objective for overall delivery service should then be set. If a supplier doesn't reach the objective for the grade satisfactorily, the supplier development process should develop the supplier.

Rigorous programs for measuring permits buying companies to rely more on supplier, this create opportunities to improve competitiveness. It's also important to measure actively in order to manage the business in desired direction. When the measurements have been performed the results must be compiled in a database, which will show the suppliers' performance history. According to Anders Karlund there exists a central supplier performance database for quality issues. We recommend that this database should be used for supplier delivery service performance as well. Since each factory conducts the measurements, the separate factory should also be responsible for reporting the measurements to the database. The database should be available for the central purchasing department at the head office. This is because they must be able to withdraw performance history regarding a certain supplier when they evaluate a supplier for e.g. extended business.

As we earlier mentioned supplier's measures need not be complicated, but they must be tightly defined, communicated and understood by the supplier. When the measurement system is implemented, well defined and runs smoothly, an increase of measurements can be done. Lear could then start to measure other measures e.g. correct labelling and correct packaging. But we however

recommend Lear to start slowly since it otherwise probably will be too exhausting, both for Lear and their Suppliers.

7.2 Supplier Development

Once the supplier performance is measured and assessed a supplier performance database should identify those suppliers that constantly are unable to reach the objectives. According to QS-9000 requirements it is a responsibility of the buyer to develop the supplier. Supplier development should be seen as a long-term relationship where the buying company and the supplier are working as partners, the aim is to secure the best possible commercial advantages. To be successful the supplier development must be viewed as a win-win philosophy and both parties must integrate key functions and activities. To improve suppliers that constantly fail to reach the monthly objectives or gets a grade below satisfactory in the six-month rating, we recommend this four step supplier development process.

7.2.1 Supplier Development Process

Level of involvement	Step 1	Step 2	Step 3	Step 4
The responsible material coordinator and the supplier's contact person	<ul style="list-style-type: none"> •Contact the supplier •Identify the problem •Ensure a solution •If not acceptable, escalate to step two 	<ul style="list-style-type: none"> •8D report is sent to the supplier •This report will help solve the problem •The report must be signed and returned to the buyer •Monitor supplier for six weeks •No improvements, escalate to step three 	<ul style="list-style-type: none"> •Supplier's top management must meet the factory management •New action plan is set up and cross functional team is created •Lear must deploy resources in order to give the supplier the best prerequisite to improve the performance •Monitor supplier for another six weeks •No improvements, escalate to final step 	<ul style="list-style-type: none"> •New business on hold •Communicated to Lear Corporation world wide •Closely monitor supplier for six months •If permanent improvements are visible, the business on hold will be cancelled •If no permanent performance improvement and no desire to improve are visible during six months, the complicated process of finding a new supplier must start and the supplier will finally be dismissed!
The responsible material coordinator and the supplier's supply chain management				
Supplier's top management and the factory management				
The purchasing department in Trollhättan and the supplier's top management				

Fig 7.1 Supplier Development Process

Step one

The first step should be when the material coordinator at the delivery follow-up department discovers that a supplier is diverging from the delivery plan. The responsible material coordinator should in this step provide direct feedback and contact the supplier's contact person in an informal way i.e. by a telephone call. The material coordinator should here try to find out why there exists a divergence, what the problem is and what the supplier is doing to solve the problem. This should be used as a daily routine when a divergence appears and is a subjective judgement from the material coordinator. If the material coordinator doesn't find the explanation acceptable, the supplier development process escalates to step two.

Step two

If the material coordinator doesn't find the explanation in step one acceptable or if the measurements show that the supplier is unable to perform as expected towards specified objectives, a written reclamation report should be sent out. We recommend Lear to use a corrective action report (8D which today is mainly used for product quality issues) where the supplier must explain in writing, what the problem is, what temporary actions are being performed, root cause and finally come up with an definitive solution and corrective actions. This report will help the supplier to analyse the problem. To be effective and ensure awareness of the problem within the supplier's organisation, we further recommend that the supplier's supply chain management must sign the 8D report since they best can influence the situation. After the action plan is received from the supplier, Lear should during six weeks closely monitor the supplier's performance against the objectives. If the supplier reaches the objectives they can continue with business as usual. If the supplier however doesn't reach the performance objectives within this six weeks or if no action report is received within the first week, the problem becomes serious and the development process escalates to a third step.

Step three

If there still is a problem with the supplier's performance Lear should demand that the supplier's corporate management e.g. C.E.O., production manager and the logistic manager, visit the Lear unit and meet with the management of that factory. It is important that different departments from Lear are participating at the meeting in order to form a cross-functional team and come up with new insights and ideas. According to TQM theory involvement of different parts of the organisation is a condition for improvement. The meeting should result in a new action plan. Since supplier developments require joint improvements by

both parties it is in this stage also important that Lear deploy resources in order to give the supplier the best prerequisite to improve the performance. Lear must here ask what the supplier needs from them to improve the performance since it, according to QS-9000 regulation, is the responsibility for the buying company to provide the supplier with the right conditions for accurate deliveries. In this step the role of each party should also be specified and the manner and timing for deploying allocated resources. Two of the investigated companies used personnel from Poolia to improve the supplier performance and we think this method also could be utilised in order to secure and supervise the material flow to Lear. If the supplier improves, we recommend that Lear pay for these resources, if the performance however does not improve, the supplier should be charged for this cost. After the second action plan is received and approved the supplier should again be closely monitored during another six weeks. If the supplier improves its performance, they will continue to deliver as usual. If they however don't improve they will escalate into the fourth and final step.

Step four

In the fourth step the supplier becomes a subject for the central purchasing department at Lear's head office in Trollhättan. The supplier should now be placed on "new business on hold" i.e. no new extended business or new projects should be placed on this supplier. To even more increase the pressure on the supplier's performance we recommend that the new business on hold decision should be communicated to Lear Corporation World Wide and the new business on hold should be valid for all units in the group. If the supplier after six months can show permanent improvements, the Lear unit should report this to the central purchasing department and the new business on hold should be cancelled. If no permanent performance improvement and no desire to improve are visible during these six months, the complicated process of finding a new supplier must start and the supplier will finally be dismissed.

There are many different strategies to consider when you are developing the supplier's delivery service performance and a combination of some suitable development strategies is the most effective way to go. In our model we utilise the assessment strategy in combination with the direct involvement. By this we mean that Lear should provide the supplier with feedback so that the supplier knows what Lear expects and also provides the supplier with directions of improvement. The direct involvement part could be seen as the activity when Lear in step three interacts and sends own resources in order to secure the material flow. Direct involvement means that investments made by Lear are unrecoverable if the relationship is dissolved. In our recommendation, this risk is avoided by insisting that the suppliers must pay for the resource if they don't

improve. In the fourth step in the supplier development process we also utilise the strategy, competitive pressure. This is when we recommend Lear to put the supplier on business hold in order to indicate that they could be exchanged if no action is taken.

7.3 Further Recommendations & Conclusions

It is important that Lear establish goals for the development program. When a supplier performs below the objective of delivery service, the supplier should be developed by the supplier development process. It is extremely important to set realistic goals and both Lear and the supplier must then accept this goal. QS-9000 demands that supplier should have 100 percent delivery precision, which we don't consider realistic in beginning of supplier development program. The program must further be well communicated and understood by supplier. The supplier must further accept and support the development program to a hundred percent. Any misunderstandings of the intent of the supplier development program will make it less effective. Therefore we would like to recommend that the obligations of the supplier should be stated in the contract.

Once a supplier development project has been completed, the supplier's continued progress must be monitored and tracked over time. To further improve the performance and capabilities of Lear's suppliers and to reach high supplier performance in the long-term, suppliers that keep a constant high performance rate on the measures should be given the opportunity to improve even more. Lear could form supplier associations where they arrange benchmarking opportunities where best in class suppliers show how they work with various improvements. Lear could also match their most important suppliers with similar production methods into associations, in order to utilise and exchange knowledge and experience. The objective with these supplier associations is to gain higher average delivery service performance among the participating suppliers. These supplier associations should be seen as a way to constitute ongoing continuous activities and this is a way to raise and update new objectives. Lear could then increase the demands and objectives on these participating suppliers.

To increase the awareness of the supplier performance, we further recommend Lear to establish fixed fees for every interruption and production stop that is caused by the supplier. This could be fixed charges for every missing or incorrect delivery note or other administrative errors. There should also be a cost per hour charged on the supplier if they cause a line stop. We further think that Lear should demand that their suppliers warn if they have any problem affecting the material flow. If they don't warn, a fee should be charged.

We would further like to recommend that suppliers that perform well are rewarded, since this is one of the most effective supplier development strategies. It doesn't need to be a sophisticated reward system, an acknowledgement in the monthly letter or a diploma to the supplier of the month has often greater effect than one might think. The reward does not necessarily need to be awarded to the supplier that has the highest performance figures, it could also be a reward for the supplier that has improved the most during a period. The reward should be seen as a long-term strategy to develop the suppliers, in this matter extended business is one of the best recognitions that a supplier can get.

A future scenario in the supplier development area is that Lear should strive to let the suppliers perform the measurement and supplier development themselves and only conduct the evaluation process. This is also supported by QS-9000, which states that the supplier is recommended to constantly evaluate and revise the delivery service. When implementing a supplier performance program, we strongly recommend Lear to read the purchasing chapter in a QS-9000 manual in order to gain further recommendations. We recommend QS-9000 Quality Systems Handbook by David Hoyle.¹⁵²

To be most effective, this recommended procedure is meant to be applied by all MOD units in order to avoid confusion among the different suppliers and constitute common actions against the suppliers. If Lear introduces our recommendations they will get a common procedure to measure, evaluate and develop their suppliers' delivery service. We consider that our suggested routine will increase the suppliers' delivery service and will strengthen the relations with their suppliers. This will probably lower the cost of material management and gain higher revenue and competitiveness, both for Lear and their suppliers.

¹⁵² Hoyle, 1999

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Appendix 1. Questionnaire for the pre study.

- Give us an overall picture of the material flow (focus on procurement and delivery).
- How many suppliers do Lear use and how is the volume distribution?
- What is purchased; raw materials or are even components purchased?

- Is everything that is manufactured already ordered?
- How is the procurement business organised and how is the rest of the organisation organised?
- How is the procurement planned – how does the demand arise?

- How large a part of the cost can be derived from procurement?
- What is bought and how large are the volumes?
- How do the relations with the suppliers' look, which connections are established and is any development used?

- Has the supplier many other customers than Lear?
- Are several suppliers used for the same product?
- How do the communication flow and the information flow look like – what happens when an order is placed – is odette or some other form of EDI used?

- When can an error in the delivery at the latest be discovered, can it for instance be discovered in the production and in that case how is it reported?
- Do signals come from the supplier if something is incorrect or late?
- How is the quality control performed when the goods are delivered?

- How does the order system look like, is data available when an order was placed and when it was delivered, can one follow the ordered good through the flow from when the order was placed to delivery via the data system?
- Is data available for those parameters Lear wants to measure and how are these divergences discovered, documented and reported?
- Is Lear ISO 9000 certified and how is the procurement department involved?

- Is anything related to delivery service measured today and in that case what – how are these measures or key figures defined?
- How is the result of these measures used?

- Is any transport damage control performed?
- Who is responsible for the transports?
- How are invoice routines performed?
- How are the goods labelled?
- How do the consignment note routines work?
- What are the consequences of low delivery service?

Appendix 2. Questionnaire for benchmarking studies

- How is the procurement operation organised?
- Are you ISO or QS-9000 certified?
- Who handles the routine contact with the suppliers?

- Are several suppliers used for the same product?
- Who handles and is responsible for the transportation?
- What do you today measure regarding the suppliers' delivery service?

- How are these measures defined?
- From where comes the data, which are these key variables, based on/how are the errors registered?
- Who is responsible for the measurement?

- Is the transporter's performance also measured?
- How do you systematically follow up the measurement and in what way and how often does the supplier get feedback?
- What happens when a supplier doesn't reach your demands for delivery service?

- Is this routine standardised (is some form of reclamation report used)?
- What do you do to find the root causes of the problem divergent delivery service?
- What does your improvement program look like: how is it organised, how often do you meet, who is participating and who is responsible etc.?

- How do you proceed with the improvement program?
- How is the improvement program followed up?
- Has the improvement program given any results?
- Do any rewards or incentives exist for those suppliers with high delivery service/ punishments for those suppliers with a low delivery service?

APPENDIX 3 CORRECTIVE ACTION REPORT (8 D)

Customer/Kund: Fax no:	Report no. / Issue: Rapport nr / utgåva: /		
Your report no: Er rapport nr:	Registration date: Registreringsdatum:		
Report date: Rapportdatum:	Part no: Art. nr:		
Your Reference: Er referens:	Part description: Benämning:		
Rejected qty acc. To customer: Reklamerat antal enl.kund:	Non-conf. qty after investigation: Antal efter utredning:		
Problem description/Analysis started – Problembeskrivning	<input type="checkbox"/>	Responsible – Ansvarig	
		Achieved date-Utfört datum	
Temporary actions / containment actions - Tillfälliga åtgärder / avskiljande åtgärder Markings on delivered OK parts - Märkning på godkända detaljer	<input checked="" type="checkbox"/>	Responsible – Ansvarig	
		Achieved date-Utfört datum	
Root cause – Grundorsak	<input checked="" type="checkbox"/>	Responsible – Ansvarig	
		Planned date-Planerad datum	
		Achieved date-Utfört datum	
Final solution and corrective actions - Slutlig lösning och korrigerande åtgärder	<input checked="" type="checkbox"/>	Responsible – Ansvarig	
		Planned date-Planerad datum	
		Achieved date-Utfört datum	
How to verify solution - Hur lösning verifieras	<input checked="" type="checkbox"/>	Responsible – Ansvarig	
		Achieved date-Utfört datum	
Target / Mål	Verified / Mätmetod	Before / Före	After / Efter
<input checked="" type="checkbox"/>			
<input checked="" type="checkbox"/>			
<input checked="" type="checkbox"/>			
Preventive actions- Förebyggande åtgärder			
Team members - Team medlemmar			

Date:
Responsible:
Telephone:
Telefax:

Lear Corporation Sweden

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SWEDEN