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The performance measurement process concerning on-time delivery in supplier-customer dyads; characteristics and consequences

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Table of content

Preface iv
Abstract vi
1. Introduction 1
1.1 Background 1
1.2 Problem discussion 3
1.3 Research questions and purposes 5
1.4 Outline of the thesis 6
2. Method 7
2.1 Scientific approach 7
2.1.1 Research approach 7
2.2 The research process 9
2.2.1 Generating a theoretical framework 10
2.2.2 Research strategy 11
2.2.3 Selection of companies and interviewees 13
2.2.4 Interviews 15
2.2.5 Analyzing the data 22
2.3 Quality of the research 26
2.3.1 Construct validity 26
2.3.2 Internal validity 26
2.3.3 External validity 27
2.3.4 Reliability 27
3. Theoretical framework 29
3.1 Performance measurement models 29
3.2 The PM process 33
3.2.1 Defining metrics 33
3.2.2 Target setting 35
3.2.3 Measurement 35
3.2.4 Analysis 36
3.2.5 Summary 37
3.3 Shared supply chain processes and consequences 37
3.3.1 Shared supply chain processes 37
3.3.2 Consequences of shared supply chain processes 38
3.4 Conceptual model 41
4. Analysis 43
4.1 Cross-case analysis concerning the characteristics of the PM process 44
4.1.1 Defining on-time delivery 46
4.1.2 Target setting 48
4.1.3 Measurement 49
4.1.4 Analysis 50
4.1.5 Characteristics in the handling of the PM process 51
4.2 Within-case analysis concerning the PM process and its consequences 53
4.2.1 Dyad 1 54
4.2.2 Dyad 2 59

4.2.3 Dyad 3 64
4.2.4 Dyad 4 67
4.2.5 Dyad 5 71
4.2.6 Dyad 6 75
4.2.7 Dyad 7 79
4.3 Cross-case analysis concerning consequences 81
4.3.1 Cross-case analysis concerning consequences in the studied dyads 81
4.3.2 Analysis of consequences in dyads in general 88
4.4 Concluding analysis 90
4.4.1 The characteristics of the PM process 90
4.4.2 The consequences of the PM process 92
4.4.3 Final model 94
5. Conclusions and final discussion 96
5.1 Conclusions 96
5.2 Further research 98
5.3 Reflections over the study 99
References 100
Appendix I; Empirical data 104
Appendix II; Questionnaire 1 149
Appendix III;Questionnaire 2 152

Table of figures

Figure 1.1 The PM process 2
Figure 1.2 The studied phenomena and problem in the thesis 5
Figure 2.1 Steps in analysis 25
Figure 3.1 The PM process 33
Figure 3.2 Conceptual model 42
Figure 4.1 Characteristics in the handling of the PM process and its consequences in dyad 1 58
Figure 4.2 Characteristics in the handling of the PM process and its consequences in dyad 2 63
Figure 4.3 Characteristics in the handling of the PM process and its consequences in dyad 3 66
Figure 4.4 Characteristics in the handling of the PM process and its consequences in dyad 4 70
Figure 4.5 Characteristics in the handling of the PM process and its consequences in dyad 5 74
Figure 4.6 Characteristics in the handling of the PM process and its consequences in dyad 6 78
Figure 4.7 Characteristics in the handling of the PM process and its consequences in dyad 7 80
Figure 4.8 Consequences for the studied suppliers 81
Figure 4.9 Consequences for the studied customers 83
Figure 4.10 Consequences for the studied dyads 85
Figure 4.11 Final model of the characteristics in the handling of the PM process and its consequences 95

Table of tables

Table 2.1 Research strategies 11
Table 2.2 The characteristics of the participating companies 14
Table 2.3 Characteristics of the conducted interviews in dyad 1 16
Table 2.4 Characteristics of the conducted interviews in dyad 2 17
Table 2.5 Characteristics of the conducted interviews in dyad 3 18
Table 2.6 Characteristics of the conducted interviews in dyad 4 19
Table 2.7 Characteristics of the conducted interviews in dyad 5 20
Table 2.8 Characteristics of the conducted interviews in dyad 6 21
Table 2.9 Characteristics of the conducted interviews in dyad 7 22
Table 3.1 Characteristics in the handling of the PM process concerning on-time delivery 37
Table 4.1 Summary of the characteristics in the handling of the PM process in the studied dyads 45
Table 4.2 Similarities and differences in characteristics in the handling of the PM process 52

Preface

A research team consisting of myself and my tutors Assistant Professor Helena Forslund and Professor Patrik Jonsson has worked over a period of two and a half years with the research project “Responsiva mätsystem för logistiksystem”, financed by Vinnova. Also participating in the project were 14 companies providing our group with access to seven supplier-customer dyads.

In the initial stage of the project all three researchers participated in the conducted interviews concerning the current situation on performance measurements, but after a time we each focused on different areas. For my own part I focused on collecting empirical data regarding the performance measurement process concerning on-time delivery, and the consequences of the handling of the process in the studied dyads. Even though my and my tutors’ research was conducted within the same project, the work was carried out separately, which the outcome also shows. The article by my tutors, published in 2007, had a similar perspective as the first research question in my thesis. As for my own research, this contributed a deeper empirical understanding of the area of the performance measurement process, as well as an exploration of the consequences of the handling of the process. This contribution was accomplished by more in-depth interviews conducted with additional representatives at each participating company.

It would not have been possible to write this thesis without the support and encouragement of a number of people. I therefore take this opportunity to express my gratitude to them all.

First and foremost I am very grateful to my tutors; Assistant Professor Helena Forslund and Professor Patrik Jonsson, for their support and guidance throughout the whole process. I thank them for always being available whenever I have had questions, and thank them too for their encouragement and feedback, which has been indispensable!

I am also most grateful to Vinnova who have funded this thesis, and the participating companies and the interviewees who have taken their time for interviews, and provided me with the necessary empirical data, thereby making this research possible.

I also want to say a special thank to my colleagues, my examiner Jon Aarum Andersen and my opponents, all of whom have provided me with helpful and constructive criticism. A special thanks to Philip Groves as well, for useful feedback and speedy language checking.

Then too, I would like to thank my family and friends for their great support during these years. Henrik and Josephine, thank you for always believing in me! And finally, a very special thanks to my significant other Björn Lundin. Without

your fantastic support and encouragement, Björn, this thesis would never have been completed!

"Well, let's start the insanity!"

- Jerry Seinfeld, in the episode "The Non-Fat Yogurt"

Abstract

Supply chain members need to evaluate their performances in customer service in order to improve them. By conducting a shared performance measurement process (PM process) of the customer service metric “on-time delivery” in a dyad of a supplying and buying company, the partners may manage its handling and gain control of the outcome of the process, and thereby also the consequences of it.

The first purpose of this thesis is to identify the characteristics in the handling of the performance measurement process concerning on-time delivery in supplier-customer dyads. An identification of the characteristics in the handling of the PM process in dyads is needed in order to fully illustrate its activities. By such a means it is possible to identify if and where the processes differ between the partners in the dyad. This motivates the importance of the second research purpose, which is to explore what consequences the differing ways of handling the PM process concerning on-time delivery result in for suppliers, customers, and dyads, respectively.

The method used is case studies of seven supplier-customer dyadic partnerships in Swedish manufacturing industries, in order to collect empirical data. The theoretical framework is based on the characteristics of the PM process and consequences of mutually conducted and agreed-upon supply chain processes.

The conclusions suggest that the PM process is not a shared and mutually agreed process in supplier-customer dyads, by which it is implied that the partners handle the activities of the process in the dyad differently. The conclusions also indicate that the partners and their dyadic relationships experience a number of consequences due to differing ways of handling the PM process in the dyad. All consequences are of negative nature, which suggests that the dyad partners not only forego the positive consequences of a mutually conducted PM process, but also experience the reversed negative consequences due to not sharing the process enough.

Key words: Performance measurements, the PM process, on-time delivery, supplier-customer dyads, supply chain process consequences.

1. Introduction

The focus of this thesis is on the characteristics of the performance measurement process (hereafter referred to as the PM process) concerning on-time delivery and its consequences for the actors in a supplier-customer dyad. The initial chapter defines the concepts and motivates the research study. In section 1.1 the background of studying the areas of supplier-customer dyads are given, and the PM process, its characteristics and consequences, are presented and discussed. Section 1.2 discusses some problems in these areas. The research questions and purposes of the thesis are presented in section 1.3. Finally the outline of the thesis is described in section 1.4.

1.1 Background

A well-known quotation within supply chain management and performance measurement is; “If you cannot measure it, you cannot manage it” (Schmitz and Platts, 2004, pp. 232). The question is therefore not if companies should conduct measurements, but rather how they should handle the PM process in order to obtain the desired and necessary control of the supply chain. Studies have shown that the top four areas companies strive for in terms of supply chain performance are; increased customer service levels, reduced total supply chain costs, reduced order cycle times, and reduced inventory costs (Harrison and New, 2002). Customer service affects customer satisfaction and ultimately how successful a company is at its marketplace (Grant *et al*., 2006). The concept is, however, a complex term that can be defined as something which originates from a set of variables from the marketing mix (product, promotion, price, and place) and from when the service is provided (pre-transaction, transaction, and post-transaction) (Ballou, 2006). Customer service is perceived by the customer, but is a result of one or several suppliers’ performance. Measuring customer service is thus an important process that involves more than one actor of the supply chain.

Close cooperation between members in the supply chain is necessary if it is going to perform at the desired level of customer service, which so far is not at an adequate level (Sandberg, 2005). Recent research shows that there is a gap between the expected and performed level of customer service in dyads of Swedish companies and their most important suppliers (Forslund, 2007). It is obvious that merely a pronounced customer satisfaction focus is not enough to obtain the required level of customer service in the supply chain. In order to improve the level, the performance of activities creating customer service needs to be measured between supply chain partners. A number of authors (Maskell, 1991; Faw-

cett and Cooper, 1998; Gunasekaran *et al*, 2001; Griffis *et al*. 2004; Hofman, 2004; Schmitz and Platts 2004; Christopher, 2005) have all emphasized the importance of performance measurement between supply chain partners. Gunasekaran *et al*. (2001) mean that even though many organizations have realized the potential of supply chain measurements, they simultaneously seem to lack knowledge in developing effective measurement processes and metrics, as well as the knowledge of the necessity for these components in achieving a successful PM process and a well performing supply chain.

The concept of performance measurement goes beyond the traditional management accounting boundaries, and therefore constitutes a valuable integrating framework both academically and practically (Otley, 1999). The PM process can be viewed in several ways. Some researchers within the field of performance measurement define the process in just a few sentences, while others attempt to define it by illustrating the process as a model consisting of several activities (Forslund, 2007). An example of a PM process model consists of five activities, starting with definition of performance metrics followed by measurement procedures, analyses, comprehensive evaluations, and ending with the improvement process (Tian *et al*., 2003). This model has been further discussed among researchers, and its steps developed into a model of the PM process (figure 1.1).

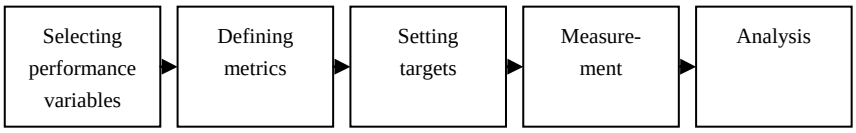

Figure 1.1 The PM process (Adapted from Forslund, 2007)

Selecting performance variables is about looking at the managers´ strategic choices and out of these creating concrete formulations. When companies within the supply chain conduct the activity of defining metrics, they need to consider what the specifics of its operations are being reflected (Lohman *et al*., 2004). This step can be carried out in several different ways and it is often done by customers and suppliers separately in the supply chain (Keebler *et al*., 1999; Forslund, 2004). Examples of important metrics often used by manufacturing companies, in order to evaluate the level of customer service, are order completeness, transit time and on-time delivery (Grant *et al*., 2006). On-time delivery can be defined as the share of orders delivered on time. The existing supply chain focus creates a central role for jointly developed metrics on which all parties agree (Forslund, 2007).

Target setting has to do with the need for the PM process to have formulated targets (Basu, 2001). This activity is not simple, but ideally members of a supply chain should come together and mutually set the targets in order for the targets to reflect customer's needs (Holmberg, 2000). When it comes to the activity of measurement, unsuitable measurement systems in a supply chain may be the cause of several problems (Byrne and Markham, 1991; Keebler *et al*., 1999). It is

often not clear which member in a supply chain should conduct the measurements, but a mutually conducted measurement activity between supply chain members is recommended according to researchers such as Stank *et al*. (1999) and Holmberg (2000). The last activity in the PM process is the one of analysis. During this step it is important that the variance from targets are analyzed and that the metrics used are reviewed. The results from this analysis should be used as input in the process of monitoring and seeking continuous improvement (Forslund, 2007).

1.2 Problem discussion

Companies have become more customer-focused, and metrics for the measurement of customer service levels in all areas of business have emerged. However, the metrics have not been integrated throughout the supply chain, even though there is a need for externally focused performance metrics from both customers´ and suppliers´ perspectives (Basu, 2001). Most studies conducted within the field of performance measurement have an intra-organizational perspective (Forslund, 2007). A dyad, or a pair of a supplier and a customer, is a building brick in the supply chain (e.g. Schmitz and Platts, 2004). Schmitz and Platts (2004) claim that there exists no comprehensive theory on dyadic performance measurement, and that research concerning how companies handle the PM process within supplier-customer dyads, is scarce. A study with its focus on the process of measuring the customer service performance metric on-time delivery in dyadic relationships is consequently of importance. From now on the PM process concerning on-time delivery is referred to as the PM process, with the exception of the research questions and purposes in the thesis.

According to Grant *et al*. (2006), there is a danger that the actors may view the PM process from different perspectives. Reasons for this may be that they differ in what they would like the process to offer, i.e. have different objectives for the PM process. Another reason could be that the actors do not have the same priority for the process of measuring customer service. Furthermore, the partners in a dyad may use different inputs in their PM processes caused by unavailable information or reluctance to use accessible information. Whatever the reasons, the end result might be that the PM process is not mutually conducted between the partners in a dyad. The positive effects of shared and mutually agreed processes in a supply chain consequently may not be reached.

The PM process and its activities may be handled in different ways depending on who carries out the process (Gunasekaran *et al*., 2004). Only when the characteristics of the handling of the PM process have been mapped out and can be illustrated may the work of managing it begin. The handling of each activity in the PM process gives it its characteristics, and depending on how the dyad partners handle the process, the results may differ, even though they both focus on on-time delivery. However, how is it ever going to be possible for companies to make any improvements within the PM process, if they do not know what char-

acterizes the different ways of handling it, and understand its consequences? When the PM process is handled in different ways it could lead to several negative consequences.

The thesis has a focus on the consequences of differing ways of handling the PM process. Examples of such consequences could be problems with communications within the dyad. When the dyad partners handle the PM process in differing ways they get different results (Grant *et al.*, 2006). This could lead to a lack of trust, which in turn makes closer collaboration between supply chain partners harder to attain, according to Lambert *et al.* (1996). Both actors in the dyad could experience problems of extra work for planners, when incorrect information caused by different ways of handling the PM process needs to be dealt with. Furthermore, when the partners´ PM process results differ, and the customer's result shows a low performance by the supplier, the supplier could experience uncertainty concerning where problems in their processes are caused. Often the supplier relies instead on his own on-time delivery figures, not unnaturally showing higher levels of performance. The customer could quite probably expect to experience a loss of income due to lost sales caused by stock-outs, even though he has tried to communicate his PM process results to the supplier; a supplier who in turn has not reacted, since his own PM process results show high on-time delivery performance.

If managers of manufacturing companies in a dyad could create a mutually agreed PM process, undesirable consequences caused by differing ways of handling the process might be eliminated. As a result, meetings between representatives from the companies could lead to agreements on actions for improvements of on-time delivery performance. As can be concluded, the potential negative consequences arising from the differing ways of handling the PM process are several for the parties involved, whereas research within the area is difficult to find. This implies that this thesis, with its focus on the handling of the PM process, and the consequences of differing ways of handling the process for different actors in a dyad, and in the dyad itself, is of relevance. If more knowledge about the different ways of handling the process existed, and the subsequent consequences for the different actors better known, then the managers ought to be able to come to an agreement on a mutually agreed-upon PM process.

The **phenomena studied** in this thesis are the characteristics in the handling of the PM process in supplier-customer dyads. The **problem addressed** in the study is that companies do not know what consequences differing ways of handling the PM process may result in. This problem is related to the few research studies within the area that have been conducted. The problem is also practical, since there is unawareness among partners in the dyads about the PM process characteristics and what consequences the different ways of handling the PM process may result in (figure 1.2). This leads to weak incentives for improvement.

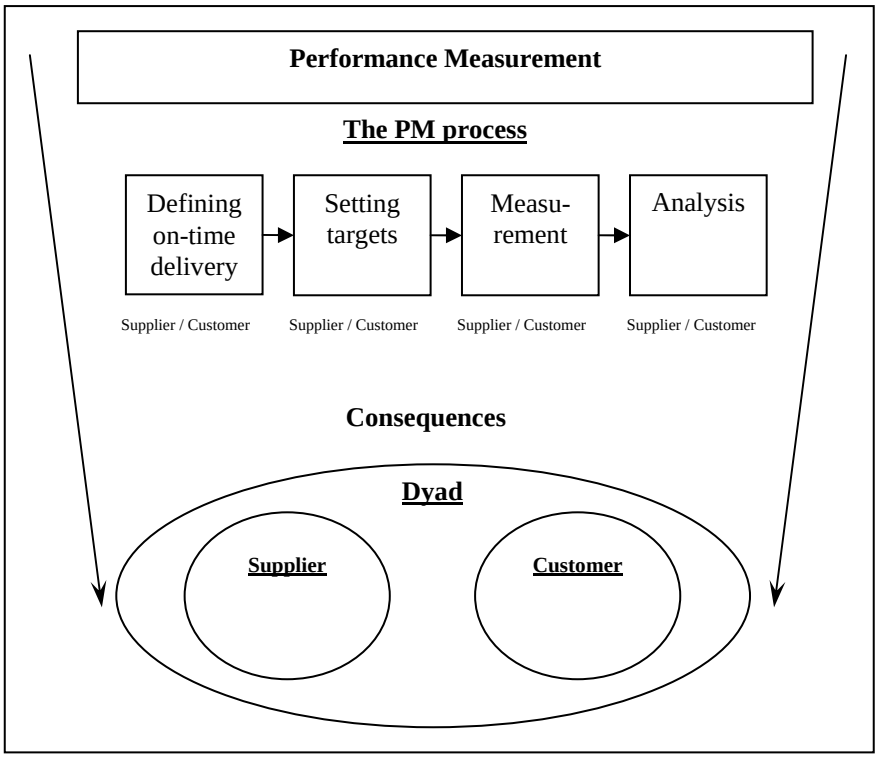

Figure 1.2 The studied phenomena and problem in the thesis

1.3 Research questions and purposes

The following paragraphs are the research questions of this study;

- What are the characteristics in the handling of the PM process concerning on-time delivery in supplier-customer dyads?
- What consequences do differing ways of handling the PM process concerning on-time delivery result in for the suppliers, the customers, and the dyads, respectively?

The first research purpose of the thesis is to identify the characteristics in the handling of the PM process concerning on-time delivery, in supplier-customer dyads. An identification of the characteristics in the handling of the PM process in dyads is needed in order to illustrate its activities. By such means it is possible to identify if and where the processes differ between the dyad partners. This motivates the importance of **the second research purpose**, which is to explore what consequences differing ways of handling the PM process concerning on-time delivery result in for suppliers, customers, and dyads, respectively.

1.4 Outline of the thesis

Chapter One
The first chapter gives a presentation of the background and relevance of the research areas of supplier-customer dyads, the PM process and its characteristics, as well as the focus on on-time delivery. Furthermore, the research questions and purposes of the thesis are presented.

Chapter Two
This chapter includes the methodological discussion and the considerations taken during the research study.

Chapter Three
The third chapter presents the theoretical framework which is used in the conducted analysis chapter of the thesis.

Chapter Four
The fourth chapter constitutes the analytical part, in which the presented empirical and theoretical data is used in a deeper discussion of the research areas of the thesis in order to answer the research questions and by so doing fulfill the purpose of the thesis.

Chapter Five
Chapter five summarizes briefly the conclusions of the thesis. Furthermore, a discussion concerning further research is presented, as well as reflections over the study.

Appendix I
The empirical case descriptions are included in appendix, due to the extensive amount of text.

Appendix II & III
Questionnaire 1 and Questionnaire 2

2. Method

This thesis is written in a monographic structure and in this chapter the methodology used is described. This includes the assumptions I have made, and the choices I have selected. The chapter contains three larger sections which are; scientific approach, the research process, and quality of the research.

There exist a number of different schools of thought as to what the most appropriate method is in various situations, and what constitutes good research. The most important point however is that the chosen method matches the research purposes and the matter at hand.

2.1 Scientific approach

Mentzer and Kahn (1995) state that positivism aims to explain and predict reality, where reality is considered to be objective, tangible, and fragmentable. Mentzer and Kahn (1995) also say that the positivistic paradigm has for a long time been the dominating one used in research conducted within the logistical field e.g. Churchman (1968). My thesis is also mainly within the positivistic paradigm, and my research is foremost influenced by the systems approach of thinking. Arlbjörn and Halldorsson (2002) argue that a conflict exists between using positivism with the systems approach, since positivism is a view that the whole equals the sum of its parts. However, I look at positivism as the view that reality may be objectively observed, and Kihlén (2005) argues that if the researcher does so, it is possible to combine positivism with the systems approach.

This thesis was written mostly within the positivistic approach. Even though I was meeting the respondents in person when I was interviewing them about the characteristics of their PM process and its consequences, I was trying to depict reality in an objective way. During my research I was however making choices that were subjective, for example the choices made about the selection of literature used to form the theoretical framework.

2.1.1 Research approach

According to Ejvegård (1993), different approaches to research often are described from one extreme to another, i.e. from reality seen as an indication of human intentions, to reality seen as a structure regulated by laws. Gradually scientists have begun to base their research on a multi-disciplinary approach, which

can even be recommended. Examples of research approaches are; the analytical approach, the actors approach, and the systems approach.

Wallén (1993) declares that the analytical approach has often been used in natural science where researchers believe reality to be objective, stable and independent of the observer. Explanations are uttered as cause-effect relationships, and objects may be abridged to parts in which the sum of the parts equals the total. If something cannot be tested empirically it is outside the scope of the analytical approach, whereas true knowledge can be verified or refuted. Furthermore, logic and mathematics, as well as objective measurements, are important when explaining something. According to Arbnor and Bjerke (1994) theories from the analytical research are considered as universal, absolute and accessible. Shortcomings of this approach are that the human is seen as an object, and that there is a reluctance to deal with the meaning of feelings and experiences that cannot be objectively measured.

Wallén (1993) says that supporters of the actors approach believe reality consists of many different views that to some extent are shared by a smaller or larger group of individuals, and that this shared view is a part of reality made objective. Individuals interact with perceived reality, and therefore are affected by it, and affect it. Individuals are a part of reality, and shape the future in their interaction. New knowledge and understanding is created when perceiving reality in the same way as the studied subject. In understanding the social system, interpretation of actions and contextual dimensions are important factors. Knowledge produced from the actors approach is dependent on individuals, unlike the analytical approach. The actors approach is commonly used in complex situations where individuals act and where the objective is a deeper understanding of the phenomena. Shortcomings of this approach are that it only creates subjective knowledge which is of limited use when a general problem is being studied. Furthermore, it has been criticized for erasing the limit between scientific research and other methods of gaining knowledge.

According to Wallén (1993) the systems approach is a reaction to the analytical approach, and supporters say that the systems approach is more suitable for dealing with more complex situations. A system is for example the solar system which comprises a group of interacting objects that could be a part of a larger system. The systems approach and the analytical approach share perspectives like rationalism and a desire for measurability. Additionally, both approaches differentiate between objective reality and a model of the same objective reality. The major difference between the two is that in the systems approach cause-effect relationships are replaced by interchange and control, and that the researcher influences reality. Arbnor and Bjerke (1994), mean that the supporters of the systems approach have the ambition of describing, explaining, and understanding how a system acts under different internal and external conditions. General theories created are usually analogies, in contrast to the ones created by the analytical approach. Knowledge generated in the systems approach is not considered as absolute, and it is instead related to one or numerous types of systems or specific sys-

tem phenomena. Wallén (1993) claims that the systems approach is of use when processes are followed over time, when cause and effect are found on other system levels, or are separated in time or space. The systems approach has been criticized of being too imprecise, and that its supporters too easily let go of the basic principles of good research. The researcher's wish to cover everything risks resulting in an approach that is meaningless and logically empty.

My thesis is mainly written within the systems approach. The predominant argument for this is that a supply chain and the processes it consists of is a complex area to investigate. Furthermore, my purpose is to identify the characteristics of the PM process, and also to explore what the consequences of the differing ways of handling the PM process results would be. Since the PM process may be looked at as a system, used by human beings operating in a social context, the actors approach could be seen as a complementary approach. I did not, however, include social or behavioral perspectives in the thesis.

2.2 The research process

This thesis is a part of the research project; "Responsiva mätsystem för logistiksystem", financed by Vinnova. Besides myself, my tutors, Assistant Professor Helena Forslund and Professor Patrik Jonsson, also participated. There were several companies involved in the project (table 2.2), and all the participating companies are manufacturing organizations, but they differ in size and location. They are however, all a part of dyads of supplying and buying companies and are dependent upon the performance of the other part in the supply chain. A great number of the managers of the participating companies are very up-to-date and enthusiastic to work with the PM process and its different activities. In several cases the companies in a supplier-customer dyad had not yet begun their cooperation within the studied area, even though they considered each other to constitute the most important dyad in their supply chains.

Professors Helena Forslund and Patrik Jonsson applied for financing of a research project when Vinnova announced that they were interested in financing such projects. In the fall of 2005 the project "Responsiva mätsystem för logistiksystem" was launched, and I started to study the literature written within the area of performance management and measurement. The case studies began by the interviewing leading persons in the companies involved. The research area was within supply chain management and the PM process. From earlier knowledge of research conducted by Helena Forslund and Patrik Jonsson, together with literature within the area, but also through the interest of the companies involved, the field of scope was explored. The objectives of the project were to investigate how the PM process was handled in companies in the dyadic relationship of supplying and buying companies - who were involved in the PM process? - what metrics were used? - and how were the measurements conducted and used? From the introductory stage of interviewing all the companies I focused my research on the characteristics in the handling of the PM process. Furthermore, I focused

my research on the consequences due to the differing ways of handling the PM process, both for the supplier, the customer, and the dyad itself.

Since there has been more research conducted within the area of the thesis´ first purpose, this research has been conducted in a more deductive manner than for the second purpose. As argued for in chapter 1, there is limited research within the areas of consequences of differing ways of handling the PM process in a supplier-customer dyad. This has resulted in an approach based on a systematic combination based on a more inductive logic. This approach is characterized by "a continuous movement between an empirical world and a model world." (Dubois and Gadde, 2002, pp. 554). By first gathering both the theoretical and empirical data about the first research question in the thesis I was able to identify characteristics of the PM process. From that a starting point was created for the theoretical and empirical information needed for the fulfillment of the second purpose of the thesis. The systematic combining grounded in a more inductive logic was the reason for the structure in this thesis, where the chapter on method needed to precede the chapter on theory in order to understand the theory and structure of the chapter.

As a summary, the conclusions in this thesis were thereby drawn by case studies of the characteristics in the handling of the PM process in seven supplier-customer dyads, and the consequences of the differing ways of handling the process.

2.2.1 Generating a theoretical framework

When creating the theoretical framework in chapter 3, articles found in the database ELIN was used. ELIN (Electronic Library Information Navigator) is a database that integrates data from several publishers, databases and e-print open archives. In order to find relevant articles in the development of 3.1 and 3.2, keywords such as; *PM process, performance management, performance measurement, dyadic relationship, performance metrics, on-time delivery* were used. The reason why the theoretical framework is based on articles of both areas of performance measurement and management is that no distinct boundary line exists between the two areas, and/or what the studied measurement process should be called or contain. The chosen definition of the PM process and its contents in this thesis, however, includes the significant activities suggested in the articles found.

The search for relevant scientific articles in the creation of 3.3 was based on a search in ELIN with keywords such as; *process-sharing, mutual supply chain processes, supply chain partnership*. The reason why articles concerning process-sharing and mutual processes were used was that theory on the PM process advocates that this process should be mutually conducted and decided-upon. The reason why the theory on supply chain partnerships was used was the fact that all the participating dyad partners in this research considered each other to have a close dyadic partnership, and to be of strategic importance to one another. After reviewing the articles found it was evident that little empirical research on a sha-

red, mutually conducted and agreed-upon PM process in dyadic relationships had ever been carried out. The employed articles were, however, all case studies, and all executed with a focus on the manufacturing sector; therefore they are used in the theory chapter in order to examine the different researchers' positions on what constitutes a shared and mutually decided process in a partnership. Furthermore, theory on positive consequences of being in a mutually conducted and agreed-upon process in a supply chain partnership was used, since no research on the negative consequences of not having enough shared processes in a partnership was found.

2.2.2 Research strategy

There are a number of different strategies that can be used in research. Yin (2003) presents strategies such as case studies, experimental surveys, history and archival analyses. As mentioned, in this thesis I chose to conduct case studies of all of the seven dyads regarding the PM process and their consequences. I considered this research strategy to be the most suitable because of wanting to study the research areas in depth. An experimental research strategy was not suitable in my research because of the lack of control. Furthermore, Merriam (1994) states that an experimental investigation tries to reduce the number of variables in order to test the effect of the influence of other variables, whereas the case study strives to incorporate as many variables as possible so as to provide a richer description. Archival analysis was not an alternative strategy in this thesis either, since it lacks the direct access to current sources of data that I wanted, even though it can provide data from yet other sources. The history research method was not chosen as a research strategy, as I wanted to make direct observations and conduct interviews in my collection of empirical data. Lastly, I did not use the survey method since I thought that it did not offer the opportunity to give as rich a description of the studied phenomena as I wanted to attain.

A summary by Yin (2003), (table 2.1) illustrates the different research strategies and relevant situations.

Strategy	**Form of research question**	**Requires control over behavioral events**	**Focuses on contemporary events**
Experiment	How? why?	Yes	Yes
Survey	Who? what? where? how many? how much?	No	Yes
Archival analysis	Who? what? where? how many? how much?	No	Yes/No
History	How? why?	No	No
Case study	How? why?	No	Yes

Table 2.1 Research strategies (Yin, 2003)

According to Mentzer and Kahn (1995), research within the area of logistics has been influenced by the economic, and in parts behavioral, approach to scientific study. The latter has resulted in a focus on the psychological and sociological perspectives of the situations, and has primarily been obtained by interviews, questionnaires, and case studies, which also supported my choice of conducting case studies as my research strategy.

Case study

According to Yin (2003), the case study strategy is often the most appropriate method to use when having research questions of the type “how?” and “why?”, which is the case in my thesis.

The case studies described in this thesis were mainly based on qualitative data. Miles and Huberman (1994) state that qualitative data is the source of well-grounded and deep descriptions, as well as rich explanations of processes in specific contexts. However, quantitative data was also of some interest during my research process. The reason for this was, for example, so that it could be established that consequences caused by differing ways of handling the PM process in a dyad really existed.

There are three types of studies according to Yin (2003), which are; explanatory, exploratory, and descriptive. Furthermore, he says that there are no clear distinctions between the different research strategies. In this thesis I raise research questions that are descriptive and explanatory in their nature. I tried to identify the handling of the PM process in supplier-customer dyads by illustrating the process´ characteristics. Furthermore, I explore the consequences experienced due to the different ways of handling the PM process for the supplier, the customer, and the dyad, respectively. Yin (2003) states that a case study is more appropriate for an exploratory research, although he also says that case studies are suitable in the phases of explanatory, descriptive and explanative.

Merriam (1994) claims that a case study has an overall objective to give a deeper understanding of phenomena by providing a rich description based on a holistic view. She adds that a case study method is focused on what happens and on processes, instead of on-the-spot accounts of reality. Furthermore, the case study is a suitable method to choose when the research is focused on a specific and well-defined system. Merriam (1994) also points out that the use of this research strategy does not try to find accurate or true interpretation of the findings, but to avoid inaccurate conclusions and, in the end, attain the best and most convincing interpretation. Yin (2003) claims that the cases in a study should be chosen because they fulfill a special purpose. Yin (2003) also points out the use of historical data in a case study. Even though I did not execute an historical study, some historical aspects were accounted for when the need arose, because I needed to be able to describe and explore the problem area as thoroughly as possible.

2.2.3 Selection of companies and interviewees

The companies participating in this thesis are Swedish manufacturing companies and their most important supplier or customer in the supply chain. The reason for this is that their PM processes, and the result of their handling, play a vital role in the companies' communication and the dyads performance.

As mentioned before, this thesis did not focus on one particular size of company. That way discrepancy in the PM process between companies of different sizes could be detected. Furthermore, this study was looking into the logistics PM process in dyadic business processes, i.e. in the inter-linked purchasing, order-to-delivery and distribution processes of manufacturing companies. The method of selecting companies could be described as "convenience sampling", where the companies were consciously selected on the basis of access to the company and, by that, empirical data (Bass, 1990).

The case studies and the project as a whole consist of seven dyads of supplying and purchasing companies, whose characteristics are described in table 2.2. The companies are all manufacturing companies. Some of them are localized around Växjö and the others are localized in other parts of Sweden. Some of the local companies S1, C2, C4 and S7 are involved in the network of Teknikcentrum, which is an organization in Växjö. These companies were introduced to the project and were immediately interested in participating. Then the companies contacted their most important supplier or customer in their supply chain to cooperate with. The contact with the three other dyads came from the network NPL - the Network for Process Management. It was companies C3, C5, S6 and C6 who wanted to participate with a strategically important supplier or customer in the project.

Dyad in question	**Partner** (Supplier/Customer)	**Turnover** (Million Euro)	**Employees**	**Industry**
Dyad 1	S1	45	320	Automotive industry
	C1	104	500	Automotive industry
Dyad 2	S2	2.5	20	Mechanical engineering industry
	C2	18	140	Air treatment industry
Dyad 3	S3	20	100	Aerospace and turbo machinery industry
	C3	800	4000	Aerospace engine components industry
Dyad 4	S4	2	30	Pump manufacturing industry
	C4	52	240	Dishwasher industry
Dyad 5	S5	40	300	Aircraft systems industry
	C5	580	4500	Military aircraft industry
Dyad 6	S6	700	1500	Steam turbine industry
	C6	100	450	Steam turbine industry
Dyad 7	S7	90	470	Aluminum components industry
	C7	100	300	Transport vehicle components industry

Table 2.2 The characteristics of the participating companies

All of the participating companies in this research project were very interested in and committed to the PM process. Furthermore, they were all willing to give the researchers in this project full access to their companies and the information their personnel had. The companies were also diverse enough in areas such as size, maturity, so that the researchers involved in the project could be sure of finding out if there were differences between the companies due to these perspectives. By sending out the questionnaires, the interviewees in the case study companies were chosen by themselves as being those with the greatest knowledge about the

PM process. The interviewees had positions in the companies such as CEOs, are responsible for purchasing and supplier relationships.

2.2.4 Interviews

When collecting primary data a range of different methods can be used. Interviews can be everything from open to totally structured. Lekvall and Wahlbin (2001) say that the main advantage of personal interviews, in comparison to other methods of questioning, is that there is an almost unlimited possibility for posing different types of questions. The use of personal interviews when collecting primary data, according to Arbnor and Bjerke (1994), is often employed when using the systems approach in research. Furthermore, they state that when collecting secondary data, researchers often use articles, internal documents from the company, which according to Yin (2003) and Merriam (1994) is also the common method when conducting a case study.

The main methods used when collecting the data I needed about the characteristics in the handling of the PM process, its consequences, was through personal and telephone interviews. On some occasions the interviews were supplemented with contacts via e-mail.

For the interviews, a thorough questionnaire was developed for each of the two research questions (appendix II and III). These were tested on some colleagues and industrial representatives in order to establish if questions could be misinterpreted, or if there were any questions that were missing, in order to supply me with the information I wanted. The interviews were conducted in order to collect data for the first research question, and also worked as a satisfactory platform in the creation of the second questionnaire for data collection for the second research question. In order for the interviewees to be well prepared, before being interviewed the questionnaires were sent out in advance. After the interviews were conducted they were all transcribed and sent to the interviewees to check, in order to avoid mistakes such as my noting information or quotes incorrectly.

In tables 2.3 to 2.9 the interviewees' positions, dates of the interviews, and the kind of interview are presented. Each personal interview was conducted during a half day's or a full day's visit to at least one of the companies in the studied dyad partnership. If both companies in a dyad were not visited, the people involved in the dyad visited their partner. The interviews at the companies were conducted by Helena Forslund and me, Patrik Jonsson and me, or in the presence of all three researchers. At the personal interviews questionnaire 1 was used. During some of the interviews a group of respondents were interviewed at the same time. At some cases an interview started with all interviewees present, and then a personal interview with each person was conducted.

In the personal interviews questionnaire 1 was used, with the exception of one occasion when the logistics manager at customer company C1 was interviewed in person with the use of questionnaire 2. This was done in order for me to en-

sure that questionnaire 2 could not be misinterpreted, and it gave me the necessary information I needed in order to fulfill the second purpose of the thesis. Each date for the telephone interviews was agreed-upon by email weeks before the actual interview, and during this initial contact questionnaire 2 was sent out as well. The telephone interviews lasted between 45 and 70 minutes.

Supplier/Customer	Interviewee's position	Date	Kind of interview;	
			Personal	Telephone
S1	Logistics manager	25 Nov 05	X	
S1	Customer responsible for C1	27 Jan 06	X	
S1	Logistics, and responsible for flow of production to C1	14 Feb 07		X
S1	Customer responsible for C1	15 Feb 07		X
S1	Factory manager	27 Feb 07		X
C1	Strategic sourcing manager	27 Jan 06	X	
C1	Logistics manager	27 Jan 06	X	
C1	Global logistics manager	27 Jan 06	X	
C1	Logistics manager	12 Dec 06	X	
C1	Material planner	13 Feb 07		X
C1	Strategic sourcing manager	27 Feb 07		X
C1	Supply manager	27 Feb 07		X
C1	Global logistics manager	1 Mar 07		X

Table 2.3 Characteristics of the conducted interviews in dyad 1

Supplier/Customer	Interviewee's position	Date	Kind of interview;	
			Personal	Telephone
S2	Production manager	21 Nov 05	X	
S2	Production manager	7 Feb 07		X
C2	Production manager	21 Nov 05	X	
C2	Purchasing manager	21 Nov 05	X	
C2	Purchaser	21 Nov 05	X	
C2	Purchaser	21 Nov 05	X	
C2	Production manager	7 Feb 07		X
C2	Purchaser	8 Feb 07		X
C2	Purchasing manager	26 Feb 07		X

Table 2.4 Characteristics of the conducted interviews in dyad 2

Supplier/Customer	Interviewee's position	Date	Kind of interview; Personal	Telephone
S3	Production technician	26 Jan 07	X	
S3	Production technician	9 Feb 07		X
C3	Research and development	16 Dec 05	X	
C3	Logistics development and general planning manager	16 Dec 05	X	
C3	Operations logistics and planning manager	16 Dec 05	X	
C3	Material planner	16 Dec 05	X	
C3	Material planner manager	16 Dec 05	X	
C3	Quality and process manager	15 Feb 07		X
C3	Material planner	16 Feb 07		X
C3	Material planner	16 Feb 07		X
C3	Material planner manager	28 Feb 07		X
C3	Logistics development and general planning manager	2 Mar 07		X
C3	Operations logistics and planning manager	8 Mar 07		X

Table 2.5 Characteristics of the conducted interviews in dyad 3

Company Supplier/Customer	Interviewee's position	Date	Kind of interview; Personal	Telephone
S4	CEO	22 Nov 05	X	
S4	CEO	1 Mar 07		X
C4	ERP manager	22 Nov 05	X	
C4	ERP manager	13 Feb 07		X
C4	Purchasing manager	27 Mar 07		X
C4	Logistics and supply manager	Refer to the interviewees above		
C4	Production manager	Refer to the interviewees above		

Table 2.6 Characteristics of the conducted interviews in dyad 4

Company Supplier/Customer	Interviewee's position	Date	Kind of interview; Personal	Telephone
S5	Program office manager	13 Dec 05	X	
S5	Program office manager	2 Mar 07		X
S5	Product division manager	6 Mar 07		X
S5	Quality manager	Refer to the interviewees above		
C5	Purchasing and supplier development manager	13 Dec 05	X	
C5	Project leader	13 Dec 05	X	
C5	Material and quality manager	13 Dec 05	X	
C5	Spare parts purchasing manager	13 Dec 05	X	
C5	Logistics manager	7 Feb 07		X
C5	Material and quality manager	2007-02-09		X
C5	Project leader	9 Feb 07		X
C5	Material quality controller	13 Feb 07		X
C5	Purchasing and supplier development manager	2 Mar 07		X
C5	Quality and certification	Refer to the interviewees above		

Table 2.7 Characteristics of the conducted interviews in dyad 5

Company Supplier/Customer	Interviewee's position	Date	Kind of interview; Personal	Telephone
Within same group of companies	IT manager	11 May 06	X	
Within same group of companies	Goods' receptionist	11 May 06	X	
Within same group of companies	Purchasing manager	11 May 06	X	
S6	Factory manager	11 May 06	X	
S6	Factory manager	16 Feb 07		X
S6	Factory manager	16 Feb 07		X
C6	Purchasing manager	11 May 06	X	
C6	Logistics manager	11 May 06	X	
C6	Purchasing manager	19 Feb 07		X
C6	Logistics manager	19 Feb 07		X
C6	Former logistics manager	28 Feb 07		X
C6	Sales and project leader manager	22 Mar 07		X

Table 2.8 Characteristics of the conducted interviews in dyad 6

Company Supplier/Customer	Interviewee's position	Date	Kind of interview; Personal	Telephone
S7	Factory manager	14 Dec 05	X	
S7	Logistics manager	14 Dec 05	X	
S7	Factory manager	28 Feb 07		X
S7	Logistics manager	13 Feb 07		X
C7	Purchaser, and responsible for supplier development	14 Dec 05	X	

Table 2.9 Characteristics of the conducted interviews in dyad 7

At some companies participating in the research project, only one person was interviewed. The reason for this was that both the interviewee in question and I thought that he/she was the most suitable person to answer questions. When asked to recommend any other suitable person within their company they stated that no one else was knowledgeable enough to answer the questions in the questionnaires. This had to do with the size of the company and/or the limited number of personnel familiar with the research topics.

In some cases people that have not been interviewed have been contacted and sent their questionnaires. These people have however stated that they are not knowledgeable enough, and have referred the questionnaires to others within the company that had already been interviewed, or to persons who were shortly to be interviewed. When no further candidates within a company had been recommended for an interview, the process of searching for additional interviewees has come to an end.

2.2.5 Analyzing the data

Pattern-matching is, according to Yin (2003), the most desirable method to use in a case study analysis. Eisenhardt (1989) states that analyzing data is the essence of creating theory from case studies, but that it also constitutes the most difficult and the least codified part of the process. She identifies several key features of analyzing, one of which is the within-case analysis which has been developed in order to handle the volume of data associated with a case study. The within-case analysis includes detailed case study write-ups for each case in order to become more familiar with each one, and may cause unique patterns to emerge before the researcher begins to generalize patterns across cases.

Eisenhardt (1989) recommends that the within-case analysis is combined with a cross-case look for patterns. This can be done with different tactics, such as choosing categories and then trying to search for "within-group" similarities coupled with intergroup differences; alternatively it can be done by selecting pairs of cases and then listing similarities and differences between each pair. A third way of combining a within-case study and a cross-case search for patterns is to divide the data by data source. The main idea behind the cross-case searching strategy is to compel the researcher to go beyond initial impressions and capture the novel findings which may be present in the collected data.

The aim of the analysis of the first research question was to identify the characteristics of the PM process in a supplier-customer dyad by illustrating its activities. In the "within-case" analysis of the first research question, a deductive approach was used (figure 2.1) with a comparison between a theoretical framework presented in chapter 3 and collected empirical data (appendix I). By exploring the characteristics of the whole PM process I wished to identify how the activities of the process were handled, and how much they were shared between the partners. By this I was able to establish if there existed any differences between the PM processes of the dyad partners which would motivate the importance of the second research question.

The second research question needed to be analyzed in several parts (figure 2.1), since its purpose was to explore both the differing ways of handling the PM process and the consequences of this for the supplier, the customer, and the dyad respectively. As mentioned previously, I used a systematic combination approach for the analysis of the second research question. This approach can be described as "a nonlinear, path-dependent process of combining efforts with the ultimate purpose of matching theory and reality." (Dubois and Gadde, 2002, pp. 556). In the approach, Dubois and Gadde (2002) state that the theoretical framework, the empirical data, and the case study analysis evolve simultaneously. By going back and forth between the different parts throughout the research process, the researcher is able to expand his/her understanding of both the theory and the empirical phenomena; the reason for this is the fact that theory cannot be understood without empirical observation, and vice versa (Dubois and Gadde, 2002).
The first part of the analysis of the second research question was conducted with the use of a within-case analysis of the collected empirical data, without comparison of any theory for each of the studied supplier-customer dyadic partnerships (figure 2.1). This was done with the purpose of finding patterns in the consequences of each of the differing ways of handling the PM process in the studied dyads so encountered.

By discovering patterns in the empirical data it was possible to disclose relevant theoretical areas to be further investigated, and by that the theoretical framework of 3.3 was developed. The creation of a theoretical framework about mutually conducted and agreed-upon supply chain processes and consequences made a cross-case analysis of the second research question, with a comparison between empirical data and presented theory, possible (figure 2.1). First a cross-case

analysis of the encountered consequences in the studied dyadic relationships in question was conducted. Next, a cross-case analysis of the consequences experienced as a result of differing ways of handling the PM process in general was conducted. This division of analyses was done in order to get as complete an explanation of the second research question as possible. On the whole the analysis of the second research question resulted in an explanation of what consequences could result from the differing ways of handling the PM process as encountered by suppliers, customers, and dyads, respectively (figure 2.1).

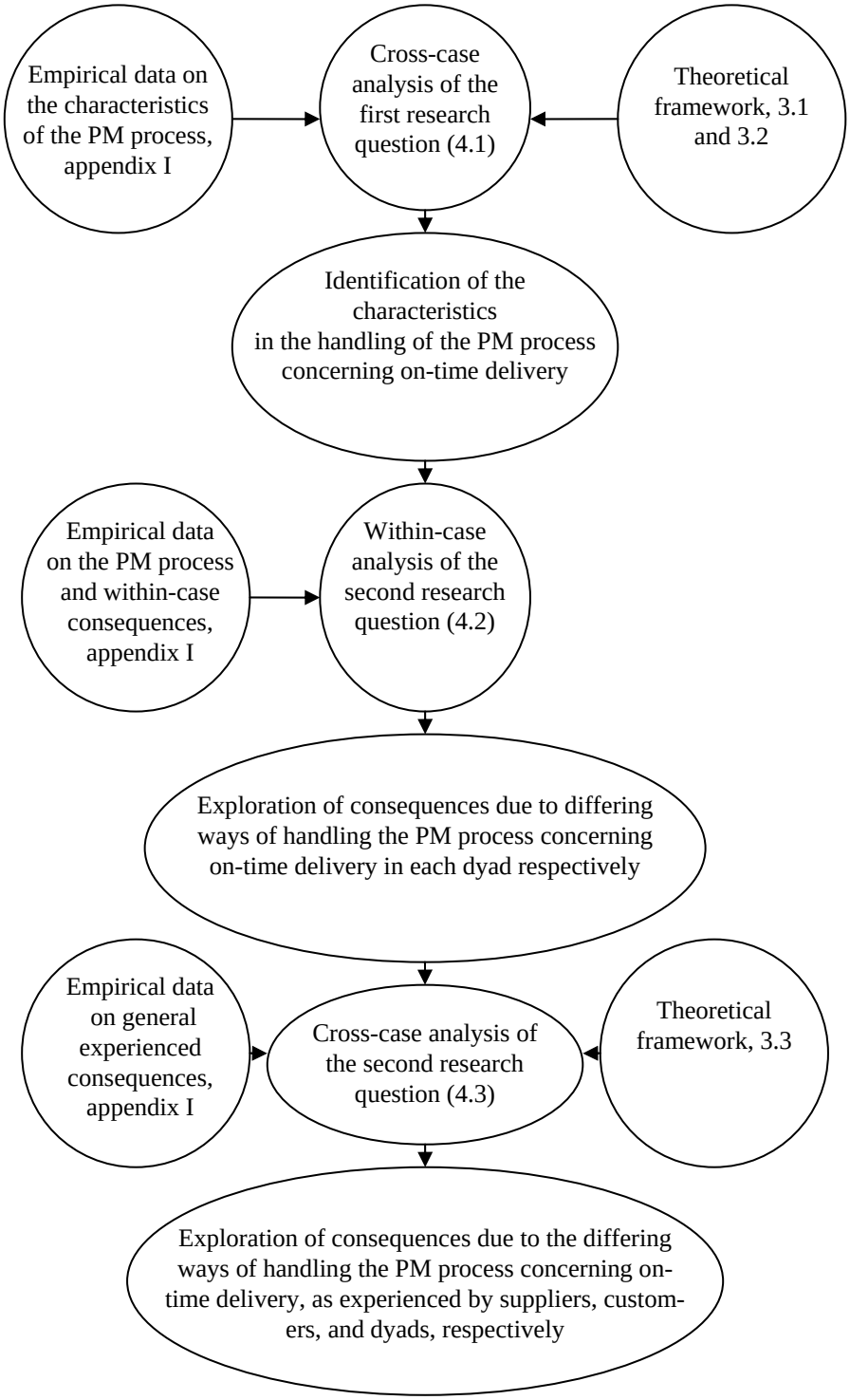

Figure 2.1 Steps in analysis

2.3 Quality of the research

According to Yin (2003) there are four tests in order to judge the quality of a case study, which are; construct validity, internal validity, external validity, and reliability.

2.3.1 Construct validity

Construct validity refers to the degree to which conclusions can legitimately be made from the workings in a study of the theoretical constructs on which those workings were based. According to Yin (2003), construct validity is reached through establishing accurate operational measures for the concept being studied, and this part is stressed as the greatest problem for case analysts to handle. In order to be able to meet the demands for construct validity, the researcher must choose the specific types of change to study, and demonstrate that the selected measures represent the changes investigated.

By interviewing several persons at most of the companies, using the same questionnaires and letting the interviewees read my transcripts, I ensured construct validity. I also established a chain of evidence by building the study around the same dimensions of content and context, and using these throughout the research process. Furthermore, I had extremely good access to the companies, since the managers were interested in the researched areas too, and were thus eager to participate in the project. More so, all the interviewees stated that on-time delivery is an essential customer delivery service metric, by which I was able to confirm the relevancy and the importance of focusing on on-time delivery in this thesis.

When collecting the data I interviewed persons at positions that enabled them to be knowledgeable within the researched area, which ensured construct validity. More so, the interviewee was able to discuss the questions asked for as long as they wanted to, since no time limit was used. The interviewee was also asked to recommend other suitable persons within their company until all relevant persons had been interviewed, which also strengthened construct validity.

2.3.2 Internal validity

Yin (2003) says that internal validity is to establish a causal relationship in which specific conditions are shown to be followed by other conditions, as distinguished from false relationships. Only explanatory and causal studies can be tested for internal validity.

In the collection of empirical data for the second research question the personal interviews were conducted over the phone in order to explore what the consequences of differing ways of handling the PM process in dyads could result in. This meant that the interviewees were asked to answer on the basis of their own

experiences, which could have constituted a weakness in the quality of the research, since people's perception is a subjective interpretation of situations. However, in the data collection of these case studies, I interviewed all suitable persons according to the participating companies themselves. That, plus the circumstance that the interviewees from the individual company all had the same view, and that a clear pattern could be found in the answers, ensured internal validity. More so, since Helena Forslund, Patrik Jonsson and I were present at the interviews for the first purpose, and we all shared opinion of the causal relationship in the collected data, which also strengthened the internal validity of this thesis. Furthermore, the participants in two workshops about the research project held at Vaxjo University on 9 September 2006 and 17 October 2007 had all encountered the same consequences caused by differing ways of handling the PM process, as the interviewees had experienced.

2.3.3 External validity

External validity is claimed by Yin (2003) to be the establishment of the area to which the results of the research can be generalized, and this is recognized as one of the biggest problems in conducting case studies. Weick (1979) however, states that learning from case studies conditioned by the environment context ought to be considered as a strength rather than a weakness, since in-depth case studies are the best research strategy in order to understand the interaction between a phenomenon and its context.

By finding similar and clear patterns in the answers of the interviewees at the participating companies regarding the case studies, my thesis also has external validity. Furthermore, I separated in-depth data collections for the two research questions. Therefore I was first able to confirm the relevancy of the second research question from the data collection of the first research question; once done, I could then commence collecting the empirical data for the second research question.

2.3.4 Reliability

According to Yin (2003), reliability is defined as the demonstration that the processes of the research, for example data collection, can be repeated, and with the same results as the original outcome. It could be described as the ability of the method to avoid the influence of chance.

In order to ensure reliability in my research I used questionnaires in the collection of data and let the interviewees expand the discussions whenever they wanted to. I also let the respondents read and comment on my transcripts of the interviews, and by doing so I avoided any misinterpretations I may have made. More so, since Helena Forslund, Patrik Jonsson and I had the same perception of the answers from the interviewees during our personal meetings. Furthermore, I got similar answers from the interviewed persons at the same company. This made the data collected trustworthy, which made the results of the study reliable.

When using the systematic combination research approach, as I used in the analysis of the second research question, a “combining of sources of evidence, while shifting between analysis and interpretation” was conducted (Dubois and Gadde, 2002, pp. 556). By that a triangulation, as Yin (2003) advocates in case studies, was attained. He argues that the advantage of triangulation is the development of converging lines of investigation.

3. Theoretical framework

This initial part of the theory chapter (section 3.1) is presented in order to position this study towards research within the area conducted earlier. The following section of the chapter (section 3.2) is presented in order to form a theoretical framework for the analysis of the first research question, that concerning the characteristics in the handling of the PM process in the studied supplier-customer dyads. This includes the area of performance measurement and different perspectives of the concept, and especially the perspective of performance measurement of on-time delivery as a process.

In section 3.3 theory is presented in order to form a theoretical framework for the analysis of the second research question, that concerning the consequences of the handling of the PM process in the studied dyads. Chapter 3 ends with a presentation (section 3.4) of a conceptual model (figure 3.2) developed from chapter 1.

3.1 Performance measurement models

Supply chain management focuses on having an end-customer perspective, creating value through cooperation in business processes, and the optimization of the entire supply chain (Christopher, 2005). Performance management and measurement are parts of supply chain management (Daugherty *et al*., 1996) and the areas provide, both practically and academically, an integrated framework with the focus on improving performance (Mwita, 2000). This thesis focuses on performance measurement. The boarder line separating the concepts of performance measurement and performance management are not always clear, but in this thesis the concepts are considered according to the definition by researchers such as Lebas, (1995) and Bititci *et al*. (1997). These researchers advocate that performance measurement is a part of performance management, and that the latter creates the context for the previous. Furthermore, the researchers claim that an efficient performance measurement system is a critical component for an efficient and effective performance management system (Bititci *et al*., 1997).

Considerable research has been carried out concerning performance measurement within the field of accounting, but researchers state that these performance measurement systems “fail to support the current business objectives and do not enable continuous improvement” (Bititci *et al*., 1997, pp. 523). Furthermore, researchers claim that there are shortcomings in accounting practices with respect to the objectivities in measuring performance in manufacturing companies (e.g. Johnson and Kaplan, 1987; Kaplan, 1990; Neely, 1993). As a result, the devel-

opment of performance measurement systems has received considerable focus due to the dissatisfaction of the backward-looking accounting-based systems that existed during the late 1970s and 1980s (Bourne *et al*., 2000). The performance measurement systems since developed have a more balanced view between internal and external metrics, and between financial and non-financial metrics, in order to overcome the criticisms of the earlier systems (Bourne *et al*., 2000).

There are several performance measurement solutions such as corporate performance management (CPM), enterprise performance management (EPM), business performance management (BPM). But even though performance measurement is an area which interests many managers, few companies have a well functioning performance measurement system (Barrett, 2004). Because of this, research on how to successfully design and implement a performance measurement system in a company has now been carried out (Bourne, *et al*., 2000), and several models on how to handle measurement of performance have since been developed (Mwita, 2000).

In a study recently carried out 70% of the respondents thought that their supply chain strategy was important or very important in achieving competitive advantage. Yet 50% of the companies had at best limited formal means of measuring their supply chain performances, and 19% had in fact no means of formal assessment at all. From this one can conclude that many organizations have little knowledge when it comes to understanding and measuring their supply chain performances. “You are what you measure.”(Harrison and New, 2002, pp. 267); but just because a company conducts measurements of a process does not necessarily make it improved (Harrison and New, 2002).

A structured approach to measuring gives the company a tool in applying a continuous and effective process in the measurement of its supply chain performance (Hofman, 2004). There are several models that can be used when one wishes to map the activities within performance measurement in a structured manner. Models often used are, for example, the BSC model (Balanced Score Card), the GSCF model (Global Supply Chain Forum), and the SCOR model (Supply Chain Operations Reference) (Lemoine, 2006). GSCF consist of three elements, these being; customer service management, order fulfillment, and reverse logistics (Lemoine, 2006). The SCOR model is a process reference model which was developed and endorsed by the Supply Chain Council – an independent non-profit cooperation. The SCOR model is a cross-functional framework that is based on the five separate management processes in order to describe, measure and evaluate the supply chain, these being; plan, source, make, deliver, and return. The framework can be used with different levels of detail, and provides an understanding of the supply chain; it therefore presents a common language for effective communication between members. Furthermore, the SCOR model contains a measuring system that has been developed in order for companies who have adopted the model to be able to measure their performance, and thereby manage it (SCC, 2005).

The academic literature within performance measurement has been criticized for having too much focus on financial aspects, with the perspective of looking only inside the organization on cost and budget variance data. BSC literature has widened the perspective of performance measurement by looking at the performance of internal processes, and is the ground for learning and innovation as well as providing external views on the business for customers and shareholders. Multiple stakeholders are a concept that has been more focused upon during the last decade. Companies can no longer only concentrate on shareholders and their customers; instead they must also consider such groups as employees and suppliers, and incorporate these in their performance measurement system too (Bourne *et al*., 2003). Implementing BSC in order to improve the performance measurement system can have a positive impact performance, such as on sales, gross profit, and net profit. However, when comparing companies that have made this implementation and had positive results with ones that have not implemented BSC, there is not always a significant difference in their development in performance (Neely *et al*., 2004).

Another example of a structured approach to performance measurement is the one introduced by Hofman (2004), who claimed that the measurement of performance is the key to excellence for many companies. However, there are considerable challenges when designing and implementing an effective performance measurement program. According to research there are seven recommendations in the handling of these challenges, and these are; to follow four universal principles to design an effective metrics portfolio, to address organizational resistance proactively, to beware of tunnel vision, to analyze the root cause, to use a top-down approach to analysis, to measure enablers, to measure within the context of a performance-management program (Hofman, 2004).

The model presented by Mentzer and Konrad (1991) is another example of a structured approach to the performance measurement. This model introduced a thirteen step process model for the development of logistics performance measurement and analysis. The model attempted to incorporate the criteria for good performance metrics, a performance analysis system, and five steps for developing performance metrics. Furthermore, the presented model's content of data collection, variance analysis and forecasting, provided the information necessary for scrutinizing and more appropriate performance metrics in any logistics area (Mentzer and Konrad, 1991).

Basu (2001) recommended a six-step cycle in order to implement and sustain the advantages of a performance management system. These six steps are; the establishment of metrics, monitoring systems, global sales and operations planning, performance improvement initiative, structured assessment and awards, and knowledge sharing. The cycle strives to develop performance metrics that correspond with both local objectives as well as company strategy. The metrics that are developed need to include the extended supply chain in order to obtain the advantages of a collaborative economy, and each metric must have a target for both the present year and the "Best in class" for the future. The effectiveness of

the monitoring systems in covering data collection, validation and reporting, is crucial in the success of the established metrics. There is a need for the company to review its performance and operating plans over a two-year planning horizon. By having meetings where selected suppliers and customers participate, a two-way communication is established. External assessment and awards are acting as a motivation prize to maintain performance progress, but there needs to be a self-assessment process within the collaborative supply chain that includes all perspectives of the network. Sharing knowledge and best practices in collaborative supply chains are vital drivers for sustainable performance management. This includes continuous communication between the involved parties, learning about best practice from other networks, and internal and external benchmarking to assess targets and gaps (Basu, 2001).

Yet another example of a structured view in developing a framework for measurement of a companies´ performance was presented by Otley (1999) and contained five key areas that needed to be addressed;
"1. What are the key objectives that are central to the organization's overall future success, and how does the organisation go about evaluating its achievement for each of these objectives?
2.What strategies and plans has the organization adopted, and what are the processes and activities that it has decided will be required for it to successfully implement these? How does it assess and measure the performance of these activities?
3.What level of performance does the organization need to achieve in each of the areas defined in the above two questions, and how does it go about setting appropriate performance targets for them?
4.What rewards will managers (and other employees) gain by achieving these performance targets (or, conversely, what penalties will they suffer by failing to achieve them)?
5.What are the information flows (feedback and feed-forward loops) that are necessary to enable the organization to learn from its experiences, and to adapt its current behavior in the light of those experiences?" (Otley, 1999, pp. 365)

To sum up, performance measurement may be viewed from several different perspectives, hence be structured in several models with different designs. Yet another example of a structured framework is to view performance measurement as a process (Forslund and Jonsson, 2007), a framework that will be used in this thesis. As mentioned, performance measurement is a part of supply chain management (Daugherty *et al*., 1996), a concept which presumes that the partners in a supply chain work together in order to enhance the supply chain's overall performance (Christopher, 2005). By this, the perspective of a model which views performance measurement as an inter-organizational shared process, which should be jointly conducted and agreed on between dyad partners (Forslund and Jonsson, 2007), becomes vital.

3.2 The PM process

When measuring performance it is not enough to just conduct the measurement, the process needs to lead to insight and the insight to action (Bourne *et al*., 2003), as in the PM process. The PM process consists of the five activities of; selecting performance variables, defining metrics, target setting, measurement and analysis (Forslund, 2007). In this study, the delivery service metric on-time delivery is in focus, which results in the activity of selecting performance variables becoming unnecessary (figure 3.1).

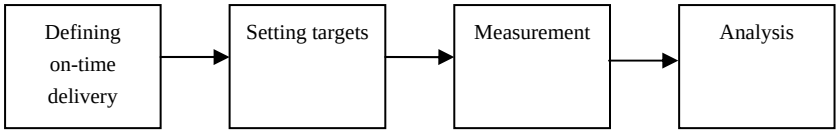

Figure 3.1 The PM process (Adapted from Forslund, 2007)

3.2.1 Defining metrics

The first activity in the PM process is defining metrics; in this thesis defining on-time delivery. The metrics chosen need in general to reflect the detailed characteristics of a company's operations (Lohman *et al*., 2004), but otherwise the activity may be carried out in a number of ways (Keebler *et al*., 1999). In a supply chain the supplier and its customer often define metrics in different ways, and the activity is often carried out by the partners separately (Forslund, 2004). The activity needs to be mutually conducted and coordinated between the partners in a dyad in order to achieve common definitions of performance metrics. The use of a "metrics dictionary", which for example states the name of the performance metric, its objective and scope, its target and unit of measure, its frequency and its owner, may ensure that the partners in a supply chain have shared and clearly defined metrics (Lohman *et al*., 2004).

When implementing the PM process within a company, or between supply chain partners, one of the main hurdles is defining performance metrics, according to Brewer and Speh (2001). Performance measurement and metrics have a significant role in companies when setting objectives, evaluating performance and determining future courses of action (Gunasekaran, *et al*., 2004). In order to achieve superior performance levels in the supply chain, companies need to measure various metrics. It is vital to measure performance if a company wants to attain superiority and a genuine platform on which to build a top quality supply chain capabilities. Companies today often measure certain aspects of the supply chain performance, but they also understand the necessity for a measurement program that is more extensive and mutually conducted between supply chain partners. The reasons, according to Hofman (2004), why this is so complicated to create, are twofold. First, there are too many metrics that can be used; one of the biggest

obstacles to manage is figuring out which metrics give the partners the biggest advantages and information, for the least investment of resources. Second, the best practice and application technologies that facilitate performance, so called enablers, makes the measuring process more complicated. The focus needs to be on a fewer numbers of metrics that provide the most balanced view of end-to-end supply chain performance.

In changing times, when boundaries between companies dissolve, and effective supply chain management requires close collaboration and mutual responsibility between supply chain members, the selection and definition of the most appropriate metrics is essential. Griffis *et al*. (2004) advocate that the metrics defined should not only be characterized as reliable and easy to observe, but also easy to communicate, and consistent with the specific needs of the organizations involved. Instead of using ambiguous metrics, or no metrics at all, specific, clearly defined performance metrics will improve the overall accuracy and effectiveness of a shared and mutually agreed-upon measurement process (Soltani *et al*., 2004). The problem is that the vast number of metrics presented and suggested in literature as being able to answer all of a companies' information needs; these constitute a challenge, since the risk of choosing an inappropriate metric for a particular need increases (Griffis *et al*., 2004). From this it can be concluded that the activity of defining metrics in the PM process is a complex process (Forslund and Jonsson, 2007).

On-time delivery

With the trend which began already in the 1990s, that of focusing upon managing time the delivery service metric, "on-time delivery" has emerged as a vital metric for evaluating companies' performances (Fawcett and Cooper, 1998). On-time delivery, delivery accuracy, length of lead-time and inventory service level, are frequently used delivery service variables (Stock and Lambert, 2001); on-time delivery, together with the aspects of delivery time, delivery flexibility and delivery stability are all aspects of lead time (Mattsson, 2004).

In order for companies to become closer and work together with improvements in their level of customers service in their supply chain, they need to be able to speak the same language, and through that intend the same thing in their communications (Griffis *et al*., 2004). Thus they need a mutually conducted and agreed-upon PM process that is characterized as having a shared and clearly defined delivery service metric, i.e. on-time delivery. The activity of defining metrics in the PM process can however be defined and carried out in different ways. Therefore the activity may well consist of different parts, such as the definition of the activity that Lohman *et al.* (2004) propose. This contains; name, objective, scope, target, definition, unit of measure, frequency, data source, owner, drivers and comments.

Another example of a definition of the content in the activity of defining metrics in the PM process, is the division according to the four parts of; measurement object, time unit, measurement point, and the day to compare with (Forslund and

Jonsson, 2007). Defining the delivery service metric "on-time delivery" is difficult, and the definition contains four different issues that need to be handled. The first issue involves the measurement object, which could be the number of orders, order lines or individual items. The second issue concerns the time unit for the order considered as being on time. This could vary between the correct day, the correct week or within a limited time window, e.g. +1/-2 days. The third issue looks at the measurement point, i.e. where along the supply chain the order is regarded as being delivered e.g. after the goods have been packed and made available for delivery, accessible at the customer's plant, or after the customer's goods reception or quality control. The fourth issue involves the comparison date contra the actual delivery date, in order to decide if it is on time or not. The comparison date could, for example, be the requested or acknowledged date (Forslund and Jonsson, 2007).

3.2.2 Target setting

The importance of the activity of target setting derives from the necessity for every performance metrics to have a formulated target (Basu, 2001). The targets should be clear and specific, rather than ambiguous or, even worse, non-existent, in order for the performance measurement process to be accurate and efficient. Furthermore, according to Simons (2000), the targets need to be quantitative and connected to time frames. On-time delivery performance targets may be formulated as averages, i.e. the same target level for all parties, or as specific targets, i.e. unique targets for a particular customer or supplier. The use of an average target usually means that the activity of setting targets is not a jointly conducted and decided process between the partners in a dyad; Forslund and Jonsson (2007) state that the supply chain partners should use a contract in order to ensure that targets are set in a shared manner.

The process of carrying out the activity of target setting is however often complex, and problems such as defining suitable performance targets, the lack of targets, the subjectivity and vagueness of targets, and also the lack of consistency between targets, has been reported (Soltani *et al*., 2004). Since a supplier's performance is often a subjective interpretation of customers needs, the partners in a supply chain need to cooperate when setting targets, in order for the targets to be accurate in their reflection of customers' demands (Holmberg, 2000). Earlier research has shown that as many as 88% of the dyads between suppliers and customers cooperate when carrying out the activity of setting targets for delivery service (Forslund, 2007).

3.2.3 Measurement

Even though the benefits of shared measurement activity between supply chain partners are often stressed in, for example, research on Collaborative Planning, Forecasting and Replenishment, there is a lack of dyadic measurement (Keebler *et al*., 1999). It is not manifested which company in a dyad that should conduct the activity of measurement – both or one of the partners. In a study of dyads,

88% of the customer companies were involved in the measurement of the supplier companies´ performed delivery service (Forslund, 2007). When conducting measurements of the on-time delivery metric, the activity relies heavily on the information and communication technology which allow efficient collection, communication and the processing of data related to performance (Forslund and Jonsson, 2007).

The activity, of measuring on-time delivery, consists of four issues and these are; report generation, measurement frequencies, performance outcome and performance feedback. The measurement reports generation could be conducted directly from the transaction system e.g. the ERP system, or indirectly by extracting data from the ERP system and transferring it into Excel and creating the reports there. The measurement of on-time delivery could also be conducted with different measurement frequencies e.g. daily, weekly or monthly, and the frequency thus chosen limits the frequency of doing the analyses. As with target figures, the performance outcome could be either the average for all customers or suppliers, or specific for specific customers or suppliers. Measurement data can be communicated between the dyad partners in a more (e.g. via a web portal) or less (e.g. via telephone or in meetings) shared manner. Performance feedback could be carried out by the other dyad partner and be commented on, adjusted and approved, in order to confirm common agreements of actual performance outcome prior to initiating the next activity, which is the analysis (Forslund and Jonsson, 2007).

3.2.4 Analysis

The results of the analysis activity should be used in continuous improvement processes and proactive decision making in a close dyad, as well as when monitoring and following up past performances in on-time delivery in order to make reactive decisions. Consequently, an accurately handled measurement activity is a necessity for a proper analysis activity of the PM process, according to Forslund and Jonsson (2007). It is important to analyze the deviation from targets that have been set, and thereafter critically reassess the metrics used. The analysis should evaluate the performance output in relation to the companies´ and supply chain's strategies, but it could also widen the scope and supervise the PM process and its position in a company, the dyad and the supply chain. That implies that the activity of analysis supports the selection of performance variables for future measurements (Mentzer and Konrad, 1991).

According to Caplice and Sheffi (1995) there is a lack of shared, systematic analyses and reviewing of performance management systems, and it is not always clear which supply chain partner is responsible for the activity (Simons, 2000). In order for dyads to carry out a thorough analysis, the rest of the activities in the PM process have to be properly conducted. There is a need for feedback concerning performance within companies, as well as between partners in the dyads, in order for correct decision-making in supply chains. The activity of analysis has issues of form (e.g. meetings and discussions) and issues of what it results in (e.g. input to continuous improvement, trend analysis, and analysis deviation

from targets); both these can be the effect of different approaches to the activity of analysis. How much the analysis is characterized as a mutually conducted and agreed-upon activity in dyads depends on the extent of supply chain perspective in the continuous improvement of the processes in the dyads (Forslund and Jonsson, 2007).

3.2.5 Summary

As a summary of the characteristics in the handling the PM process discussed earlier, and the characteristics concerning on-time delivery, the following table is presented (Table 3.1).

Defining on-time delivery	MO Measurement object - orders, order line or items TU Time unit - day, week or window MP Measurement point - after packaging, available for delivery, accessible at customer - or after goods reception and control CD Comparison date - requested or acknowledged date
Target setting	Target figures - average or specific
Measurement	MF Measurement frequency - day, week or month RG Report generation - directly or indirectly PO Performance outcome - average or specific PF Performance feedback - none, commented, adjusted, accepted
Analysis	FA Forms of analysis - meetings, discussions RA Result of analysis – input to continuous improvement, trend analysis, analysis of deviation from targets

Table 3.1 Characteristics in the handling of the PM process concerning on-time delivery (Adapted from Forslund and Jonsson, 2007)

3.3 Shared supply chain processes and consequences

This part of the theory chapter is presented in order to form a theoretical basis for the cross-case analysis of the consequences of differing ways of handing the PM process (section 4.3). The presented theory is on shared and mutually conducted supply chain processes and the consequences of shared supply chain processes. The reason why this theory is used is the lack of research on the consequences of having a shared PM process, and more so, the lack of research on the consequences of not sharing a supply chain process enough.

3.3.1 Shared supply chain processes

van Donk and van der Vaart (2004) state that in relationships that involve selling or buying strategic products, the companies need to strive for a close, sharing

collaborative partnership. A supply chain partnership can be described as; "a tailored business relationship based on mutual trust, openness, shared risk and shared rewards that yield a competitive advantage, resulting in business performance greater than would be achieved by the firms individually." (Lambert *et al*., 1996, pp. 2).

According to Forslund and Jonsson (2007), a mutually conducted PM process in a supply chain partnership is a process that is characterized as conducted jointly between the involved companies, a process on whose content and execution both partners have agreed. Supply chain performance is improved if the suppliers and their customers share the same supply chain processes (Frolich and Westbrook, 2002). However, according to Hofman (2004), supply chain partners often have difficulty in realizing the importance of a shared PM process, even though an appropriate and effective performance measurement system, according to earlier conducted research, may create several positive consequences, such as higher product quality (Soltani *et al*., 2004). One of the major reasons for the difficulties in realizing the importance of a mutually conducted supply chain measurement process is the problem of identifying a performance metric that both partners find equally important and relevant to measure (e.g. Brewer and Speh, 2001; Hofman, 2004).

3.3.2 Consequences of shared supply chain processes

In the lean supply chains of today the focus is often on lowering costs and improving customer service (Brewer and Speh, 2000). According to Lambert *et al*. (1996), consequences, and thereby benefits, of being in supply chain partnership where processes are shared and mutually agreed-upon include areas such as: asset/cost efficiencies, customer service improvements, marketing advantages, profit stability/growth, joint planning, communication, risk/reward sharing, trust and commitment, contract style, and financial investment.

Asset/cost efficiencies. A prominent reason to share a supply chain process is the potential for cost reduction. Mutually conducted processes may lead to reductions in transportation costs, handling costs, packaging costs, information costs, or product costs, and may increase managerial efficiencies. Furthermore, a sharing and close partnership may enhance the development and use of specialized equipment and processes between the partners, without the fear of technology transfer to a competitor (Lambert *et al*., 1996).

Customer service. A close partnership with jointly conducted and agreed-upon supply chain processes can often lead to benefits of service improvements for customers in the form of reduced inventory, shorter cycle times and more timely and accurate information (Lambert *et al*., 1996). Close collaboration is a prerequisite for efficient sharing and utilization of information between supply chain partners, according to researchers (e.g. Groznik and Trkman, 2006; Trkman *et al*., 2007); in order to ensure on-time deliveries and competitive products in the

supply chains, business processes need to be carried out in a shared manner (Smits *et al*., 2006).

Marketing advantages. According to Lambert *et al*. (1996), a more process-sharing relationship between supply chain partners can lead to positive consequences of enhancement of a company's marketing, of easing entry into new markets, and of providing better access to technology and innovation.

Profit stability/growth. A distinctive driver for mutually conducted and decided-upon processes in a supply chain partnership is the potential for profit. Close and collaborative relationships lead to long-term volume commitments, reduced variability in sales, and common use of assets and other improvements that enhance profitability. Lambert *et al*. (1996) say that in today's competitive environment with leaner organizations, it is necessary to form closer relationships with key partners in the supply chain in order to maintain a prominent position and to grow. Not having a close and collaborative partnership with suitable supply chain members squanders the chance of competitive advantages.

Joint planning. Joint planning can range from the sharing of existing plans to the joint development of strategic objectives. Joint planning creates both flexibility and strength to a relationship, and constitutes a positive consequence of a shared process partnership (Lambert *et al*., 1996). The members of the supply chain partnership need to be involved in the planning, and be committed to common goals, but it is of great importance to identify what processes to share with one's supply chain partner, and to what extent of sharing and management should be applied for each process (Cooper *et al*., 1997). Close and collaborative partnerships have been recommended as having the potential to enhance planning and problem solving, and to improve knowledge of the process by the participants according to Reed (1999).

Gunasekaran *et al*, (2004), state that a shared PM process will create benefits by way of improvements in cross-functional and intra-organizational processes, and improve planning and control. However, this requires that both partners in the supply chain partnership take part in the development and planning of the PM process. Thus, companies should come together to discuss the measurement and improvement of supply chain management performance (Gunasekaran *et al*., 2004).

Communication. In a mutually conducted process between supply chain members it is necessary for the partners to be able to communicate and speak the same language (Griffis *et al*., 2004). That is why a consequence of a successful process-sharing partnership is effective communication on both a day-to-day and a non-routine basis. The success of a relationship is dependent on communication situations, on regularly scheduled meetings and on phone calls; and of course the willingness to share news as well as communication systems such as EDI (Lambert *et al*., 1996). The biggest transformation in collaborative economy has been created by the Internet and other information systems. According to Basu

(2001), the Internet has enabled transparent information to be shared between partners. Communication links should be across all levels of the companies; the partnerships become stronger the more breadth and depth that exists in communication patterns (Lambert *et al*., 1996). Hofman (2004) claims that the companies that perform at a high level are increasing their information flow throughout their supply chains, which enable a high visibility throughout the chains. The better a company's´ visibility is, the better its perfect-order fulfillment is, but many companies commonly try to cover up the problem of poor visibility by providing unnecessary resources to internal activities.

Risk/reward sharing. Lambert *et al*, (1996) claim that a positive consequence of a close process-sharing supply chain partnership is that not only are the risks and costs of the partnership shared, but so too are the rewards and benefits.

Trust and commitment. "No partnership can exist without trust and commitment. Loyalty to each other, loyalty to the partnership, and a long-term focus are all elements of trust and commitment." (Lambert *et al*., 1996, pp. 11). It is hard to precisely define trust and commitment, but usually partners intuitively know if it exists in a relationship, and no true partner should, for example, have to worry constantly about being replaced (Lambert *et al*., 1996). van Donk and van der Vaart (2004) say that uncertainty increases the need for more close and sharing partnerships and Childerhouse and Towill (2002) state that a consequence of having a close supply chain relationship is that the partners know more of how they can reduce the sources of uncertainty in the partnership.

Contract style. The type of contract that is used in a process-sharing partnership reveals a lot about the relationship. Usually, the strongest and closest relationships have the shortest and least specific agreements, or no written agreement at all. In some cases it only takes a document outlining the basic philosophy and vision for the partnership in order for the partners to be truly close, according to Lambert *et al*, (1996).

Financial investment. Sharing financial resources across the relationship is often a benefit of a close and sharing supply chain partnership, and this also strengthens the relationship. Sharing assets, having joint investments in technology, exchanges of key personnel, and mutually conducted research and development, are all activities that indicate a high financial interdependency, which then leads to a stronger and closer partnership (Lambert *et al*., 1996).

According to Lambert *et al*., (1996), an appropriately established and effectively managed close and collaborative supply chain partnership will improve the performance for both the relationship and the partners involved. Process improvements, profit incentive, and the enhancement of competitive advantage are all likely outcomes of an effective and collaborative supply chain relationship. The outcome will however vary depending on the drivers which initially motivated the development of the partnership. It should be remembered; even though partnerships are necessary and beneficial, building and further developing sharing

partnerships takes time and resources (Lambert *et al*., 1996). Additionally, other obstacles to a process-sharing partnership may exist, such as issues of company size and power structure. Small suppliers and customers do not usually want to become close and share processes with larger and more powerful companies in the supply chain, according to Bates and Slack (1998). Furthermore, the power structure is not easily influenced in a relationship, and powerful customers such as the ones in the automotive industries, often force their suppliers to obedience, which does not benefit the creation of close, process-sharing partnerships (van Donk and van der Vaart, 2004).

3.4 Conceptual model

The focus of the thesis is on the characteristics in the handling of the PM process in a dyadic relationship, and the consequences that can be caused by differing ways of handling the process for the supplier, the customer, and the dyad itself. The unit of analysis, and the studied phenomena in the study, are illustrated in figure 3.2, where the content of the activities in the PM process is characterized. The circles represent the consequences that differing ways of handling the PM process result in. No consequences are listed in the figure 3.2, since no earlier research on the consequences caused by differing ways of handling the PM process has been encountered. Additionally, no research on such consequences, grouped according to a supplier, customer and dyad, has been found.

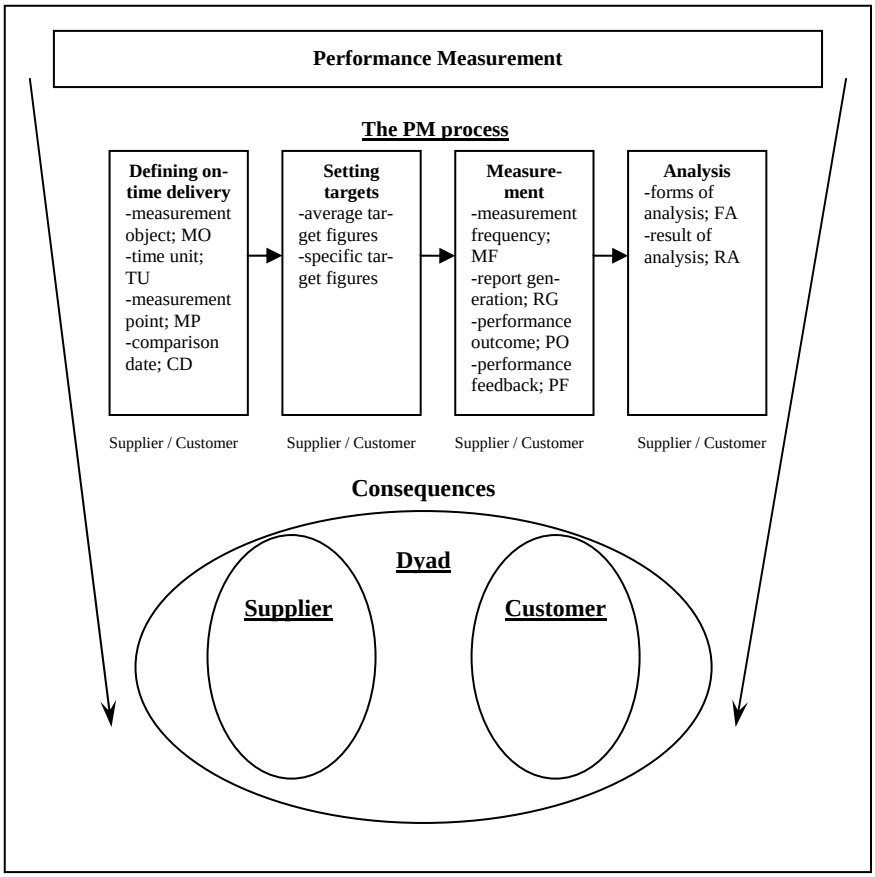

Figure 3.2 Conceptual model

4. Analysis

In this chapter, an analysis of the theoretical and empirical data is conducted in order to answer the research questions of the thesis, and thereby fulfill the purposes of the thesis. This is done in accordance with the structure described earlier in the method chapter (figure 2.1).

The first research question is about identifying the characteristics in the handling of the PM process concerning on-time delivery in companies in a supplier-customer dyad. From the empirical data (appendix I) a summary of the characteristics (table 4.1) is presented. A further cross-case analysis (section 4.1) is conducted with a structured discussion of presented theory and empirical data in a cross-case analysis of the seven participating dyads. In order to make the text easier to follow, key findings are in bold. Additionally, each activity in the PM process is analyzed and ends with conclusions, marked as bold and italics, about whether or not the PM process is a mutually conducted and agreed-upon process, as it ought to be.

The second research question is about exploring what consequences differing ways of handling the PM process concerning on-time delivery result in for the customer, the supplier, and the dyad, respectively. This purpose requires a deeper within-case analysis of the differing ways of handling the PM process in each dyad and the consequences (section 4.2), as well as a cross-case analysis (section 4.3).

In section 4.2 each activity of the PM process for each dyad is explored and discussed. This is followed by an exploration and a within-case analysis of the consequences experienced by each partner in each dyad. In section 4.3 all the encountered consequences originating from differing ways of handling the PM process in the studied dyads are analyzed, and compared to the theory presented in chapter 3 in a cross-case analysis. This is done in order to find patterns for exploring what consequences differing ways of handling the PM process result in. The kind of analysis is carried out for both the dyads in focus, as well as for consequences in general for a supplier, a customer and a dyad. A division of the consequences experienced by the studied research participants, and the ones they perceive in general, is done in order to get as complete an exploration of the research question as possible.

In the final part of the analysis chapter (section 4.4) a concluding analysis is presented which summarizes the findings of the thesis.

4.1 Cross-case analysis concerning the characteristics of the PM process

By studying a summary of the characteristics of the ways the studied companies handle the PM process (table 4.1) it is possible to get a structured view of the activities performed by the partners in the dyads, which also was one of the reasons of applying this kind of research into performance measurement.

In table 4.1, the activity of defining on-time delivery is presented with its content of measurement object; i.e. what time unit is being used, at what point the company conducts its measurement, and with what day the measurement is being compared. The activity of setting targets is represented by information concerning the actual target, and whether the studied partners use average on-time delivery targets for all their suppliers, or if they have specific targets for the studied partner in the dyad. In the measurement activity the frequency of the conducted on-time delivery measurements is displayed, as well as the way reports are being generated. If an on-time delivery report is generated in a direct manner, the report is produced by the company's ERP system without any additional steps; this is the opposite of using measurement data from the ERP system and then creating a report manually. Furthermore, the measurement activity presents an outcome on the on-time delivery performance, the figure itself, and information about whether it is an average figure for all the suppliers/customers, or a specific figure for the actual partner in the studied dyad. Lastly, the measurement activity also shows whether or not the studied companies provide feedback to their dyad partner about the on-time delivery figures. The analysis activity in the PM process is presented by information about what forms of analysis the studied dyad partners use, and what kind of continuous improvement activities the dyad employs.

PM process	Defining on-time delivery	Target setting	Measurement	Analysis
Dyad 1 **S1 & C1**	S1: MO - order line TU - day -1 MP - accessible CD - requested day C1: MO - order line TU - day -3/+1 MP - accepted goods CD - requested day	S1: - average, 100% C1: - average, 98%	S1: MF - weekly RG - indirect PO - average 96% PF - none C1: MF - monthly RG - direct PO - specific >97% PF - none	S1/C1: FA - meetings RA - none
Dyad 2 **S2 & C2**	S2: MO - order line TU - day MP - dispatched CD - ack. day C2: MO - order line TU - day +/-1 MP - accepted goods CD - requested day	S2: - specific, 100% C2: - specific, 100%	S2: MF - monthly RG - direct PO - specific 100% PF - accepted C2: MF - monthly RG - indirect PO - none PF - none	S2/C2: FA - meetings when problems occur RA - none
Dyad 3 **S3 & C3**	S3: no measurement is conducted C3: no measurement is conducted	S3: no measurement is conducted C3: no measurement is conducted	S3: no measurement is conducted C3: no measurement is conducted	S3/C3: FA - frequent discussions RA - none
Dyad 4 **S4 & C4**	S4: MO - order TU - day MP - accessible CD - ack. day C4: MO - order line TU - day +/-2 MP - accepted goods CD - ack. day	S4: - average, 96% C4: - average, 95%	S4: MF - monthly RG - direct PO - average 98% PF - none C4: MF - monthly RG - direct PO - average 90%. PF - none	S4/C4: FA - discussions when problems occur RA - none
Dyad 5 **S5 & C5**	S5: MO - order line TU - day MP - accessible CD - requested day C5: MO - order line TU - +/-1 week MP: accepted goods CD - requested day	S5: - specific, 100% C5: - specific, 95%	S5: MF - monthly RG - indirect PO - specific 100% PF - none C5: MF - monthly RG - indirect PO - specific 95% PF - not accepted	S5/C5: FA - annual meetings RA - trend analyses initiate actions at the supplier
Dyad 6 **S6 & C6**	S6: MO - order TU - day MP - accessible CD - ack. day C6: no measurement is conducted	S6: - specific, 95% C6: - specific, 90%	S6: MF - weekly RG - indirect PO - specific 90% (8 weeks) and 96% (6 months) PF - common server, accepted C6: MF - none RG - none PO - none PF - common server, accepted	S6/C6: FA - monthly meetings RA - common analysis and actions, six sigma projects
Dyad 7 **S7 & C7**	S7: MO - order line TU - day MP - accessible CD - ack. day C7: MO - order line TU - day MP - accepted goods CD - ack. day	S7: - average, 95% C7: - average, 100%	S7: MF - monthly RG - indirect PO - <90% PF - none C7: MF - monthly RG - indirect PO - specific <90% PF - not commented	S7/C7: FA - occasional meetings RA - supplier identifies causes for each late delivery

MO - measurement object
TU - time unit
MP - measurement point
CD - comparison date

MF - measurement frequency
RG - report generation
PO - performance outcome
PF - performance feedback

FA - forms of analysis
RA - result of analysis
S - supplier
C - customer

Table 4.1 Summary of the characteristics in the handling of the PM process in the studied dyads

4.1.1 Defining on-time delivery

In all those dyads where the partners conduct measurements of on-time delivery, the supplier and the customer each has his own definition of the metric, and does not cooperate with his dyad partner in the decisions surrounding the content of the metric. Instead the interviewees state that it is the company's own requirements, and the ERP system used is the one which determines the definition of the on-time delivery metric. This corresponds to results from earlier conducted research, for example Keebler *et al*. (1999), Forslund (2004), and Lohman *et al*. (2004).

None of the dyads uses a "metrics' dictionary", as requested by authors such as Lohman *et al*. (2004). However, one customer uses a logistics contract with its supplier which states the metrics they measure and what its definition is of, for example, on-time delivery. This is welcomed by the supplier, who says that the explanation, among several positive aspects, creates a common starting point in conversations about metric figures. By doing so, one of the main hurdles in implementing a mutually conducted PM process between supply chain partners (Brewer and Speh, 2001) is addressed and solved.

The interviewed persons, whether their company conducts any measurements or not, agree upon that the delivery service metric of on-time delivery is one of the most important ones to measure when evaluating a company's performance in customer service. This focus on customer service conforms to the results of a study by Harrison and New (2002). Griffis *et al*. (2004), however, state that in changing times, when boundaries between members in supply chains dissolve, a mutual responsibility exists for the fulfillment of end-customer demands, and companies therefore need to cooperate in order to meet service demands from their customers.

In general the studied dyad partners have the same measurement object, namely the order line, in their definition of the delivery service metric on-time delivery. The perception of a dyadic relationship is that its partners consider one another to be important to each other's performances and their relationship is of greater value than many other supply chain relationships. By this, the products produced and handled in the relationship become vital, implying that most companies want to keep track of each order line, and consider a definition of on-time delivery using a complete order to be too broad a definition.

In the dyads where the measured object differs between the partners' on-time delivery definition, it is the supplier who uses the full order as its measurement object. A reasonable explanation for this could be that suppliers often wish to fulfill their commitments completely. By that, they consider delivering only parts of a full order as a failure on its behalf, and therefore none of the order lines should be registered as being on-time. This kind of reasoning is positive in the sense of a clear focus on fulfilling customer demands, as researchers such as Harrison and New (2002), Brewer and Speh (2000) and Schmitz and Platts (2004) recom-

mend. But it also has a negative side to it; in any dyad the partners should cooperate and conduct the PM process in a mutually agreed manner (Forslund and Jonsson, 2007), but when one partner chooses to have his own definition of a metric, cooperation immediately becomes more difficult, as declared by Griffis *et al*. (2004).

Several of the studied dyad partners have the same comparison date in their definition of on-time delivery. This indicates that the suppliers have the customer service focus that is necessary in order to evaluate the effectiveness of logistical processes as stated by Mentzer and Konrad (1991). According to interviews, however, many partners do not change the compared date in their ERP systems, even though the partners have informed each other of orders being delayed, or of other changes in the delivery date. This results in different on-time delivery figures. In some cases this is the very idea, since some interviewed customer companies think changes made by a supplier in the delivery date is to be considered as if the order were not on-time. Not using the information that a dyad partner communicates, and thereby deliberately creating differences in the partners' on-time delivery figures, probably does not encourage sharing information in a dyad.

Some of those interviewed at customer companies argue that it is the supplier who should adjust his definition of on-time delivery. This could explain why the comparison date differs, as it seems as if customers would rather measure what the customer requests from the outset, than what the supplier agrees to and acknowledges. Thus the dyad partners do not jointly conduct and agree upon the PM process as they should, according to Forslund and Jonsson (2007).

Stock and Lambert (2001) argue that on-time delivery is a popular and useful delivery service metric which is confirmed by the studied dyads, as almost every company measures the metric. As mentioned however, **the definition of on-time delivery differs between all dyad partners, especially when it comes to the measurement point and the time unit used**. According to Fawcett and Cooper (1998) the on-time delivery metric reflects a company's performance. Differences in the measuring point and the time unit seem to reflect the insecurity about some of the dyadic processes, such as transportation and registration, which certain companies have. The supplier usually knows when an order is ready to be transported, and uses this as its measurement point, since it is usually not responsible for the transportation between the studied dyads. The customer companies however, need to anticipate the transportation time in the time unit of their on-time delivery metrics. The best option would of course be that the carrier's loading process at the supplier could be the measurement point for both supplier and customer. Anyway, anticipating the transportation time for the customer does not appear to be too hard to accomplish, but as the interviews show, there is often an uncertainty at the customer companies about the internal goods reception and the workload and procedures of that department. As a result, the measurement point in a customer's on-time delivery metric is usually when the goods' reception has accepted and registered the order as delivered, and the un-

certainty results in a time unit of delivery window of several days, in some cases even weeks. By using this kind of on-time delivery definition, it seems as if many customer companies ignore the actual problem of insecurity and ownership of the problem; when a delivery from a supplier gets registered as being on-time it could in fact be quite late. As a result of this it can be difficult to investigate who is responsible for the deliveries that get registered in the conducted measurements as late. It can be concluded that the activity of defining metrics is a difficult and complex activity, as earlier research results point out (e.g. Keebler *et al*., 1999, Forslund and Jonsson, 2007).

Most interviewed persons claimed that they did not know how their dyad partner defined on-time delivery, which shows that ***the activity of defining on-time delivery is not a jointly conducted and agreed-upon activity***. Not sharing, or even using, the information that is shared about the definition of on-time delivery applied by a partner is not a good prerequisite for the sharing of the rest of the activities in the PM process. This remark is made since a common definition of on-time delivery is a prerequisite for validity, and differences in handling this activity cause consequences for the rest of the activities, according to Forslund and Jonsson (2007).

4.1.2 Target setting

In all the supplier-customer dyads so studied, except for the one in which no performance measurements were conducted, on-time delivery targets did exist, which a researcher such as Basu (2001) argues for. Furthermore, the targets the dyad partners use are quantitative and connected to timeframes, just as Simons (2000) advocates.

In half of the dyads average on-time delivery targets are used, which Forslund and Jonsson (2007) say demonstrates that the PM process is not a mutually agreed-upon process in a dyad. This statement is also reinforced by the fact **that differences in the targets exist in all the dyads where average targets are used**. Earlier conducted research, however, contradicts the studied dyads, since it states that 88% of all dyads cooperate when setting targets for delivery services (Forslund, 2007).

In the other half of the studied dyads the partners use specific on-time delivery targets for the dyad partner in question. This could indicate that these companies comply with the recommendations of Holmberg (2000) about the need to conduct this activity jointly in order reflect the performance of the partners accurately. The interviews, however, show that the partners do not cooperate when setting targets, something which also is confirmed by the fact that **almost all the specific targets differ between the dyad partners**. In one of the dyads the specific targets are the same, but this is a lucky coincidence, since none of the partners know about the other one's target, nor has it communicated its own.

Soltani *et al*. (2004) claim that the activity of setting targets should be of importance in the PM process in order to obtain accurate and efficient performance measurements. The conducted interviews however show that ***the activity of setting targets is not a mutually conducted and decided activity within the studied companies***, nor do they consider it of being of any significance.

4.1.3 Measurement

As advocated amongst others by Maskell (1991), a company's performance needs to be measured in order for it to handle important elements such as strategic decisions and day-to-day control of the manufacturing and distribution operations. All the interviewees agree with the theory presented about the importance of performance measurements, even though their company may not conduct any on-time delivery measurements of its own or of its dyad partner's performance in the area. The majority of the studied dyad partners, however, conduct measurements of the on-time delivery performance, which of course is a prerequisite in the handling of the PM process within and between companies.

The interviewees conform to the statement by Forslund and Jonsson (2007), who say that it is necessary to have information and communication technology that allow efficient collection, communication and processing of data related to performance. **The studied dyad partners generally conduct measurements of on-time delivery on a monthly basis**, and the interviewees say that this frequency provides their company with data that gives them a good general view of the company's own, and its supplier's, delivery service performance. Furthermore, the interviewed people say that measuring on-time delivery once a month provides them with sufficient basic data to create supplier evaluations – if they would have the time and/or the desire to do so. This explanation could be interpreted as a way of saying that the studied companies have the means, but not always the knowledge or resources, to use the measurement data. The way the partners generate reports also supports this conclusion, since **the most common way of creating reports among the studied dyads is in an indirect fashion**, namely by extracting on-time delivery data from the company's ERP system and manually generating reports in, usually, Excel. These additional steps when creating measurement reports show that several of the interviewees either do not know how to handle their ERP system in the most efficient manner, or that the ERP system used is not able to generate reports directly from the conducted measurements. Furthermore, generating one's own non-standardized, self designed report in Excel is not in line with creating measurement data reports that can be shared with colleagues and dyad partners, since performance outcome can be affected and misunderstandings easily arise.

Almost none of the companies inform its dyad partner about the results of its on-time delivery measurements. Only one supplier gives their customer feedback and expects the customer to comment on its measurements, but unfortunately it does not have any dialogue about the matter. In another dyad the supplier and customer use a common server and therefore have access to each

other's measurement results, but since only the supplier conducts any delivery service measurements. The possibility for a shared process becomes somewhat shattered.

Several of **the studied companies measure performance outcome in on-time delivery as an average** for all their supply chain members, and by that cannot identify the specific performance of the dyad partner. **Even though other companies measure performance outcome specifically for the dyad partner, a difference in the outcome presented still exists**. Therefore, only sharing the measurement data in the dyad would probably not be enough, since the on-time delivery figures differ, and by that it becomes difficult to make a shared analysis activity.

As expected, considering the characteristics of the previous activities in the PM process, ***the measurement activity is not a mutually agreed-upon activity in the studied dyads***, as Keebler *et al*. (1999) advocate. Even though most of the companies measure on-time delivery for the dyad partner, and consider it to be an important activity, the activity itself is conducted in a separate manner.

4.1.4 Analysis

As research studies stated back in the 1990´s, there is a lack of systematic analysis and reviews of performance measurement systems (Caplice and Sheffi, 1995), which also is confirmed in the case of the dyads studied today.

According to Gunasekaran *et al*. (2004), it is important to measure performance, because the metrics used, and the measurement of them, sets the objectives and future courses of action. In the case of the dyad where no measurements are conducted it seems as if none of the activities in the PM process is handled at all. This makes the companies becomes somewhat perplexed over the nature of their relationship and how to improve the dyad's performance. The dyad in question however does have meetings, and the partners communicate often, but as the interviews show, the partners have not only experienced a number of performance problems, but would appear to have no plans for dealing with them.

In the dyads where both partners measure their on-time delivery **the partners also have meetings as the form of analysis**. Several partners do however only meet if one or both partners think a problem in the performed on-time delivery has occurred. It is positive that all the partners have personal meetings, some even on a regular basis. A negative aspect is that all the interviewees claim that the results of a meeting where on-time delivery metric figures are presented are only an agreement on the fact that the metrics differ. Even though the partners often discuss deviations from targets, as Mentzer and Konrad (1991) advocate, **the meetings do not often handle follow-ups of past performance, or lead to continuous improvement processes** as the theory suggests.

The only dyad which regularly works with continuous improvement projects is dyad 6. This dyad however is the one where only one of the partners measures on-time delivery. A kind of circumstance that is not to be preferred, since only one of the partners presents metric figures, and the discussions probably run the risk of being somewhat one-sided. In the dyad in question, the partners have a common server and thereby share the base of information. Therefore they are able to regularly investigate and analyze the on-time delivery figures, but as stated by Forslund and Jonsson (2007), the performance measurement needs to be a jointly conducted and agreed process.

In the dyads where the partners have meetings when a problem with on-time delivery is perceived, it seems as if the partners rely on the notion that the other partner will inform the first one about its opinion. This kind of passiveness ought to endanger the positive dyadic relationship, since harm is already done rather than prevented by means of actions decided upon at earlier meetings. This kind of continuous improvement activity would of course only be possible if the dyad partners had a shared and jointly agreed-upon PM process, which is not the case in any of the dyads now studied.

Forslund and Jonsson (2007) state that an accurately handled measurement activity in the PM process is a prerequisite for a proper analysis activity. Furthermore, Bourne *et al*. (2003) claim that measuring performance it is not enough, and that the process needs to lead to insight, and the insight to action. When identifying the characteristics of the previous activities in the PM process it becomes clear that no dyad partner has much knowledge of the other partner's PM process; that implies that ***the analysis activity is not a mutually agreed-upon activity***, and results in little action being taken to continuously improve the PM process.

4.1.5 Characteristics in the handling of the PM process

In table 4.2 a summary of the characteristics in the handling of the PM process in the studied dyads is presented. This table includes the similarities and differences between the handling of the process by the dyad partners.

PM process	Defining on-time delivery	Target setting	Measurement	Analysis
Dyad 1 **S1 & C1**	Both partners define their own OTD. Same MO and CD. Difference in TU and MP.	Average targets, 2% difference.	Difference in MF, RG and PO. No PF.	Common FA. No common RA.
Dyad 2 **S2 & C2**	Both partners define their own OTD. Same MO. Difference in TU, MP and CD.	Specific targets, 0% difference.	Same MF. Difference in RG, PO and PF.	Common FA. No common RA.
Dyad 3 **S3 & C3**	No measurement is conducted.	No measurement is conducted.	No measurement is conducted.	Common FA. No common RA.
Dyad 4 **S4 & C4**	Both partners define their own OTD. Same CD. Differences in MO, TU and MP.	Average targets, 1% difference.	Same MF and RG. Difference in PO. No PF.	Common FA. No common RA.
Dyad 5 **S5 & C5**	Both partners define their own OTD. Same MO and CD. Differences in TU and MP.	Specific targets, 5% difference.	Same MF and RG. Difference in PO and PF.	Common FA. No common RA.
Dyad 6 **S6 & C6**	Since only S6 measures OTD there is a difference in MO, TU, MP and CD.	Specific targets, 5% difference.	Same PF. Difference in MF, RG and PO.	Common FA and RA.
Dyad 7 **S7 & C7**	Both partners define their own OTD. Same MO, TU and CD. Difference in MP.	Average targets, 5% difference.	Same MF, RG, PO and PO.	Common FA. No common RA.

MO - measurement object
TU - time unit
MP - measurement point
CD - comparison date
MF - measurement frequency
RG - report generation
PO - performance outcome
PF - performance feedback
FA - forms of analysis
RA - result of analysis
S - supplier
C - customer

Table 4.2 Similarities and differences in characteristics in the handling of the PM process

The great many differences in the characteristics in the handling of the PM process evince that the process is not a shared and mutually agreed-upon process in the studied dyads (table 4.2). A shared and mutually agreed-upon PM process would be a process conducted jointly between the partners, and a process that both partners have agreed on as to its content and execution, as suggested by researchers (e.g. van Donk and van der Vaart, 2004; Forslund and Jonsson 2007). In order for the PM process to be a shared and mutually agreed-upon process in the dyads, the partners need to share a majority of activities, which entails joint discussions and decision-making to consider the content of the activities. According to Lambert *et al*. (1996), if the partners at least share their measurement results of their own PM processes regularly with their dyad partner, it could indicate a starting point in the creation of shared supply chain processes. To regularly share information in the supply chain partnership means that the dyad partners meet frequently, use and discuss the measurement data that exists, and do this on a regular basis. This is the opposite of having meetings every now and then, or of sharing information measurement data that is not previously handled and discussed between the partners.

According to Hofman (2004) supply chain partners have problems of understanding the necessity of a shared PM process, which seems to be the case in the studied dyads (table 4.2). Furthermore, Hofman (2004) says that one of the major

reasons why it is so complicated to create a mutually conducted measurement process is that there are just many metrics to choose between. In the studied dyads however, the only metric discussed is the on-time delivery metric, and as described earlier, none of the partners has the same definition of this metric. Since defining on-time delivery is an activity at the beginning of the PM process, it has become clear that the following activities are affected negatively when it comes to the possibility of sharing and mutually agreeing to the process.

Soltani *et al*., (2004) claim that instead of applying ambiguous metrics, or no metrics at all, specific and clearly defined performance metrics should improve the overall accuracy and effectiveness of a supply chain process. It has become obvious that the studied dyad partners do not share any of the activities in the PM process, and it all starts with each partner defining on-time delivery in his own particular manner. Almost all the companies conduct measurements (table 4.1); furthermore, they all think that on-time delivery is one of the most important performance metrics to be measured. They also agree with theory that this metric has the ability to detect performance connected with mission goals and the environment of the logistics processes as stated by Griffis *et al*. (2004). By this, the studied dyad partners have a common ground for shared and mutually agreed-upon PM process. This conclusion of this research shows that one of the main hurdles when implementing a shared measurement process is to identify metrics that both partners find equally important and meaningful to measure (e.g. Hofman, 2004, Brewer and Speh, 2001).

4.2 Within-case analysis concerning the PM process and its consequences

As can be deducted from the identification and analysis (section 4.1) of the characteristics of the differing ways of handling the PM process in dyadic relationships, there is no shared and mutually agreed-upon process, as researchers propose (e.g. Sandberg, 2005; Forslund and Jonsson, 2007). In order to understand what consequences this results in, a deeper identification and exploration of each dyad's way of handling the PM process, and the consequences of this for the involved partners, is conducted.

Each company's way of handling each activity of the PM process is analyzed and the consequences each supplier and customer company experiences is explored. As in the analysis of the first research question, key findings are in bold. Furthermore, the consequences of differing ways of handling the PM process are in bold and italics.

4.2.1 Dyad 1

The PM process in dyad 1

The PM process is not characterized as a shared and mutually agreed-upon process in dyad 1. The major argument for this statement is the fact that the dyad partners do not jointly discuss any of the different activities in the process and thus have not agreed on the content of the process. Both companies however, conduct the PM process, but they never have discussions concerning what it should incorporate.

Both partners, as in all the studied dyads, call their delivery service metric **on-time delivery, but they define it differently and separately** (figure 4.1). In dyad 1 both partners use order line as their measurement object. This seems to be a result of both supplier and customer being eager to control and supervise each product, rather than mutually agreeing between the partners. Furthermore, they both use the requested day on an order from customer C1 as the day to compare with in the conducted measurement. As a customer company in the automobile industry it ought to be natural to use the date one requests an order to be delivered within the measured on-time delivery metric. Since this industry is known for being highly competitive and fast changing, a buying company's on-time delivery metric needs to reflect how well a supplier fulfills the customer's requirements; this in turn has an effect on the customer's performance. From a supplier company's perspective in the industry in question, it is also natural to use the customer's requested delivery day as a comparison date when measuring its own delivery service, since a supplier needs to live up to the high demands in the business, or run the risk of being replaced.

The two companies have a difference in both the time unit and the measuring point they use when measurements of the on-time delivery are conducted. As the empirical data shows, the difference in the measurement point is caused by customer company C1, whose on-time delivery metric does not register the actual point at which they become responsible for the manufactured goods once S1 has fulfilled its commitments. Supplier S1 has no other option than to measure its on-time delivery as the time when the order is accessible for transportation, since C1 is responsible for this process. The time unit used is also very different in the partner's definition of on-time delivery. In this perspective S1's definition is natural, since it conducts the measurement with a time unit of requested day minus one on an order from C1. This deduction is logical as regards the transportation time, considering that the two companies are located only two hours apart. Since the PM process is not a shared process between the two dyad partners, the definitions of on-time delivery differs, but the reasonable time unit that customer C1 would use in its definition would be the requested day as per its orders. The company, however, has a definition of an on-time delivery metric which is measured with a delivery window of minus three days, and plus one. From the interviews conducted it can be concluded that the company is uncertain about its

goods reception and the workload of that department, which is compensated for and reflected in the on-time delivery metric definition at customer C1.

As figure 4.1 illustrates both **S1 and C1 uses average targets for their on-time delivery figures in their measurements**. As pointed out earlier, the use of average on-time delivery targets indicates that the PM process and the activity of setting targets is not a shared and mutually agreed-upon process, as is the case in dyad 1. The partners have never discussed the targets used, and neither company has conveyed to its partner what its targets for on-time delivery are. Furthermore, the targets use differentiates, which also demonstrate that the activity of setting targets is not characterized as a mutually conducted process activity. The target of 100% on-time delivery to all of S1's customers indicates that the company wishes to meet the high demands of all of its customers in the competitive automobile industry. This ought to be a positive sign for a supplier of any industry. When a supplier uses 100% as its target for on-time delivery, it does not really matter if it is an average or a specific target; just having an average target of 98% for all the suppliers for a customer company as C1 indicates that the company does not differentiate between purchased products of differing importance.

When it comes to **the activity of measurement in the PM process, each partner in dyad 1 conducts its own on-time delivery measurements**. This also becomes obvious when investigating the content of the measurement activity, which shows a difference in all the aspects of frequency of measurements, how reports are generated, and what the performance outcome is. Furthermore, neither partner gives the other any feedback concerning the results of the measured on-time delivery. As mentioned earlier, supplier S1 uses an average target of 100% in its on-time delivery metric, and this is quite possible as long as the target is still achieved. As table 4.1 however displays, S1's performance outcome in on-time delivery to its customers is on average 96%, and the use of average targets then becomes a problem, since the company needs to analyze the measurement data in order to find which customers' orders are finished too late. Furthermore, there is some manual handling of the measurement data when supplier S1 creates a report. The positive side to S1's measurement activity, nevertheless, is that the company conducts on-time delivery measurements in three different ways, which often results in a good overview of the performed on-time delivery.

In customer C1´s case, the results of the monthly measurement activity show each one of the supplier's performed on-time delivery, and the reports are generated automatically in its ERP system. The company can present specific performance outcome numbers, and in the dyad in question S1 has an on-time delivery performance higher than 97%. What is noticeable is the fact that customer C1 does not give S1 any feedback on its performance, which should really be an easy task since specific numbers already exist and only need to be conveyed.
The last activity of the PM process is the **analysis, which is not characterized as a shared or mutually agreed-upon process activity between the partners**. On the other hand, the companies do have the same kind of approach on how this activity should be handled, and that is through mutual meetings. In these meet-

ings the partners have never discussed the results of their measurements of on-time delivery, but the involved people in the relationship are often in contact with each other, and these people consider the relationship to be very close. As a result of the non-existing conveying of measurement data, the partners have never conducted any mutual improvement actions; instead they have mainly used the measurement data internally in order to make improvements and perform at a higher level.

Consequences for S1 as a supplier

The interviewees all agree that the most prominent consequence of differing ways of handling the PM process in dyad 1 is that supplier S1 is ***not evaluated in a correct manner***. This result in a ***lower on-time delivery figure than S1 deserves***, and by that the company is ranked lower in C1´s supplier rating than it should be. The interviewed persons all state that the company ***experiences uncertainty*** when it comes to customer C1´s on-time delivery measurements, since they all know about the several occasions when the carrier or C1´s own goods reception has been the cause of the late deliveries. Furthermore, the empirical data reveals that because of the differing ways of handling the PM process, supplier S1 worries about getting an ***undeserved bad reputation*** as a supplier, which it perceives could mean a ***decrease in sales and/or a loss of potential customers***. It is understandable that S1 as a supplier reacts negatively to the different ways of handling the PM process, since it is a company in a fast changing industry with high demands. Experiencing and being worried about low on-time delivery results with a customer, results which the company cannot influence or deserve, is justified in an industry where partners may be replaced quickly. Furthermore, the dyad partners do not have a contract, and thus S1 has no legal commitment of future business with customer C1.

Consequences for C1 as a customer

The people interviewed at customer C1 say that a very noticeable consequence of the differing ways of handling the PM process in dyad 1 is ***uncertainty***. This uncertainty is internal, and is caused by the company's own definition of the on-time delivery metric, in which the measurement point is at the stage where the goods are registered by the goods' reception instead of on being picked up at supplier S1. Examples of consequences caused are the ***internal conflicts***, because those involved blame the various actors in the supply chain when an order is registered as being late. The responsible actor could be the goods' reception, the carrier, or S1 as the supplier and it then becomes ***difficult to hold anyone accountable***. According to some of the interviewees, this has permitted customer C1 have ***too large a delivery window*** in its definition of its on-time delivery metric, and of being too complying in its relationship with supplier S1. According to C1 this in turn gives S1 an excuse for not performing to the highest possible level.

Not being able to trust its on-time delivery metric instead of looking more closely at the measurement data presented has caused the personal opinion of S1 as a supplier to be of concern. This uncertainty has produced consequences in the

form of ***changes in the manufacturing plans and the holding of larger safety stocks***, and the interviewees at customer C1 claim that these consequences have resulted in the company becoming the buffer in the supply chain. The latter consequence, that of holding of larger safety stocks, is understandably worrying to C1, considering how competitive the automobile industry is, and that lean production and just-in-time are prevailing concepts.

During the collection of the empirical data, the consequence of personal opinion mattering in the supplier evaluation was evident. It seems, however, as if management and the sourcing department have somewhat different opinions of S1 as a supplier, and this causes internal conflicts. Management thinks that C1 should treat S1 in the same manner as its customers treat them when they are the supplying company in the chain. With very high demands on speed and accuracy, it is adjusting to the customer's demands no matter what its own opinions are. However, the personnel responsible for the contact with Supplier S1 at the sourcing department think that the relationship is, and should be, more personal, since the two partners can support each other, irrespective of where the fault lies when orders are late.

Consequences for dyad 1

The partners in dyad 1 do not think that the biggest problem they have is not giving each other feedback about on-time delivery figures, but rather that when they do have their meetings, those meetings ***do not result in any actions for improvements***. The interviewees all claim that the mutual meetings just end in extra work such as discussions about which partner's on-time delivery figure is the more correct, and other ***non-value adding activities which do not improve the dyad's performance***. The partners say that the companies tend to ***talk past each other*** and for each partner to ***believe its own opinion*** and therefore ***not working together and becoming closer and more competitive in the supply chain***.

The interviewed persons at supplier S1 say that they experience having an inferior position at business negations between the partners. This is amongst other things caused by the fact that customer C1 does not want to have a long-term contract between the partners. Another reason is also the fact that C1 shows lower on-time delivery figures than supplier S1 thinks it deserves. These circumstances in turn result in consequences such as an ***atmosphere of mistrust*** in the studied dyad.

When analyzing dyad 1 it becomes clear that the partners do not conduct the PM process in a mutual manner; what is even more prominent is that the partners do not even share information with each other. As the empirical data shows, customer C1 does not even always register the changes in the delivery dates that the partners have agreed-upon. This automatically results in lower on-time delivery figures for S1, which ought to hurt the relationship and create distrust in it too. Furthermore, not having a long-term contract in the dyad should negatively affect the basis to share and mutually agree upon the PM process. If a contract ex-

isted, it would not be such a complicated step to extend it to include logistical agreements and prerequisites for a mutually conducted PM process.

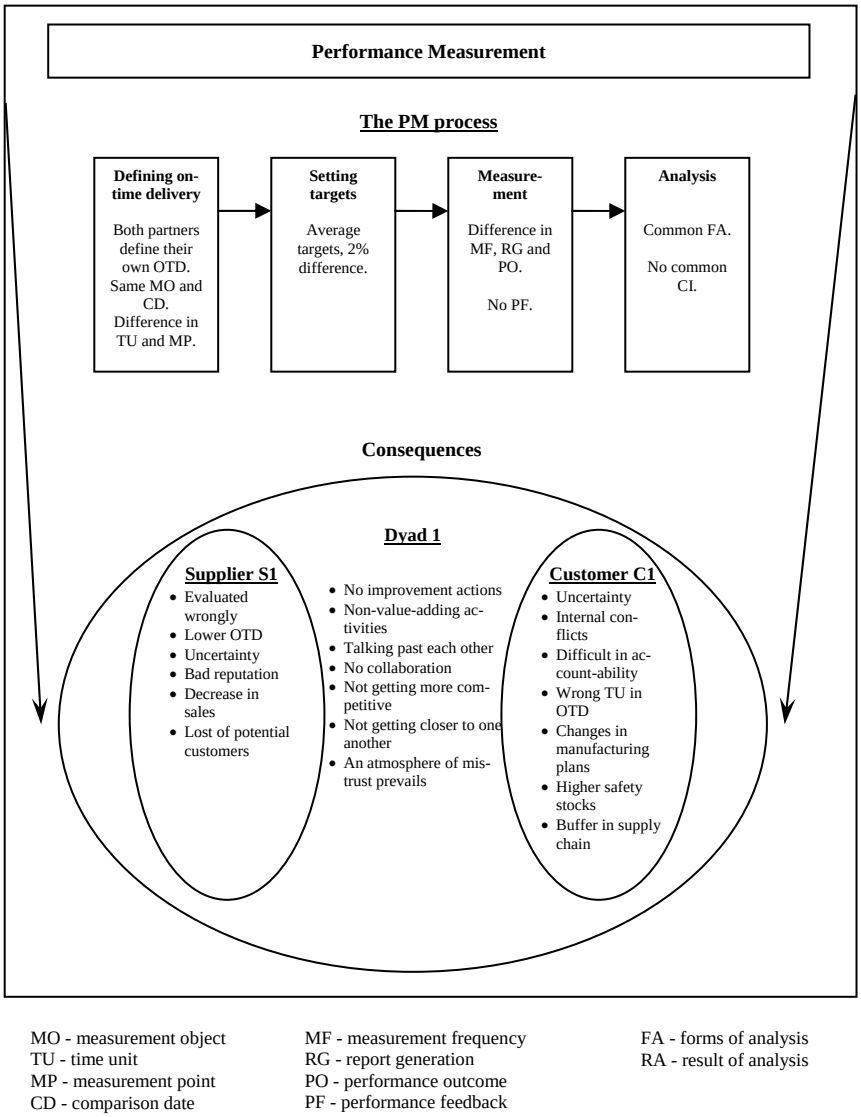

Figure 4.1 Characteristics in the handling of the PM process and its consequences in dyad 1

4.2.2 Dyad 2

The PM process in dyad 2

The PM process in dyad 2 is not characterized as a mutually conducted and agreed-upon process. Although both partners measure on-time delivery in the dyad, they have never discussed any of the different activities in the process, nor jointly decided-upon its content. Instead each partner **defines the measured on-time delivery differently** (figure 4.2). In dyad 2 both partners use order line as their measured object, which is fairly natural since S2 is customer C2's subcontractor and supplies C2 with simple and low value components, but in large volumes. Therefore it becomes important for both partners to be able to control each item.

Both partners use the day as their time unit in the measurement of on-time delivery, but customer C2 has a delivery window of one day back and forth relative to the requested day in its orders to S2. From the conducted interviews it seems as if customer C2 would like to be able to dispense with this kind of delivery window in its measurements of supplier S2's performed on-time delivery, since the partners are only located one hour apart. It appears, however, that customer C2 is somewhat restrained by its ERP-system and its definitions of metrics. It is understandable that C2 would like to be able to measure the purchased items from supplier S2 on the exact day they are delivered, since the products are of importance to the on-going flow in the production. On the other hand, the reason why it does not have complete control of the supplier's performance could be that the products bought from supplier S2 are not strategically important or of high value.

As mentioned (appendix I) in their measurements of S2's on-time delivery, customer C2 compares the day the products are delivered with the day it requested in its orders. Supplier S2, however, in its definition of on-time delivery, compares that day with the day they acknowledged the order. The difference is interesting, since it ought to result in very different on-time delivery figures, if there is a difference, between the requested date and the acknowledged date in an order from C2. Furthermore, none of the partners registers what the other partner's stated date is which ought to complicate the business of comparing the on-time delivery figures even more. The company has nonetheless never had any problems in its deliveries from S2, and a comparison of on-time delivery figures has therefore never been done. Since S2 is a subcontractor to customer C2, and C2 is the only customer for which the items are being made-to-order, it seems as if S2 is more dependent to C2 than the other way around. Furthermore, customer C2 buys large volumes, and has even made investments in machinery at supplier S2. It is therefore credible that S2 naturally wants its customer to be satisfied. Additionally, as a more dependent party in the relationship, S2 would accept and adjust the metric's figures according to those of customer C2 should they ever have complaints of S2's performance in on-time delivery. This scenario is also reinforced by the statements from both partners during the interviews, claiming that

S2 is very flexible as a supplier when it comes to issues such as product development and meeting customer C2's specific demands.

In dyad 2 supplier S2 is responsible for the transportation between the partners. Nevertheless the company measures its on-time delivery when the order is dispatched to C2, but since the companies only are an hour's driving distance apart, it should never be a problem. Customer C2 conducts its measurements when the goods are accepted, which is not unnatural since it is the one responsible for the transportation. The interviewees at the customer company say, however, that the goods' reception sometimes does not always register the order the day it is delivered; in that way orders are sometimes registered as being late, even though they are not.

Target setting in dyad 2, as with all the other activities in the PM process, is not characterized as a shared and mutually decided activity. Even though both partners use a specific target of 100% (figure 4.2) for on-time delivery, which could imply that the partners have agreed on the content of this activity, the partners have never discussed the topic. Both companies have other targets, including for example cost reductions, but these are not quantified as is the on-time delivery target. The fact that the dyad partners only use specific and quantified targets for measuring on-time delivery indicates the importance of the delivery service metrics. None of the partners in the dyad is aware, however, of the other partner's target, and the fact that both partners use specific targets for on-time delivery, and have the same target of 100%, is therefore more of a coincidence.

One of the reasons why the dyad partners both have a 100% as their specific target for on-time delivery is probably connected with the items being manufactured and bought. C2 probably considers the short driving distance between the two companies, and the relatively simple products bought from S2, to be such that there should not be any problems in the manufacturing process to cause deliveries being late. Secondly, supplier S2 is a rather small company, and C2 its largest customer; it only makes to order, and is keen on being on time with its deliveries. Furthermore, none of the partners have ever experienced any problems in their relationship, or with their deliveries, which probably also adds to the partners´ expectations of a high on-time delivery figure, hence the 100% target.

The partners in dyad 2 conduct the activity of measurement in the PM process in separate ways (figure 4.2). It is quite common for a company to conduct measurements monthly, so the fact that the partners have the same measurement frequency is nothing else than the way things are. As the interviews show, Supplier S2 creates on-time delivery reports directly from its ERP system, which is why it is able to state that it has an on-time delivery performance outcome of 100% in its relationship with C2. Customer C2 also believes this to be true, but since it does not create any on-time delivery reports specifically for each supplier unless necessary, it cannot show the exact on-time delivery per-

formance outcome without some extra work. The extra work in this case would be the extraction of data from its ERP system, creating an Excel sheet. As with the content of the on-time delivery metric it seems as if the personnel at customer C2 do not have full control over how to manage the ERP system. Rather, they are restrained by it, and thereby forced to modify their needs to what the system offers instead of the other way around, as it ought to be.

Even though on-time delivery figures have never been an issue discussed between the partners in the dyad, figures are mediated every now and then. When on-time delivery performance is reported supplier S2 gives feedback to C2 by accepting the figures, whereas customer C2 does not give S2 any feedback on its figures. A reason for this is probably the high on-time delivery figure of 100% from supplier S2, and the apprehension of both partners to maintain a well-working relationship without any late deliveries.

The partners in dyad 2 say that they conduct the activity of analysis in the PM process independently from each other. When being asked about what analysis forms the dyad applies, the interviewees say that they only have meetings if and when any problems occur. In these meetings the partners do not discuss any of the aspects of their conducted PM processes. Instead, the meetings are more focused on resolving just the problem at hand. Not having meetings regularly implies that the partners do not share and mutually agree upon the content of the PM process, and consequently it is not surprising that there is no continuous improvement process as a result of the analyses.

Consequences for S2 as a supplier

In its dyad with customer C2, S2 ***does not consider that it experiences any consequences*** due to differing ways of handling the PM process. The interviewees claim that the reason for this is the fact that they are able to keep up a 100% on-time delivery figure towards the customer C2, and thus the differing ways of handling the PM process have never been an issue between the partners.

In the manner supplier S2 handles its PM process it could be argued that it nevertheless experiences some consequences of the situation. The supplier is convinced that its measurements of its performance produce the correct results, and is confident in its handling of the PM process in its relationship with customer C2. The confidence in the on-time delivery figures makes the company able to rely on its performance, which in turn results in such positive consequences as being able to concentrate on keeping up the work, or even making improvements and becoming more efficient.

It could be discussed if supplier S2 does in fact experience any consequences in the form of its being somewhat inferior in power in its relationship with C2, due to its dependency and company size, and is almost always expected to be on time with its deliveries to C2. This has the effect of S2 making to order for customer C2, but making to stock for its other products. This could result in unnecessary capital being tied up, of obsolete stock being held, and of being incapable of tak-

ing on new customers. These consequences can, however, not be directly affiliated to the differing ways of handling the PM process in the studied dyad.

Consequences for C2 as a customer

Even though customer C2 and supplier S2 has never compared or discussed their respective handling of the PM process, those interviewed at C2 state that they experience some consequences of the probable differing ways of handling the process. Supplier S2 reports 100% on-time delivery figures to C2, but C2 does not give any feedback on these figures. The reason for this may be that they are somewhat uncertain of their on-time delivery figures for S2 and therefore elect to believe S2's measurement processes to be correct. The uncertainty of the accuracy in on-time delivery figures originates from C2's handling of its own ERP system. Since it feels it cannot really handle the system and its parameters in the performance measurements, it opts to go along with the personal opinions of S2's performance and the figures S2 reports from its own measurements.

The ***uncertainty and mistrust of C2's own on-time delivery measurements*** cause the company ***not to be able to fully evaluate supplier*** S2, or other suppliers for that matter, and on that account it is concerned that it ***cannot hold suppliers that are late in their deliveries responsible***. Furthermore, it causes ***internal conflicts*** in the company when discussions arise about whether it is the supplier's fault, or the late registration of arriving deliveries, that should be held responsible. The uncertainty also results in consequences such as ***extra work when discussions need to be held, and the re-planning of internal production processes*** is made in order to keep C2's promises to its customers.

The uncertainty in handling of ERP systems and its components seems to cause C2 consequences that are somewhat unnecessary. The idea behind the use of an ERP system is to support the business processes in a company. If the personnel do not feel comfortable with the components of the system, then the system needs to be changed or the personnel need to be educated, otherwise the intended supporting instrument becomes a restraining one. The interviewees at C2 are aware of this, and say that they would like to become better in the handling of their ERP system.

Consequences for dyad 2

Neither customer C2 nor supplier S2 perceives that its dyad experiences any consequences due to different ways of handling the PM process. The explanation for this, accordingly to both partners, is that the relationship never has had any problems with on-time delivery, and thus they have never had any discussions or comparisons that have made them aware that their handling of the PM process differs.

The dyad nonetheless has a kind of mutually conducted activity of analysis, which in the end results in an improvement process in the investments in manufacturing machinery that customer C2 has made at S2. When C2 invests by installing machines in S2 that are for the production of its ordered items, it also

gets loyalty from S2 at the same time, which strengthens their relationship. The result of the investments is a better relationship, items manufactured exactly as customer C2 requires better production capacity, and specialized machinery at S2 at no cost to itself. Hence, there are consequences in the form of improvements for both partners; however, these consequences cannot be connected directly to the differing ways of handling the PM process in the dyad.

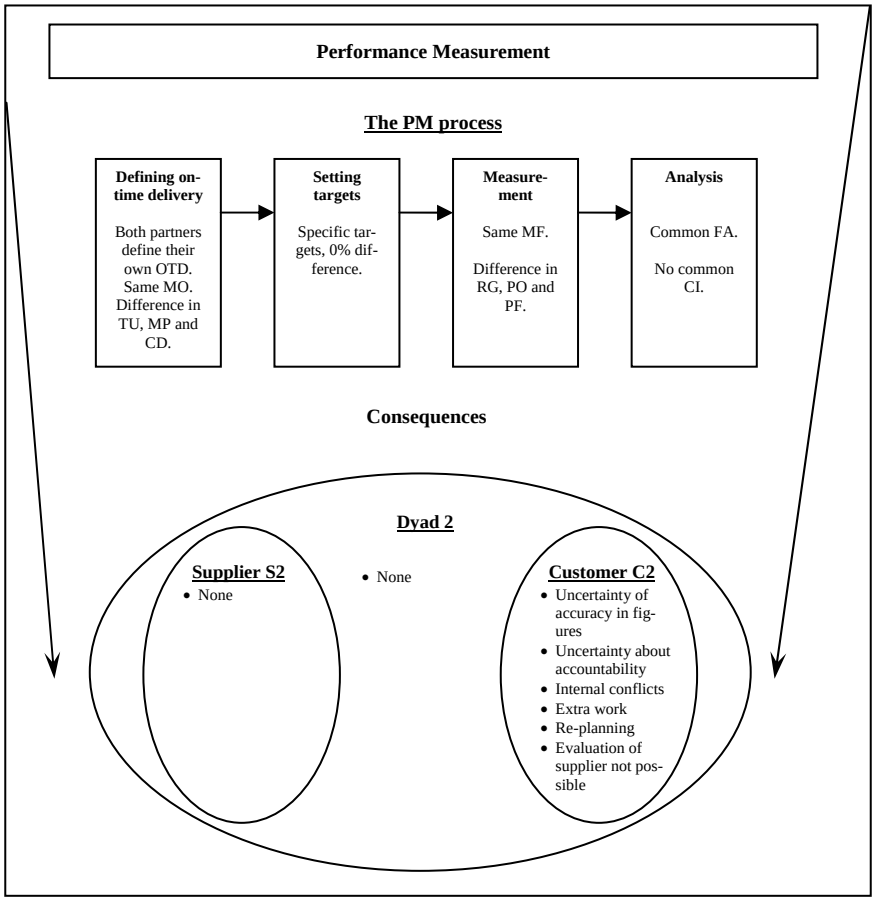

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Figure 4.2 Characteristics in the handling of the PM process and its consequences in dyad 2

4.2.3 Dyad 3

The PM process in dyad 3

None of the partners in dyad 3 conducts any on-time delivery measurements, and thus the PM process is not characterized as a shared and mutually agreed-upon process in the dyad (figure 4.3). Both partners, however, plan separately from each other to conduct measurements of on-time delivery, amongst other matters the metrics, in near future, and works with the content of their PM processes.

The reason for the non-existent measurements between the partners is probably their very informal relationship. As stated (appendix I), supplier S3 is located only 15 minutes' driving distance from customer C3. Supplier S3 was created by former employees at C3, and consequently the personal relationship between those involved has always existed. This seems to have both a positive and negative effect on on-time delivery issues in the dyad. One positive feature is the fact that the involved persons often are in contact with each other and are able to have frequent discussions about on-time delivery issues. This could be seen as a stating point to a mutually conducted analysis activity in the PM process. The partners, however, claim that there have really never been any concrete results from these discussions.

Consequences for S3 as a supplier

According to supplier S3, not conducting a PM process, or handling it in differing ways, has given rise to several consequences. S3 says that it often has to spend resources on ***extra work*** such as trying to find explanations for late deliveries, or verifying the correctness of a discussed delivery date. Furthermore, the company experiences ***internal conflicts due to re-scheduling in the manufacturing process***, and discussions about which customer order that should be prioritized. This causes a ***negative atmosphere in the working environment, longer lead-times***; even worse, the risk of ***getting a bad reputation*** as a supplier can result in both lost sales and potential customers.

Supplier S3 and customer C3 are both suppliers and customers to each other. The on-time delivery figure is perceived as very low in the dyad, which results in very complicated logistical flows. S3 recently became a part of a larger group of companies, and this ought to mean that they need to begin to handle the PM process differently from the way they have done. Without any on-time delivery measurements the company cannot report any figures which a larger group of companies probably requests. No on-time delivery figures means that supplier S3 has problems in conveying its point of view to C3, and the discussions with C3 seem to be very unstructured and fruitless, even though they are friendly. If S3 conducted a PM process the result would probably be a more formal and effective relationship with customer C3.

Consequences for C3 as a customer

Customer C3 is in the process of formulating a PM process, but has as mentioned not began the process yet. The interviewees claim that even though no measurements are done their perception is that the on-time delivery figure for S3 as a supplier is low. Furthermore, they say that not being able to present figures for S3´s performed on-time delivery results in problems when the partners try to negotiate. Since none of the partners has on-time delivery measurement figures to present, the discussions are based on each partners´ perceptions, and this is ***unproductive and usually does not result in any improvements of the mutual processes.***

The interviewees at C3 also say that not conducting any on-time delivery measurements could give the suppliers a perception that C3 is not interested in deliveries being on time. This could result in ***suppliers who do not perform at their outmost level*** in their relationships with C3. Another consequence of C3´s way of handling the PM process is that the involved persons at C3 have to ***spend unnecessary resources to explain and justify supplier relationships*** such as the one with S3. When no on-time delivery figures can be presented, and the perception is that the figure for supplier S3 is low, management may react. But since the partners in the dyad are dependent on each other, the people involved have to put in ***extra work*** to clarify the situation, which is complicated even more by the fact that no on-time delivery figures can be presented for either partner's performance.

Consequences for dyad 3

Both partners in dyad 3 say that their handling of the PM process has resulted in consequences such as ***extra work and time being spent on meetings that do not resolve and problems***. The partners claim that they ***do not have any common starting point***, since no-one can present accurate on-time delivery figures. This means that the personal perceptions of the performance by the involved people are stated, and ***instead of an improvement in the mutual processes and the dyad's competitiveness, the meetings result in misunderstandings and discontent***.

Several of the consequences due to the handling of the PM process in dyad 3 seem to originate from the informal relationship between the partners. The interviewees at supplier S3 say that because of the informal relationship customer C3 does not respect the stated circumstances of C3's orders. This causes various consequences to arise. Due to the informality in the dyad the negative consequences for both partners are probably the result of the choice to use a local sourcing method. The partners in the dyad know each other well, and are mutually dependent on each other's performances, which has resulted in positive attributes such as a deep and friendly atmosphere in the dyad. However, the relationship is created with partners that know each other personally, and the companies are localized only minutes away, both of which have caused an unstructured relationship to develop, with a lack of respect for each other's situations.

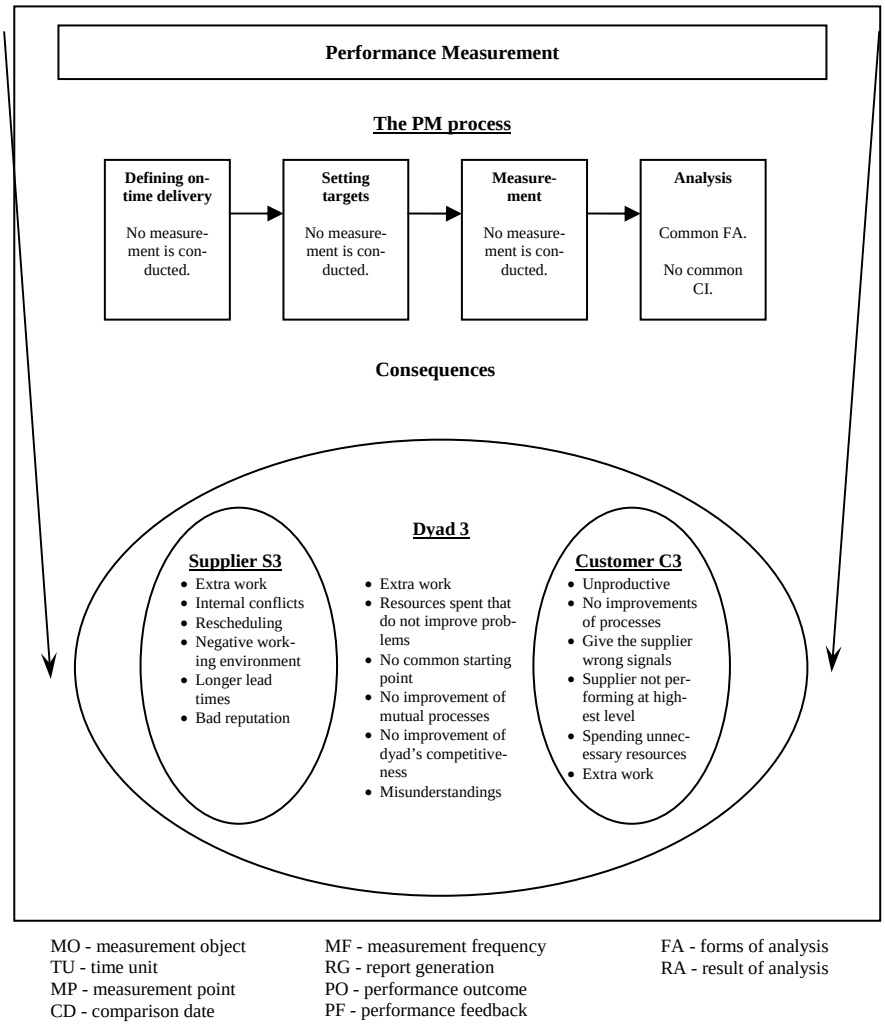

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Figure 4.3 Characteristics in the handling of the PM process and its consequences in dyad 3

4.2.4 Dyad 4

The PM process in dyad 4

In this dyad the PM process is not characterized as a shared and mutually agreed-upon process. The reason for this is probably the fact that none of the partners has experienced any problems in the deliveries from supplier S4 to customer C4. Thus the partners have never needed to discuss the handling of the measurements of on-time delivery, nor the presented figures, even though they are different.

Both partners measure on-time delivery, but each defines the delivery service metric differently and separately (figure 4.4). The companies use the acknowledged day from supplier S4 as the comparison date in their measurements of on-time delivery when an order is placed by customer C4, but otherwise the content of the metric differs. The use of the acknowledged day in both partners´ measurements should be in supplier S4´s favor, since a supplier's acknowledged day is based on its capability rather than on the customer's demands. Furthermore, customer C4 does not keep a record of the statistics of its requested delivery dates versus the acknowledged delivery dates from S4, which makes an analysis of the supplier's performance difficult to conduct. The reason why customer C4 does not have this kind of statistics is probably that it has never had problems with late deliveries from supplier S4.

Supplier company S4 uses "full order" in its definition of when a delivery is on time, whereas C4 measures the order line as the measurement object in its on-time delivery metric. Company S4 is one of the few studied suppliers that measures full order as its measurement object. This indicates however that it is a company that has a high regard for what is a high level of performance, since it would get a lower on-time delivery figure in its own measurements if merely one order line, of several, is late.

The time unit in both dyad partners' definition of on-time delivery is the day. However, customer C4 has a delivery window of plus/minus two days from the agreed delivery date. The reason for this is probably insecurity over the registration date due to the work load in its goods' reception, but since supplier S4 is located only minutes away, the delivery window seems somewhat large. A delivery that could arrive on a Thursday instead of a Monday should have some impact on the scheduled production, unless the customer is interested in keeping stock-in-trade.

Customer C4 is responsible for the transportation of goods in dyad 4, but uses accepted goods as the measurement point in its on-time delivery definition. The reason for this is that it first wants to inspect the delivered goods, and needs time to get the goods registered into its ERP system before it can conduct any measurements. Supplier S4, on the other hand, uses accessible order as its measure-

ment point, which is quite natural since it does not have the responsibility for the transportation in the dyad.

In dyad 4 both partners use average targets for on-time delivery. As stated earlier, the PM process is not a shared and mutually agreed-upon process in dyad 4, and the use of average on-time delivery targets is therefore in accordance with presented theory. None of the partners has conveyed its target to the other, and a difference of 1% exists. Supplier S4 is the partner that luckily has a higher on-time delivery target than customer C4, which is positive, since S4 as the supplier should live up to its customer's demands. Since C4 uses an average target of 95% for all its suppliers, it seems as if the company does not differentiate between the importance of different products purchased. This is somewhat strange for a manufacturer of a product that is composed of more or less important components.

Each partner in dyad 4 conduct the PM process activity of on-time delivery measurement in a separate manner. The partners, however, do have a quite similar content of their measurement activities. Both measure on-time delivery each month, and both generate reports of the measurement directly from their ERP systems, which is a structured and reliable way of conducting measurement activities. As stated (appendix I), the companies do not measure specific partners´ performances, and this results in the partners not conveying any on-time delivery figures to each other. Furthermore, no partner gives the other any feedback on its performance. In general the performance outcome in on-time delivery for supplier S4´s deliveries to its customers is 98%. Customer C4 reports an average performance outcome of 90% for its suppliers, but estimates a figure of almost 98% in the dyad with S4. The high percentage in performance, and the concordance in perception of the performance between the partners, is probably the reason why they have not discussed any on-time delivery figures in dyad 4.

In the last PM process activity, the partners **use the analysis form of discussion, but as for the other parts of the process the analysis activity is in general not a jointly conducted or decided activity**. The partners have experienced very few problems with on-time delivery, implying that neither partner thinks there exist any results of the analysis activity. It seems as if the well-functioning relationship in dyad 4, in combination with the fact that the partners work closely together in processes such as product development, has resulted in very few problems with deliveries not being on time. This circumstance is probably also supported by the short driving distance between the companies.

Consequences for S4 as a supplier

Supplier S4 ***does not think it experiences any consequences*** as a result of its way of handling the PM process. This statement is probably made with regard to any negative consequences. It could be argued that the company should nevertheless experience certain consequences, an example of which could be the confidence it seems to have in its own performance. Also, there is the structured planning circumstance in the manufacturing process it appears to have due to the

company's high performance in on-time delivery, and the impression of organized control it purveys in its internal processes.

Since supplier S4 uses average targets, and no partner in dyad 4 conveys the content of its PM process to the other, it could also be argued that S4 as a supplier does not know if it meets its individual customer's demands. This should worry the company somewhat, since exact figures could be useful in negotiations and other interactions with its customers.

Consequences for C4 as a customer

Customer C4 also claims that it ***does not experience any consequences*** due to its way of handling the PM process. However it could be argued, as in S4´s case, that there should exist certain consequences. As mentioned (appendix I), customer C4 uses average on-time delivery targets for all its suppliers, which should make it hard for the company to really evaluate its suppliers separately. With average targets, as also mentioned, it indicates that the company does not separate the purchased goods in terms of importance before final assembly of the product; this is somewhat worrisome.

Consequences for dyad 4

As stated (appendix I), ***none of the partners in dyad 4 says that it experiences any consequences as a result of its handling of the PM process, and this is also their opinion regarding this particular dyad***. The major reason for this is probably that the partners have a well-functioning and close relationship in which late deliveries have never been a problem. Since on-time delivery issues have never been discussed, the PM process between the partners has never been compared.

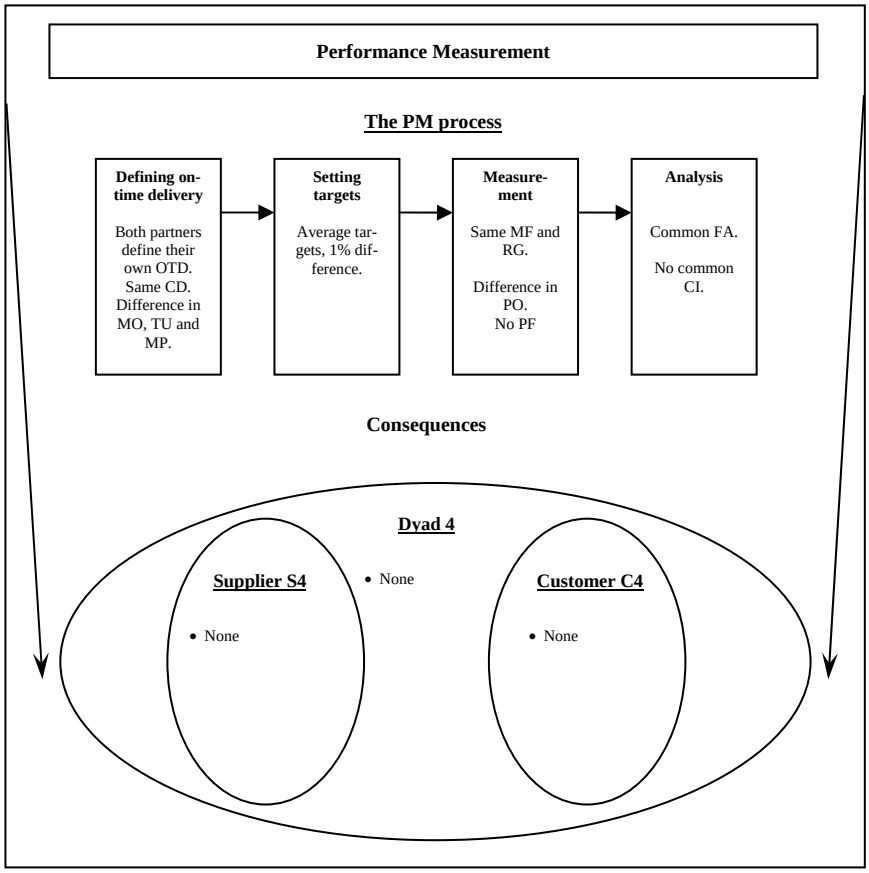

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Figure 4.4 Characteristics in the handling of the PM process and its consequences in dyad 4

4.2.5 Dyad 5

The PM process in dyad 5

Even though both supplier S5 and customer C5 belong to the same group of companies, the PM process is not characterized as a shared and mutually conducted process in dyad 5. The partners, especially the involved persons in the relationship, know each other well, and communicate quite often, but the PM process has never really been discussed.

Both partners measure on-time delivery, but they define it differently and in a separately manner (figure 4.5). Both partners use order line as the object in their metrics measurements, which is probably a result of the special products being manufactured in the dyad. In the aircraft industry the extremely high demands on quality calls for a need of control right at the order line level. Both partners also use customer C5´s requested delivery date as their compared day in their on-time delivery metrics. The reason for this is probably the delivery schedule used, which extends over a longer period of time. This implies that the supplier S5 has time to make its manufacturing plans, and does not have any reason to acknowledge a different delivery date.

Since supplier S5 orders the transportation, but is not responsible for it, it uses the day as its time unit, and the dispatched delivery as its measurement point. Remarkable in customer C5´s on-time delivery definition is not that it uses accepted goods as its measurement point, but rather that it has used a time unit window of three weeks for its delivery. The two companies are located only one hour's driving distance from each other, and as customer C5 has decided the delivery date, there should be no confusion about when the orders should arrive. The problem seems to lie in the fact that the definition of on-time delivery used was developed in C5´s former ERP system, and over time it has still not developed a new definition of on-time delivery. Therefore it has a somewhat ancient metric. Furthermore, it seems as if the interviewees in both companies agree that there exists some insecurity about when the goods' reception actually registers the delivered goods at customer C5, and of the workload of that department.

Both S5 and C5 use specific targets for on-time delivery in their relationship, but the PM process activity is neither shared nor jointly decided-upon. Supplier S5 has a specific on-time delivery target of 100% towards C5, which indicates the commitment in performance from the company. Customer C5, on the other hand, has a specific target of 95% in on-time delivery for supplier S5. Even though contracts do exist in the dyad about the targets, they are old, and the interviewees at the two companies say that they have not discussed the targets for a long period of time. The difference in target figures between the two partners also indicates this.

The measurement activity in dyad 5 is not characterized as a mutually conducted activity. Both partners have a measurement frequency of once a month, and they both generate reports indirectly, which may be considered somewhat ineffective. As stated earlier in the theory, the generation of reports indirectly takes more time, but it also involves the risk of using incorrect data. As mentioned in the previous paragraph, supplier S5 has a target of 100% in on-time delivery to C5, and according to its performance outcome it meets this target. The interesting thing is that C5´s measurement of supplier S5´s performed on-time delivery is 95%. The difference in performance outcome has been discussed several times by the partners in the dyad, but without results. The only performance feedback they give each other would appear to be a scenario where customer C5 does not accept the conveyed on-time delivery figures from supplier S5.

The analysis activity in the PM process, as in the rest of the activities, is not conducted in a shared manner in the dyad. The partners do, however, apply an analysis form of annual meetings in which discussions are held about issues such as on-time delivery. The partners agree that the discussions about on-time delivery do not usually result in any mutual improvement projects. Supplier S5, however, claims that they initiate internal analysis in order to investigate the background and, if necessary, make improvements when C5 is not satisfied. This ought to be positive for the development of the dyad's competitiveness.

Consequences for S5 as a supplier

The interviewed persons at supplier company S5 agree that they find C5´s PM process to be incorrect. They claim that the consequences of their way of handling the PM process are important issues for them, especially when their company as a supplier is ***evaluated incorrectly***. This way of handling the PM process gives results showing that S5 is getting a ***worse reputation than it deserves***, which could lead to consequences such as ***lost sales or losing potential customers***. Luckily the aircraft industry is quite small, and the potential customers usually know about the performance capabilities of each potential supplier.

It seems that the frustration at S5 is much due to the notion that customer C5 does not have full control of its PM process, but still conveys the figures as if they were correct. S5 has on several occasions been able to prove C5 wrong at times when it has presented low on-time delivery figures for S5. This seems to have made supplier S5 somewhat skeptical of several of C5´s internal processes.

Consequences for C5 as a customer

Customer C5 considers the different ways of handling the PM process to result in a number of consequences, both internally and externally. Internally, the interviewees claim that the difference between the partners' handling of the PM process results in the ***insecurity*** over which partner has the correct on-time delivery figures. This insecurity leads to discussions and ***resources being spent on extra work re-planning and analysing projects***. Furthermore, those interviewed claim that the insecurity in the internal process dependability ***makes improvements and implementations more difficult to carry out***, and also drives the company to

build up ***unnecessary safety stocks***. C5 experiences this insecurity in its internal process reliability, and it seems as if C5 is the partner that reports lower on-time delivery figures than does its supplier. Therefore it is not surprising that customer C5 is forced to create safety stocks, even though they are not needed. If the responsible persons get signals of problems with deliveries not being on time due to low on-time delivery figures, it is only natural to react.

Externally, customer C5 claims that the differing ways of handling the PM process result in difficulties in discussions and improvement processes in the relationship with S5, because they ***do not have a common starting point*** when discussions are held about on-time delivery.

Consequences for dyad 5

As mentioned above, the interviewees from both partners in dyad 5 say that discussions between the partners often ***merely result in the partners agreeing that their handling of the PM process differs***, since their figures differ. Naturally both partners believe their own on-time delivery figures, and this ***creates mistrust in the relationship*** between the partners in the dyad. It also results in consequences of ***extra work*** and resources being wasted on meetings that seldom if ever result in any changes of the situation. Furthermore, the partners state that it becomes ***more difficult to implement mutual actions in order to improve the dyad's performance and competitiveness*** when the handling of the PM process differs between the partners.

In the aircraft industry it is quite common for customers to state in the contract how they will handle the PM process. It seems as if many of the consequences perceived as problems in dyad 5 would disappear, or at least could be addressed and solved, if this kind of contract also existed in this particular relationship. It is somewhat remarkable that supplier S5 has this kind of contract with other customers, but not with the customer that is within the same group of companies as itself. As with several of the studied dyads, close and informal relationships sometimes tend to result in an unstructured relationship that does not favor the competitiveness of the dyad's.

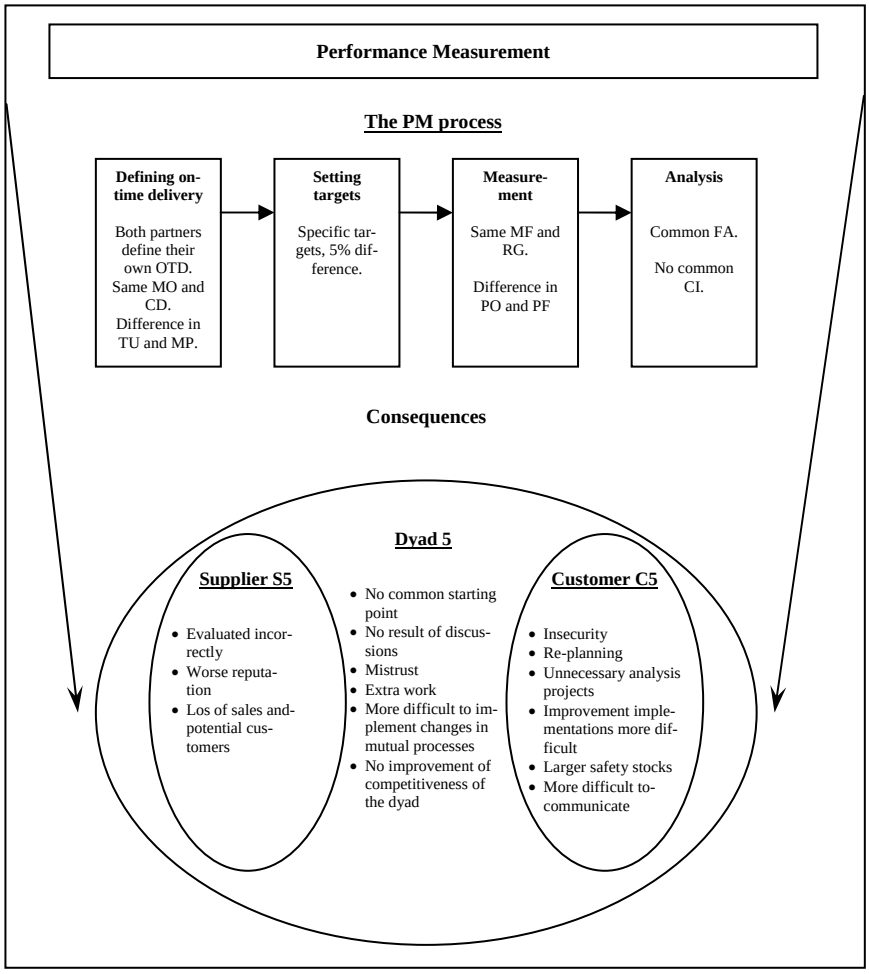

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Figure 4.5 Characteristics in the handling of the PM process and its consequences in dyad 5

4.2.6 Dyad 6

The PM process in dyad 6

As stated (appendix I), only supplier S6 conducts the PM process in dyad 6, and naturally the process is therefore not characterized as a shared and mutually agreed-upon process. The major reason for this situation is the fact that the studied partners once belonged to the same division of the company, and only when they were separated did S6 begin measurements of its on-time delivery towards C6, who had then become one of its customers.

It could be argued that **supplier S6´s definition of on-time delivery used in the dyad with C6 reflects somewhat the fact that it is the only partner conducting measurements in dyad 6** (figure 5.6). It is satisfactory for customer C6 that the measurement object in the definition is the "full order", since one late order line would result in a lower on-time delivery figure; using "accessible order" as the measurement point, and "acknowledged date" as the day compared, is more in supplier S6´s interest. This argument derives from the fact that this definition enables S6 to measure its point of view in performance, but not in comparison to its customer's wishes. In its orders to S6, C6 does not have any statistics on what delivery date it requested. Moreover, customer C6 does not have any data about whether delivered orders have been accepted or have been forced to be altered.
When studying the PM process activity of target setting in dyad 6, it appears as if this activity is not shared. **Both partners use specific targets for on-time delivery, but the targets differ**. Supplier S6 has a 5% higher target in on-time delivery for its customer C6 than does C6 for S6 as its supplier. Even though the targets differ, the partners have actually discussed the issue, and both have agreed to the specific figures. It can however be questioned how customer C6 is able to have a specific target for supplier S6 of 90% in on-time delivery when it does not conduct any measurements of its own.

The measurement activity of the PM process is naturally not a shared and jointly decided- upon activity between the partners, since only supplier S6 measures on-time delivery in dyad 6. This is done weekly, which is quite frequent when compared to other companies interviewed in the study. S6 generates its report of on-time delivery indirectly, and the interviewees say that the data is "washed" before a report is created. This could be seen as indicating a danger in the accuracy of the report, as discussed earlier, with the risk of using incorrect data as soon as that data needs to be handled and transferred from the ERP system. As both partners in dyad 6 have access to the same server they are both able to see and accept the outcome of the conducted measurements. The weekly measurements are taken up at monthly meetings, which results in common analyses and action processes such as the six sigma projects being instigated. In this way **dyad 6 is the only studied relationship where the activity of analysis in the PM process is a mutually conducted activity**. Having a structured approach, such as adding the concept of the six sigma projects to the analysis activ-

ity, ought to mean that the partners are able to implement significant improvement projects, thereby producing a very positive effect on the dyad's overall competitiveness.

Consequences for S6 as a supplier

Even though supplier S6 is conducting the measurements of on-time delivery in the dyad with C6, and is able to influence the dyad's mutual handling of the rest of activities in the PM process, it states that it encounters certain consequences as a result of the situation. The interviewees at S6 state that since they conduct the PM process, and C6 does not, S6 experiences a ***lack of feedback*** on its handling of the process. They claim that a consequence of this is that S6 is ***not able to get input from customer C6 in order to become more efficient in several of its processes, both internally and externally***. Furthermore, S6 experiences that it becomes ***harder to detect problems or opportunities of improvement*** when customer C6 handles the PM process as it does.

It would not be strange if supplier S6 was comfortable with the situation in which it was the only partner conducting all the activities in the PM process, since it is the one who has the input and, by that, gets to control the rest of the activities and their results. It is however positive that S6 has the drive to become better, and wants to improve its own competitiveness as well as C6´s and the dyad's. In particular this ought to please the management of the group of companies to which both partners in dyad 6 belong.

Consequences for C6 as a customer

The interviewees at customer C6 are concerned about the difference in the way the partners in the dyad handle the PM process. Since C6 has no measurements of S6´s on-time delivery it ***cannot evaluate S6 fully as a supplier***. This is serious, according to the interviewees, since C6 ***cannot present figures that show the management of the group of companies to which both partners belong that S6 is the most suitable supplier***.

Supplier S6 measures delivery time against the acknowledged date, and C6´s own lack of measurements leads to consequences such as the risk that supplier S6 ***does not prioritize C6 as a customer*** and consequently would rather handle other customer's orders. This has also led to ***internal conflicts*** about which partner that should take responsibility for the measurements, which could be ***negative for C6´s competitiveness in the marketplace***. Furthermore, C6 claims that since it does not conduct any measurements of its own, it becomes difficult to find areas in which supplier S6 can be improved.

It seems very strange that customer company C6 does not conduct any measurements of its own on on-time delivery, since all the experienced consequences seems to originate from its lack of its own PM process. As mentioned above, management at the group of companies both partners belong to has expressed its request for measurements, since Supplier S6 needs to be evaluated; in order for

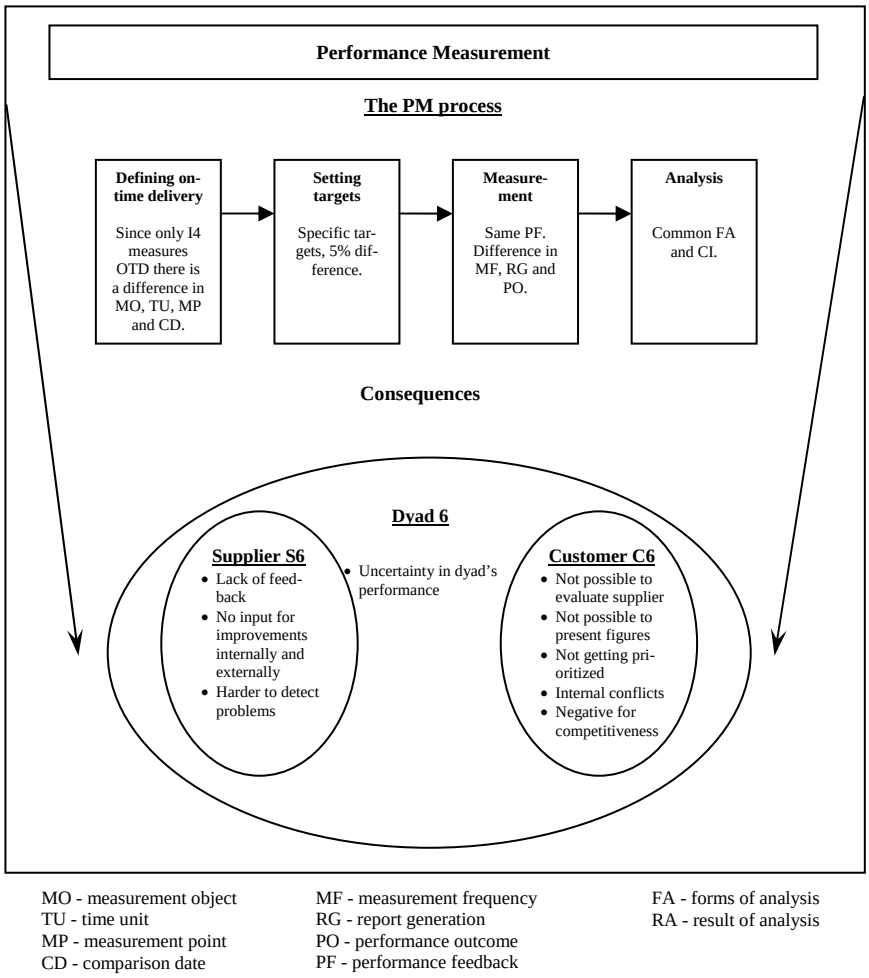
the whole group of companies to be as efficient as possible, S6 needs to be the best supplier.

Consequences for dyad 6

The relationship between S6 and C6 is very close and works well, but the interviewees say that they experience insecurity in the difference in the company's handling of the PM process. This result of this is a consequence of ***uncertainty if the dyad is performing as efficiently as is can***.

As argued in the cases of both dyads 3 and 5, it seems as if the informal relationship that is created when individuals or divisions that have been, or still are, within the same group of companies, later become business partners, they easily tend to cause problems. The informality appears to cause unstructured relationships that, while friendly and close, also lack respect and clear guide lines of behavior.

Dyad 6 is the only studied dyad in which the analysis activity in the PM process is shared, which is very positive. However, the input of the analysis activity comes only from one of the partners, since only one is conducting the PM process; that appears to be somewhat one-sided.



MO - measurement object
TU - time unit
MP - measurement point
CD - comparison date

MF - measurement frequency
RG - report generation
PO - performance outcome
PF - performance feedback

FA - forms of analysis
RA - result of analysis

Figure 4.6 Characteristics in the handling of the PM process and its consequences in dyad 6

4.2.7 Dyad 7

The PM process in dyad 7

In dyad 7 the PM process is not characterized as a jointly agreed-upon and conducted process. The main reason for this seems to be a lack in communication and joint improvement projects between the partners.

Even though the activity of defining on-time delivery in the PM process is not a shared activity in the dyad, the definition the two partners give of on-time delivery is quite alike (figure 4.7). Both partners use order line as their measurement object, which probably originates from the automobile industry in which they are active, and where demands considering each product being on time, and in the right quality is high. Both partners also use the day as their time unit, and supplier S7´s acknowledged date as the day they compare with in the measurements. The only difference that exists in the partners´ definition of on-time delivery is the fact that customer C7 uses the measurement point of accepted goods, whereas S7 uses accessible as its measurement point, even though it is the one responsible for the transportation. The companies are however only located two hours' driving distance from each other, which should have a positive influence on the accordance of the partners´ figures. Still, it could be argued that supplier S7 at least uses dispatched goods as its measurement point.

As mentioned (appendix I), the PM process is not a mutually conducted process, which also the fact that **both partners use average targets** for all their customers' and suppliers' on-time delivery figures indicates. Furthermore, the difference of 5% in the targets shows that the targets have not been jointly decided-upon. The difference of 5% could become a problem in the relationship, since C7 as the customer has a higher target than the supplier S7, implying that the customer's demands are higher than the supplier is satisfied with. As commented upon in other studied customer companies cases, it seems somewhat strange not to use specific on-time delivery targets for a supplier, since it indicates that the customer does not differentiate between the importances of different products purchased.

Both supplier S7 and customer C7 conduct the activity of measurements in the PM process, but they are done in a separate manner. Both partners measure once a month, but they do not give any feedback to each other about the performance outcome that is conveyed. This seems somewhat strange, since both partners during the interviews reported that the performed outcome in on-time delivery from S7 is much lower than both partners´ individual targets. When it comes to generating reports about on-time delivery figures, none of the partners have an ERP system that is capable of creating a report directly. Instead both partners manually create reports of on-time delivery indirectly, which as commented on before, causes a risk of data being used incorrectly, or of other human errors.

The activity of analysis in the PM process is a somewhat shared activity in dyad 7, but at the same time not. As mentioned (appendix I), the partners have not given any feedback on the low on-time delivery figures that each partner conveys to the other. This seems a bit strange, since it ought to be in the interests of both partners to take joint action in order to improve the on-time delivery of orders. The partners do have meetings every now and then, which is the form of analysis being used in the dyad. But time is scarce, and the results of the analysis activity are more one-sided when supplier S7 by itself tries to find causes for late deliveries in order to improve its own on-time delivery record.

Consequences

Since customer C7 did not have the time to continue its participation in this research project, no interviews were able to be conducted about the consequences of differing ways of handing the PM process. As supplier S7 did wish to continue participating, the interviewees answered according to their encountered consequences from a supplier's point of view and from the dyad's point of view in general. Therefore their experiences will be included in the broader analysis of consequences due to differing ways of handling the PM process in dyads.

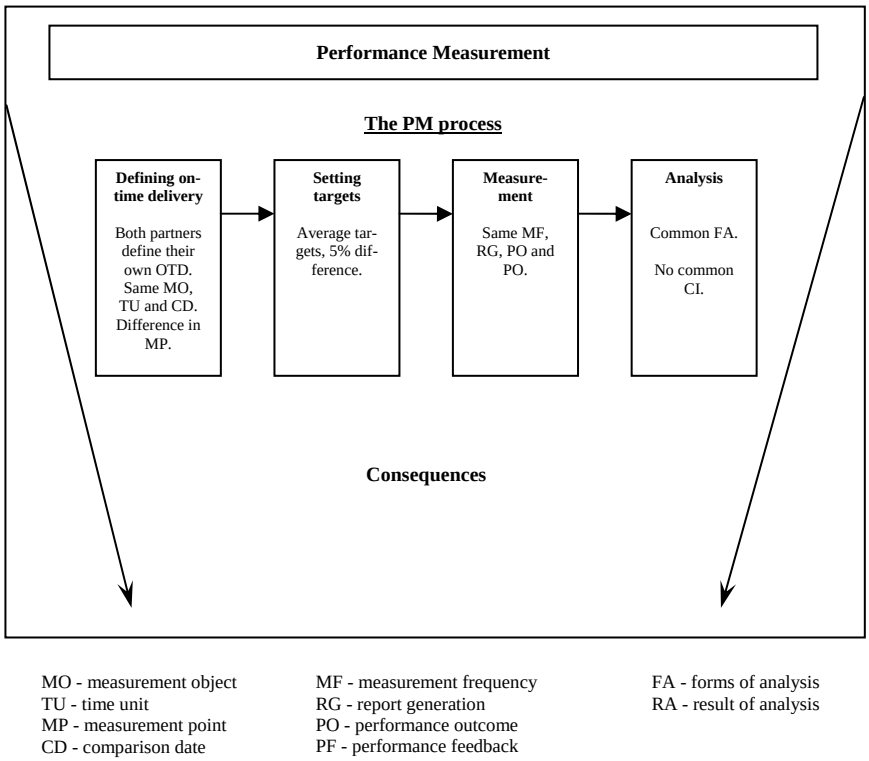


Figure 4.7 Characteristics in the handling of the PM process and its consequences in dyad 7

4.3 Cross-case analysis concerning consequences

In this part a cross-case analysis is conducted. The reason for this is to find patterns in the consequences of differing ways of handling the PM process. A combined summary of the consequences stated by the participants, and presented in section 4.2, will be analyzed in a cross-case analysis. This is done in order to explore what consequences the differing ways of handling the PM process result in.

In section 4.3.1 the cross-case analysis is focused upon the consequences encountered by the dyads participating in this research. In section 4.3.2 the focus is upon the consequences experienced as a result of differing ways of handling the PM process in general. This division is, as stated earlier in this chapter, done in order to get as complete an exploration of the research area as possible.

4.3.1 Cross-case analysis concerning consequences in the studied dyads

Consequences for the studied suppliers

From the analysis (section 4.2) a summary can be created of the consequences encountered by the suppliers due to differing ways of handling the PM process in the studied dyads (figure 4.8).

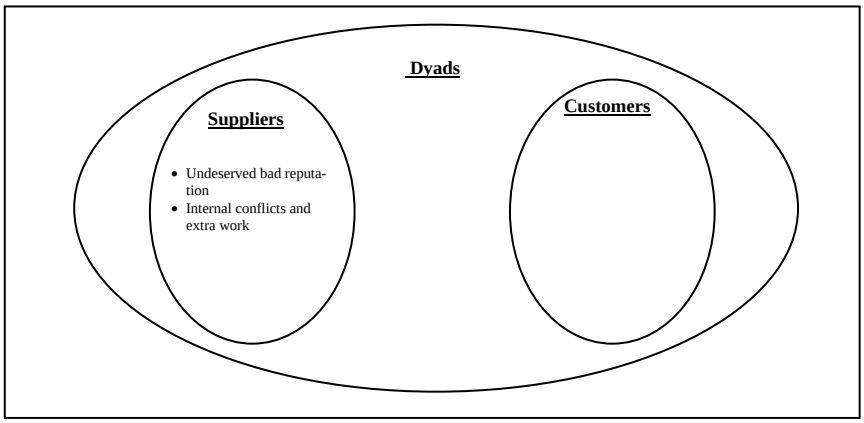


Figure 4.8 Consequences for the studied suppliers

Several of the interviewed supplier companies perceive a risk that they are getting undeservedly low figures when their customers conduct on-time delivery measurements based on differing ways of handling the PM process. This could result in a worse reputation for a supplier than it deserves, which could cause

consequences such as a loss of sales or of potential customers. One of the drivers to be in a close supply chain partnership is, according to Lambert *et al*. (1996), that the partners have a benefit in marketing. By performing better on-time delivery due to close partnerships, both partners are able to attain a reputation of performing on a high level, something which attracts new customers. This is especially true in industries with high demands in delivery service performance, such as the automotive industry; however, considering that risks of getting a bad reputation is perceived among the participating suppliers, it is clear that this worries any supplier in any industry. The supplier companies in smaller industries, such as the aircraft industry, have the advantage of potential customer companies knowing a lot about each supplier, since there are so few of them. This makes a supplier's reputation less significant. Some of the interviewed supplier companies stressed that a reputation of a high performance in on-time delivery is one of the best marketing tools available, since a reputation comes from action, and that speaks louder than words.

As van Donk and van der Vaart (2004) state uncertainties in a partnership indicate that the partners are not sufficiently close and cooperative, this is true in the case of the dyads of the worried supplier companies. It appears as if the suppliers that have experienced a risk of getting an underserved reputation are lacking trust in the dyadic partnership. Trust is one of the most important components of shared and mutually conducted processes, according to Lambert *et al*. (1996). The suspicion from some of the suppliers surrounding their dyad partner's differing way of handling the PM process reveals a lack of trust and cooperation in the partnership.

The rest of the interviewed supplier companies do not say they have encountered a "worse-reputation-concern"; furthermore, they do not seem to experience as many consequences as the supplier companies discussed. Does this indicate that they are in close collaborative dyads? In the case of dyad 2 this statement could be to some extent true. In this dyad the customer has invested in manufacturing equipment at the supplier, which is a sign of commitment and loyalty. Furthermore, they are sharing financial resources, which according to Lambert *et al*. (1996) lead to a stronger and more close partnership. This is also true in dyad 4, where the partners have mutually conducted development projects, and a partnership component that leads to a sharing of the risks/rewards as well as the benefit of asset/cost efficiency, which all brings the dyad partners closer (Lambert *et al*., 1996). The two dyads mentioned are also the ones that have not encountered any problems in on-time delivery, which results in fewer consequences experienced through the differing ways of handling the PM process. In the third dyad, where the supplier does not perceive a "worse-reputation-concern", only the supplier conducts on-time delivery measurements and has therefore naturally not encountered this consequence.

Another pattern in consequences due to differing ways of handling the PM process experienced by the suppliers in the studied dyads has to do with internal consequences. These internal consequences are issues such as re-scheduling manu-

facturing plans, internal conflicts due to discussions about responsibility, difficulties in detecting areas of improvement, and extra work of analyzing what the sources of the differences are. Suppliers that have encountered internal consequences share an atmosphere of an informal relationship in the dyad. It is however risky to conclude that this is an underlying cause, since suppliers in other informal dyadic partnerships do not always encounter these kinds of consequences. Furthermore, earlier conducted research states that the strongest and closest partnerships usually have the least specific contract, or even no written agreements at all (Lambert *et al.*, 1996). This indicates that informal dyadic partnerships rather are a positive starting point when implementing a shared and mutually agreed-upon PM process in the dyad successfully.

The two suppliers also have in common that they are partners that do not get full information surrounding their partner's PM processes, since the partners in question do not conduct any on-time delivery measurements themselves. Instead, the customer reports an experienced discontent with the supplier's on-time delivery performance. This results in an uncertainty at the supplier company which, as argued earlier, indicates that the partnership needs to become closer (van Donk and van der Vaart 2004).

Consequences for the studied customers

From the analysis (section 4.2) a summary can be created of the consequences encountered by the customers due to differing ways of handling the PM process in the studied dyads (figure 4.9).

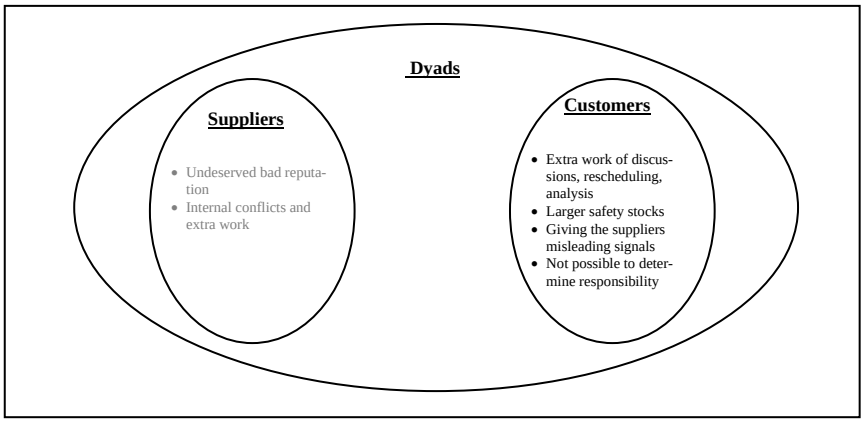


Figure 4.9 Consequences for the studied customers

When the stated consequences by the studied customers are studied in depth, it becomes clear that the customer companies encounter more consequences than do the studied suppliers. Another pattern is the fact that all the customers, except for the one that does not experience any consequences from the differing ways of handling the PM process, report the same kind of consequences. This is interesting, since the only aspect that is equivalent between the studied companies is the

circumstance that they are customers in a dyadic partnership. By that it is meant that they are not all within the same industry, do not have the same kind of relationship to the studied supplier, nor the same kind of situation in their marketplace. The answer to the pattern could be in dyad 4, which is the only one in which neither supplier nor customer experiences any consequences caused by the differing ways of handling the PM process.

In dyad 4 the supplier and customer work closely together in a partnership where, even though the PM process is not shared and mutually agreed-upon, the activities of product development and some planning seem to be jointly conducted processes. This is what theory advocates in the creation of positive consequences of shared and mutually conducted processes in supply chain partnerships (Lambert *et al*., 1996; Cooper *et al*., 1997; Reed, 1999). Therefore this dyad should have done the preliminary work in the implementation of a jointly conducted and decided-upon PM process as well.

Theory advocate that uncertainties increase the need for interacted supply chain processes (van Donk and van der Vaart, 2004), which is very true in the case of the consequences that the studied customers encounter due to differing ways of handling the PM process. The reason for this statement is the fact that the studied customer companies seem to have one common underlying cause to their experienced consequences, and that is insecurity; this is evinced both internally and externally.

From a customer company's point of view in the supply chain, integrated processes with essential suppliers are of importance in order to control uncertainties in manufacturing processes, as well as how well suppliers perform (Grant *et al*., 2006). In the studied dyads the PM process is not a shared and mutually agreed-upon process, which causes the customer companies to experience internal consequences such as extra work in discussions and analysis projects, building larger safety stocks, internal conflicts, rescheduling. Unnecessary resources are being spent on for example re-scheduling and meetings that do not give the customer company any more accurate information about which partner's PM process is accurately handled. This seems to make the customer company react by building safety stocks to handle the insecurity. Thus it becomes clear that the studied customer companies encounter quite the opposite to the positive heightened customer service consequence of mutually conducted supply chain processes in the form of reduced inventory, shorter cycle times, and more timely and accurate information, as stated by Lambert *et al*. (1996). The interviewed customer companies that state that they build unnecessary large safety stocks due to insecurity, also claim that the safety stocks risk hiding other internal and external problems, ones that otherwise would have become apparent and dealt with.

Furthermore, some of the customer companies state that they react externally by using a time unit in their definition of on-time delivery to cover up possible mistakes in their handling of the PM process. It does not seem to be a question of a particular branch of industry, but rather insecurity in the internal processes that

cause the customer companies to use larger delivery windows in their on-time delivery metric than they wish. The goods receptions´ work load and routines are often mentioned as possible internal concerns that are not fully comprehensible to the interviewees. The result is large delivery windows in the PM process. The customer companies worry that this gives the suppliers the wrong signal of their not being interested in deliveries being on time, which in turn could make the supplier not perform at the highest possible level. The customer companies that do not conduct any on-time delivery measurements conduct the same line of reasoning, and therefore also experience this to be a consequence of the differing ways of handling the PM process. It is evident that supply chain processes, like the PM process, need to be more jointly conducted and decided-upon in order to ensure deliveries being on time, as Smits *et al*. (2006) declare.

If the PM process was a mutually conducted and agreed-upon process, the sharing and utilization of information between supply chain partners would be more efficient, as earlier research shows (e.g. Groznik and Trkman, 2006; Trkman *et al*., 2007). In the studied dyads this is not the case, and therefore several customers encounter problems with uncertainties in establishing responsibility in the supply chain activities as consequences of differing ways of handling the PM process. The interviewees state that if the dyad partners had a shared and mutually decided PM process, they would be able to hold the actor who is accountable for a delivery being late responsible. This would result in the possibility for the dyad partners to hold outside actors such as carriers responsible, but also to maintain a better visibility of the supply chain activities, which according to Hofman (2004) would further support a shared PM process.

Consequences for the studied dyads

From the analysis (section 4.2) a summary can be created of the consequences the dyadic relationships encounter due to differing ways of handling the PM process in the studied dyads (figure 4.10).

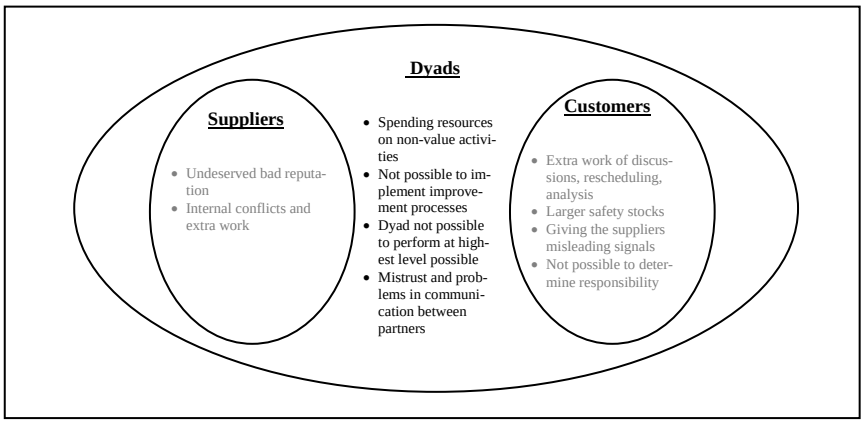


Figure 4.10 Consequences for the studied dyads

When investigating the consequences (figure 4.8, figure 4.9, and figure 4.10) it becomes obvious that no studied partner seems to encounter positive consequences of the differing ways of handling the PM process. This indicates that the studied dyadic partnerships could be much closer (Lambert *et al*., 1996).

Whereas both of the interviewed partners in dyads 1, 3 and 5 experience quite a lot of consequences of the differing ways of handling the PM process, the dyad partners in 2, 4 and 6 perceive almost none. In the latter group it might be argued that one reason could be location of the partners, where all the dyad partners are located very close to one another. This argument of local sourcing does not however explain the fact that one of the dyads that encounters the most consequences is also located only with a driving distance of minutes between the partners. Furthermore, none of the studied dyad partners have more than a few hours' transportation distance between each other.

Other explanations worth considering regarding the difference between the studied dyads and the amount of reported consequences in each could be the formality of the relationship between the dyad partners, the branch of industry, the power structure, and company sizes. None of the mentioned variables can, however, explain the circumstance that half the studied dyad partners experience more numerous consequences than the other half. The major reason for this statement is the fact that a variable that evidently exists in a "several-consequences-dyad" also exists in a "no-consequences-dyad" and vice versa. It can be noted, however, that dyads 2 and 5 where the partners do not state any consequences at all due to differing ways of handling the PM process, both seem to be working in a closer manner than the other studied dyads. As mentioned earlier, these dyads have for example invested in mutually conducted product development projects, and it appears as if the supplier companies are willing to put extra work into the customers in question. By this, the partners have taken a step on the way of becoming a closer supply chain partnership, according to Lambert *et al*. (1996). Another less complex explanation as to why the partners in dyads 2 and 5 do not experience any consequences could be the simple fact that these dyads have not encountered any problems with deliveries not being on time. Therefore, the partners have not really ever had any reason to compare and therefore question each other's ways of handling the PM process. Another variable in both dyads is the circumstance that the supplier is located close by and of considerably smaller size, but these prerequisites exist in other dyads as well. It can be concluded that none of the studied dyads have a shared and mutually agreed-upon PM process. That means that this research neither can nor cannot confirm that variables such as company size, power structure or industry characteristics are obstacles to shared supply chain processes, as earlier conducted research implies (Bates and Slack, 1998; van Donk and van der Vaart, 2004).

Dyad 6 is also one of the dyads where the partners do not experience many consequences due to the differing ways of handling the PM process concerning on-time delivery. In this dyad, however, only one of the partners conducts on-time delivery measurements, and the encountered consequences are thereby somewhat

oblique. The dyad has the advantage of access to a common server which supports the partnership communication and thereby the creation of a closer supply chain relationship (Lambert *et al*., 1996; Basu, 2001). However, the dyad processes cannot become shared until both partners can participate and jointly agree upon, and conduct, the activities in the PM process in a mutual manner according to Forslund and Jonsson (2007).

Communication is a vital component in a close supply chain partnership (Lambert *et al*., 1996), but even though the studied dyad partners seem to communicate quite a lot, several partners perceive communication to be a part of the negative consequences. The interviewees mean that a lot of resources are being spent on non-value-adding activities such as meetings and discussions that do not explain the sources of the differences in the handling of the PM process, or how to mange them. If the studied dyads had a shared and mutually decided PM process they would be able to communicate and speak the same language (Griffis *et al*., 2004). By being able to speak the same language and mean the same thing, the partners would have a common starting point in the decision-making surrounding the content in the activities of the PM process. Instead the studied dyad partners talk past each other; implementing improvement processes becomes more difficult, which in turn creates even more uncertainty about the other partners´ processes.

Another consequence encountered by the studied dyad partners that the dyads are being subjected to by having differing ways of handling the PM process, is the questioning of the dyads´ performance. Lambert *et al*. (1996) argue that one of the most distinctive drivers for shared supply chain processes and close partnerships is the possibility of profit stability for key supply chain partners, and growth through higher competitiveness. The interviewees fear, however, that their dyad does not perform at the highest level possible. This is because of the difficulties in understanding each other, and the insecurities that the partners perceive as a result of a non-shared and agreed-upon PM process which is handled differently by the partners.

The partners of the “several-consequences-dyads” also report that when the partners discuss the results of each PM process, they experience several consequences due to mistrust and problems with commitment within the partnerships. If a supply chain process is shared in a partnership, the partners trust and is committed to each other. This in turn leads to other improvements in the supply chain process, according to Lambert *et al*. (1996). Since the PM process is not mutually conducted and agreed-upon in the studied dyads, the partners say that each company tends to believe in its own PM process results, which do not give the partners a common starting point, and therefore often leads to misunderstandings and a negative atmosphere in discussions. According to the interviewees this in turn makes it more difficult to negotiate and create a really close and well-functioning supply chain partnership.

4.3.2 Analysis of consequences in dyads in general

Besides the consequences that the interviewees experience in the studied dyads, the partners have also encountered additional consequences. These are not only due to the differing ways of handling the PM process, they are also experienced in other dyadic relationships in the supply chain. These are shortly discussed in order to give as complete an exploration of the second research purpose as possible. The presented consequences are a summary of the interviewees´ statements, and will not be examined from the circumstances within a specific dyad. This is because the interviewed persons have answered from general experience, and not specified the detailed prerequisite of each reported case. No additional consequences from the perspective of a dyad were mentioned during the conducted interviews, for which reason no others than the ones already analyzed in 4.3.1, will be discussed.

Consequences in general

Some of the supplier companies say that they have created larger safety stocks as a consequence of the differing ways of handling the PM process in dyadic partnerships. The reason why they have created unnecessary safety stocks is that they try to overcompensate because of insecurity in their on-time delivery performance. The interviewees claim that this is an ineffective use of resources that do not solve the problems in the long term.

Several of the interviewed persons at the supplier companies say that suppliers cannot ignore a differing PM process result reported by a customer, and therefore are forced to react and spend resources. This is done since they fear being replaced, and the supplier companies say that this is a consequence of differing ways of handling the PM process in dyadic partnerships that they have encountered. Because of this it becomes evident that they do not have a shared PM process, since Lambert *et al*. (1996) claim that if a supply chain process is shared, the partners take part in a committed relationship in which they are loyal to one another, and none of the partners experience a fear of being replaced.

When dyad partners report different PM process results, management in the supplier company may react in a negative manner and question the performance of the internal processes. Some of the interviewed supplier companies say that the reported PM process result is unfair and incorrect, but still creates a negative atmosphere in the companies that leads to several other negative consequences, such as extra documentation and analysis projects.

Several of the interviewed supplier companies state that when the handling of the PM process differs in the dyad partnerships, there is a risk for the consequence of suppliers believing that they perform at a high level, whereas the customers' apprehension is different. By that, the supplier has a false notion of their on-time delivery performance.
Several of the interviewed customer companies say that they think it is very remarkable that suppliers do not adapt their PM process to that of the customer.

They say, as theory also advocates (e.g. Grant *el al*., 2006), that suppliers need to meet their customers´ demands in order to be competitive in the supply chain. If a customer is dissatisfied with a supplier's on-time delivery, there should not be a discussion about the differing ways of handling the PM process, but rather an adjustment to the customer's way of working.

When the way of handling the PM process differs in the dyad, some of the customer companies report that they encounter consequences in the internal working environment. They mean that the differing results reported by the partners create an internal insecurity that leads to internal conflicts, and that those affect the working environment in a negative manner. Furthermore, the internal insecurity makes it more difficult to get the personnel motivated, since the customer company may handle the PM process erroneously and report results that are not correct.

Another consequence due to internal insecurity created by differing ways of handling the PM process is that it becomes difficult to detect supplier performance trends at an early stage, and be able to react in time. The interviewees at the customer companies say that when they do not have confidence in their PM processes results in their not daring to force suppliers to pay fines for late deliveries. These negative influences on the internal atmosphere and processes may, according the interviewed persons, also result in other consequences that can spread throughout the customer company. They imply that it affects the customer company's reputation and competitiveness in a negative manner.

Some customer companies say that even though a supplier is important, and performs at an acceptable level, management may react negatively to the differing reported PM process results. This may cause conflict and force the personnel involved to spend time on explaining the situation, as well as forcing personal opinions to come in to account. If conflicts caused by difficulties in communication and collaboration occur in the dyad due to the differing ways of handling the PM process, the customer company may be forced to replace a supplier as a consequence thereof.

Several customer companies say that a consequence of the differing ways of handling the PM process is difficulties in making a good supplier to an outstanding one. The interviewees mean that if the dyad partners are not close enough, it is hard to have a very effective collaboration in the dyad, with continuous improvements. Without a close supply chain partnership the positive consequences of this kind of relationship, as reported by theory (e.g. Lambert *et al*., 1996), become difficult to obtain.

4.4 Concluding analysis

The research questions of this study are;

- What are the characteristics in the handling of the PM process concerning on-time delivery in supplier-customer dyads?
- What consequences do differing ways of handling the PM process concerning on-time delivery result in for the suppliers, the customers, and the dyads, respectively?

In this part of the analysis chapter, the result of each of the research questions is presented. The chapter ends with the final model illustrating the characteristics and consequences of the PM process.

4.4.1 The characteristics of the PM process

The first activity in the PM process is **defining on-time delivery**. The handling of this activity in the studied dyads is characterized as not being jointly conducted or agreed-upon. In general the studied dyad partners have the same measurement object in their definitions of on-time delivery, namely the order line. Several of the studied dyad partners have the same comparison date in their definitions. This definition differs, however, between all dyad partners when it comes to the measurement point and the time unit used.

The second activity in the PM process is **target setting**. This activity is also characterized as an activity not mutually conducted and decided-upon in the studied companies. In half of the dyads average on-time delivery targets are used, but differences in the targets exist in all the dyads. In the other half of the studied dyads, the partners use specific on-time delivery targets for the studied dyad partner in question. Almost all the specific targets, however, differ between the dyad partners.

The third activity in the PM is **measurement**. The handling of this activity is, as with the previous activities in the process, characterized as an activity that is not a jointly performed and agreed upoin the studied dyads. The studied dyad partners do, nevertheless, generally conduct measurements of on-time delivery. This is most often done monthly, and the most common way of creating reports among the studied dyads is in an indirect fashion. A characteristic is also that almost none of the studied companies give their dyad partner any feedback about their on-time delivery measurement results.

The fourth and last activity in the PM process is **analysis**. As with the rest of the PM process, it is also characterized as an activity that is not mutually conducted and agreed-upon. The studied dyads do, however, usually employ meetings as a

form of analysis, but these meetings do not often handle follow-ups of past performance or lead to continuous improvement processes.

The studied supplier-customer dyad partners all consider each other to be of strategical importance in the supply chain, but do not share and/or mutually decide upon the handling of the PM process or content, as researchers advocate (e.g. van Donk and van der Vaart, 2004; Forslund and Jonsson, 2007).

When looking at the result of this study regarding the characteristics in the handling of the PM process, it becomes clear that some of the characteristics are conformed by earlier conducted research, and others not.

Keebler *et al*. (1999); Forslund and Jonsson (2007) claim that the PM process´ activity of defining metrics, in this case on-time delivery, is difficult, complex and often carried out by the partners separately (Forslund, 2004). Empirical studies within the area are however rather few, thus this study's result, showing different definitions of on-time delivery in all studied dyads, endorse this claim.

Even though, several of the studied partners do not carry out any delivery service measurements, all the studied supply chain partners find on-time delivery as a very important metric to be measured in their supply chain. This is in accordance with earlier conducted research, which shows that on-time delivery is one of the most important metrics to be measured when evaluating the performance of delivery service by supply chain members (e.g. Fawcett and Cooper, 1998; Stock and Lambert, 2001). Furthermore, the studied partners have a strong focus on end-customers throughout the supply chain, as researchers such as Schmitz and Platts (2004), Brewer and Speh (2000) advocate. However, few studies have empirically proved this, and the presented findings consequently confirm and validate earlier conducted research within the area.

Caplice and Sheffi (1995) say that there is a lack of shared PM processes within supply chains, and Hofman (2004) claims that one of the reasons for this is the partners' problems of understanding the necessity of a jointly conducted and agreed-upon PM process. This is the case in the studied partners, but Hofman (2004) also claims that the other reason for the lack of shared PM processes is the existence of too many metrics to choose between. The studied supply chain partners however all agree about the importance of measuring on-time delivery. By that is meant that this study indicates that agreeing upon a metric of equal importance to the partners is not a reason to having a non-shared and mutually agreed-upon PM process.

Earlier conducted research of the activity of target setting in supplier-customer dyads implies that the partners cooperate when carrying out the activity (Forslund, 2007). In order for the targets to reflect customers´ need, researchers also state the need for this activity to be coordinated in the supply chain (Holmberg, 2000). On the other hand the results presented in this study show otherwise. None of the studied partners have a shared and jointly decided target setting ac-

tivity. Furthermore, none of the partners finds the activity to be of such an importance as earlier research indicates (Basu, 2001). More so, no pattern can be found concerning the use of average or specific on-time delivery targets, and by that this empirical study contradicts the view that the use of specific targets indicates that the activity is mutually conducted and decided-upon (Forslund and Jonsson, 2007).

Researchers such as (e.g. Keebler *et al*., 1999) argue that the measurement activity in the PM process should be a shared activity between the supply chain partners. This empirical study shows, however, that even though the characteristics are the same in the way the studied dyad partners handle their measurement activities, they conduct the activity in separate ways.

There is a lack of mutually conducted systematic analysis (Caplice and Sheffi, 1995), and not having a shared measurement activity could, according to Forslund and Jonsson (2007), indicate that the following activity of analysis in the PM process is not conducted as effectively as possible. These statements are reinforced by the findings of this study, where the analysis activity is not jointly conducted or agreed-upon. More so, very little of the measurement data is used for improvements in the supply chain, even though the studied partners often have meetings and discuss on-time delivery figures.

4.4.2 The consequences of the PM process

In the studied dyadic relationships the PM process is handled in differing ways, which results in consequences for the suppliers, the customers and the dyads.

Several of the studied **suppliers** experience a fear of an underserved bad reputation as a consequence of the differing ways of handling the PM process in the dyads. Furthermore, the studied supplier companies encounter internal conflicts and the extra work of discussions and re-scheduling as a result of the differing ways in the handling of the PM process. This is probably due to the insecurity that arises when the partners report differing on-time delivery figures. These consequences are reversed negative sides to the consequences and components of mutually conducted and agreed-upon supply chain processes, as reported by earlier research (Lambert *et al*., 1996).

This result of the study indicate that the **customers** in a supplier-customer dyad experience more consequences than their supplying dyad partners, as a result of the differing ways of handling the PM process. Encountered consequences often mean extra work, internal discussions and rescheduling, but also of not having the possibility to determine responsibility in the supply chain, and the creation of unnecessary safety stocks that tie unnecessary capital. Most of the encountered consequences seem to derive from insecurity due to differing ways of handling the PM process. The insecurity thus experienced probably also explains the tendency among the studied customers towards a larger time unit than they would wish to have in their definition of on-time delivery. A larger time unit in turn

creates an encountered consequence of a fear of giving the supplier misleading signals that one is not interested enough in high performances in on-time delivery.

According to the involved partners, the studied **dyads** encounter various consequences due to the differing ways of handling the PM process. The interviewees claim that when the dyad partners discover that their PM process differs, they often spend unnecessary resources on non-value adding activities such as internal meetings and analyses, as well as meetings with each other that do not create any improvements to the dyad. Thus the resources are spent, producing nothing but an agreement on the difference in their handling of the PM process. The handling of all the activities in the PM process differs between the partners, which causes the studied dyads to experience problems in implementing improvement processes that should have been a result of the analysis activity in the process. In addition, many of the interviewed persons say that the dyads encounter a consequence by dint of not having the chance to perform at the highest level possible due to insufficient cooperation in the conducting of processes such as the PM process. Then too, the differing handling of the PM process in the dyads causes consequences of problems in the communication between the partners, and this can provoke mistrust in the dyadic relationship where the partners tend to believe in the results of their own PM processes instead of their partners´.

Several researchers call for mutually conducted supply chain processes, and often emphasize the positive consequences of an integrated PM process (e.g. Brewer and Speh, 2000; Frolich and Westbrook, 2002; Grant el al., 2006). Little empirical research has however been conducted on the consequences of not having a jointly conducted and agreed-upon PM process. This implies that the result of this study brings new insight to the overall situation, both theoretically and practically.

Increased communication is one of the positive consequences of a shared and mutually agreed-upon supply chain process, according to researchers such as Lambert *et al*. (1996) and Hofman (2004). The result of this study, on the other hand, shows that even though the studied dyad partners do not have a mutually conduced and decided PM process, they still frequently communicate with each other. This could indicate a common starting point in sharing of supply chain processes, according to Lambert *et al*. (1996), but this is not the case in the studied dyads. Instead, the findings of this study indicate that the dyad partners are not able to find a common ground in their discussions, as a result of differing ways of handling the PM process. Therefore they are not able to speak the same language that researchers call for (Griffis *et al*., 2004). This is probably the reason why several of the studied dyads experience some of the mentioned negative consequences such as spending resources on meetings that do not improve the dyad’s performance, mistrust, and a fear of not performing at highest possible level.

Forslund and Jonsson (2007) propose that the supply chain partners need a contract to ensure a mutually conducted and agreed-upon PM process. Whereas Lambert *et al*. (1996) suggests that having a less formal contract, or no contract at all, indicates a partnership with shared processes. Furthermore, researchers such as Bates and Slack (1998), and van Donk and van der Vaart (2004) state that examples of obstacles to shared supply chain processes are if one partner is larger than the other, or has more power than the other. The circumstances of the studied dyads as regards company size, power structure, distances, contracts, and industry characteristics differ both between the studied dyads and the studied partners. It is however difficult to find any patterns in the circumstances that would explain why some dyad partners experience a larger number of consequences than do others. As a result, this study neither can, nor cannot, confirm earlier conducted research studies within the area.

This study discloses that insecurity is an evident consequence that the studied supplier-customer dyad partners encounter due to differing ways of handling the PM process. Furthermore, the studied dyad partners do not have a shared and mutually agreed-upon PM process. By that, the result of the study verifies earlier research, which states that perceived insecurity in supply chain partnerships is an indication that the partners are not working sufficiently well together (van Donk and van der Vaart, 2004). The perception of insecurity as a consequence of the differing ways of handling the PM process in dyadic partnerships is also prominent in other dyads besides the ones studied. In the stated consequences as experienced in general for a supplier, a customer and a dyad, the underlying cause seems to be those of insecurity and of not trusting the dyad partner. This in turn brings about both internal and external negative consequences, such as an unawareness of performance levels, of suppliers being replaced, and of customers forced to replace non-co-operative suppliers. These examples of encountered general consequences are issues that validate the research, and state that they are an indication of supply chain processes that are not shared enough (Lambert *et al*., 1996).

It is understandable that supply chain partners who do not share and mutually decide upon supply chain processes do not get to experience the positive consequences of having shared supply chain processes, such as the ones pointed out by earlier research within in the area (e.g. Lambert *et al*., 1996; Brewer and Speh, 2000). The findings of this study, however, seem to indicate that several dyad partners not only miss out on the positive consequences, but rather experience the mentioned positive consequences in a reversed negative manner as a result of them not conducting the PM process in a shared manner.

4.4.3 Final model

It can be concluded that the PM process is not shared and mutually conducted and agreed-upon (section 4.1.1.). In the final model presented, however, the **most common** characteristics in the handling of the PM process in the studied supplier-customer dyads are illustrated. This means that the presented character-

istics consist of the **most frequent** way of handling the different activities in the PM process in supplier-customer dyads. In some cases no pattern can be found, which implies that the numbers of suppliers or customers handling a specific activity in a certain way are equal.

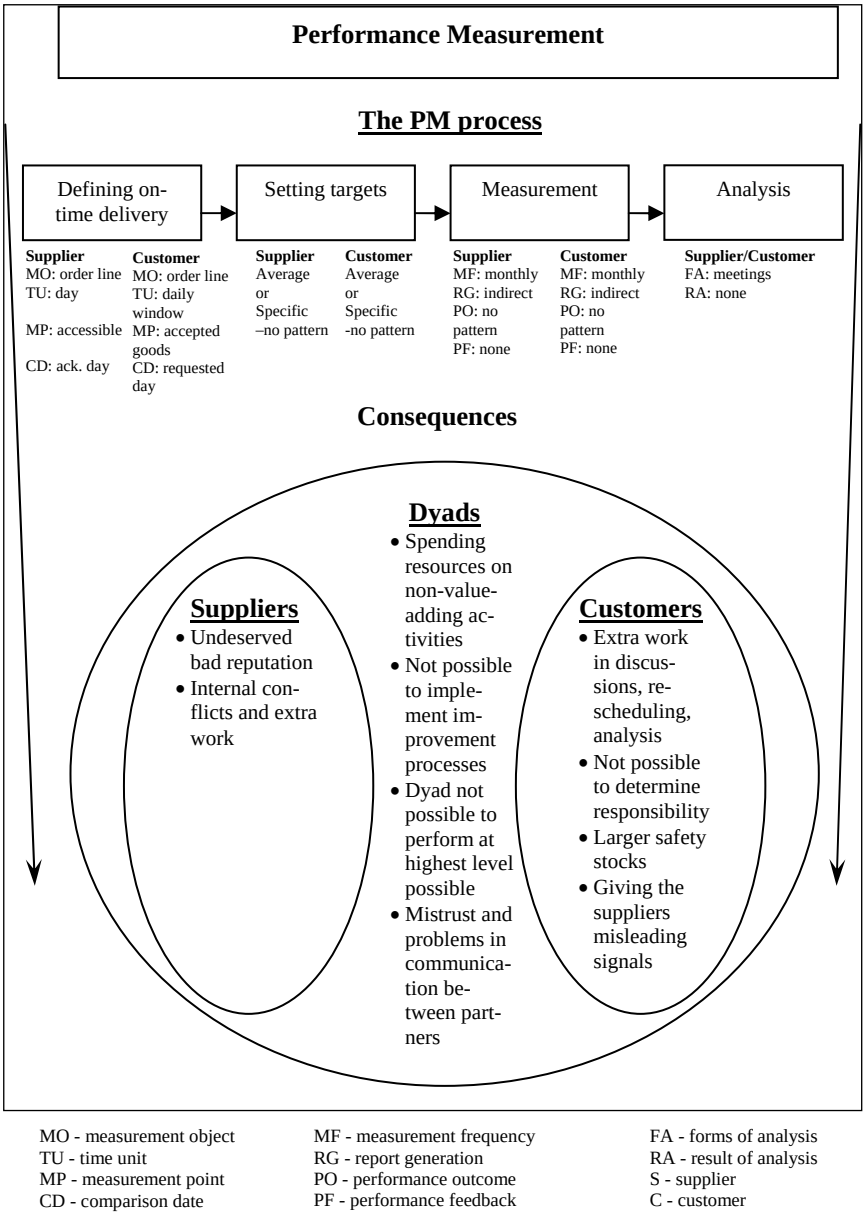


Figure 4.11 Final model of the characteristics in the handling of the PM process and its consequences

5. Conclusions and final discussion

In this chapter a brief summary of the conclusions in this thesis is presented. Furthermore, a discussion regarding further research, as well as a reflection over the study as a whole is held.

5.1 Conclusions

In this thesis the characteristics in the handling of the PM process concerning on-time delivery in supplier-customer dyads have been identified (figure 4.11). The conclusion can be made that the PM process is not one shared and mutually agreed-upon between the dyad partners within each activity in the process is, but is handled in a separate manner between the partners. An explanation as to why the PM process is not jointly conducted between the dyad partners could be the apprehension that measuring on-time delivery is not of importance, but as this study has shown, this is not the case. It can be concluded that supplier-customer dyadic partners are more often than not unaware of each other's ways of handling the PM process. More so, the dyad partners generally have not considered the consequences they experiences due to differing ways of handling the PM process in their supplier-customer dyads. Additionally, this study shows that communication is not enough in the creation a mutually decided on and conducted PM process in supply chain dyad partnerships. Instead the partners need to become more knowledgeable of the characteristics of each other's handling of the PM process in order to be able to speak the same language and have a common starting point in discussions.

This thesis also explore what consequences differing ways of handling the PM process concerning on-time delivery result in, as experienced by suppliers, customers, and dyads, respectively (figure 4.11). The study shows that suppliers experience fewer consequences than do their customers, due to differing ways of handling the PM process. An explanation to this may be that buying customer companies usually has more at stake concerning late deliveries than does supplying companies. Insecurity caused by differing ways of handling the PM process seems to be the source to most of the encountered consequences. From this study it can be concluded that when the partners present different results of their PM process, both partners experience both internal and external negative consequences in the dyad partnership. More so, this study implies that supplier-customer dyads not only forego positive consequences of a mutually

conducted and agreed-upon PM process, but also experience the reversed negative consequences due to not sharing the process enough.

The in-depth examination of the characteristics in the handling of the PM process concerning on-time delivery in dyadic partnerships in several different industries provides valuable knowledge. The findings of the study are expanding the scope of research from single firms to supplier-customer dyads; it is research that is otherwise scarce to find (Schmitz and Platts, 2004). By identifying the characteristics in a structured, illustrated manner, **contributions of this study are both theoretical and practical**. This statement can be made in the knowledge that the findings not only enhance knowledge within research, but also that of practitioners. This kind of contribution is also valid in the exploration of the consequences due to differing ways of handling the PM process concerning on-time delivery in supplier-customer dyads.

It is difficult to generalize the conclusions of this study; the main reason for this is the fact that only seven dyads, in different settings, have been studied in the thesis. More so, the participating dyads were chosen with the method of "convenience sampling", and a thorough investigation of the population, and choice of appropriate samples, has therefore not been conducted. The research areas of the characteristics of the PM process, the consequences and dyadic perspective, however, all lack empirical studies; thus in-depth case studies are necessary. Furthermore, the studied dyad partners provided very similar answers during the conducted interviews, which would evince the existence of external validity. Thereby, it could be possible to generalize the findings of the study, as claimed by Yin (2003).

Few studies have empirically identified the characteristics in the handling of the PM process concerning on-time delivery, or any other performance measurement area, in dyadic partnerships. Therefore this study may help companies in supplier-customer dyads to become more knowledgeable about how and why their dyad partner handles their PM processes as they do. Consequently, **the results of the study make a practical contribution to industry**.

Another practical contribution is that the studied dyad partners need to collaborate more when handling the PM process. One recommendation to consider is the one by Gunasekaran *et al*. (2004) who stated that supply chain partners need to develop cross-functional teams with each other, with the aim of evolving a shared process-oriented structure in order to attain an efficient flow of resources throughout the supply chain. These kinds of partnerships can minimize or eliminate functional and departmental boundaries and overcome any negative consequences of each partner's specialization, and by that achieve improved supply chain competitiveness. Such partnerships support the development of modern supply chains by jointly supporting conducted and decided processes between suppliers and customers.

The findings of this study may also draw companies´ attention to the consequences of differing ways of handling the PM process in dyadic partnerships. Mangers can get an understanding that supply chain partners who do not have a shared and mutually agreed-upon PM process not only forgo positive consequences, but also experience negative ones. Thus, this study is of practical relevance for industry.

5.2 Further research

During the research process several interesting questions have emerged. These questions are not only the results of chosen delimitations in the thesis, and of weaknesses identified in the methodology used in this study, but also of new studies that are related to conducted analyses and the research areas.

The findings of this study could neither confirm nor otherwise the role of moderating variables such as industry characteristics, the existence of contracts, or the power structure in the encountered consequences. Therefore it would be interesting to study the impact of a single variable on to what extent the PM process is shared in a partnership or not. Furthermore, it would be interesting to investigate the correlation of single moderating variables with the characteristics in the handling of the PM process concerning on-time delivery, or any other performance metrics. Lastly it would also be interesting to conduct research on how different moderating variables interact with the consequences experienced due to a certain way of handling the PM process.

It would be interesting to carry out a longitudinal in-depth case study of a few of the participating supplier-customer dyads who during this study did not conduct any on-time delivery measurements, and view their development of a PM process. This kind of study could investigate areas such as; advantages of measuring the performed on-time delivery in a dyad, how the performance in on-time delivery is affected in the dyad, and what problems the dyad partners encounter during the implementation of a PM process.

Furthermore, it would be interesting to conduct a longitudinal in-depth case study of experienced consequences in dyads that begin to handle the PM process in a shared manner. By exploring the encountered consequences in a dyad that has mutually conducted and agreed-upon the respective companies' PM process, it should be possible to explore if there exists a change in the consequences experienced. The implication of this study concerns the fact that dyads not only forego the positive consequences that companies get of a mutually conducted PM process, but also experience the reversed negative consequences due to not sharing the process enough, could be explored.

Even though there is a need for in-depth case studies to be conducted within these research areas, it would be interesting to carry out survey studies. One important argument for this kind of research strategy would be the opportunity to

test and explain the patterns and connections which have been identified in findings of this study. Such a study would also generate more general conclusions.

5.3 Reflections over the study

This licentiate thesis does not explain or link a specific encountered consequence to a particular activity in the PM process. The reason for this is that the PM process and the experienced consequences have been studied as a whole. The consequences therefore derive from differing ways of handling the PM process in general, and not from individual activity. The argument for this kind of approach is, however, the fact that the interviewees were asked to give their subjective encountered consequences due to differing ways of handling the PM process. If the interviewed persons also would have had to state their opinions about which specific activity in the process that causes each consequence, similar patterns could become hard to find, and the research quality would deteriorate.

From the results of this study it becomes clear that customers need to convey how they conduct the PM process in order for suppliers to be able to react and prevent dissatisfied customers. That means preventing inferior customer service in their delivery service.

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Appendix I; Empirical data

This appendix presents the empirical data collected through interviews with representatives for the companies studied in the research project (table 2.3 to 2.9). The appendix describes the characteristics in the handling of the PM process in the studied dyads, thereby illustrating its activities. Finally the experienced consequences of differing ways of handling the PM process are introduced for the supplier, the customer and the dyad respectively. This is done both for the studied supplier-customer dyad, and also in general terms.

I-1.1 Dyad 1

I-1.1.1. Company characteristics

S1 - the supplier company

This supplier is a division within a larger multinational company, localised some two hours' drive from the customer C1. The overall turnover for the group is about 400 Million Euro. The studied unit in Småland has a turnover of 45 Million Euro and has 320 employees. S1 produces customized components to the automotive industry, and the product portfolio contains 150 end products. Its customers are to 1/3 internal customers, but also automotive producers (e.g. Volvo and Scania) and suppliers to the automotive producers (e.g. Bosch). Customer C1 purchases 10 different kinds of brake components. Supplier S1's competitive advantage is built on product quality, where the demand is extremely high. Company C1 is one of its largest customers, and is consequently a strategically important customer for S1.

C1 - the customer company

The studied unit C1 is located in Skåne and makes brake systems and components for on-road and off-road vehicles; it is a world market leader in its particular segment. C1´s customers are in the automotive industry, and also other component manufacturers. The largest customer segment is European heavy truck manufacturers. The studied unit in Skåne has a turnover of 104 Million Euro and some 500 employees. Supplier S1 is a single supplier of two of the components, including about 20 different variants. While the components have a high volume, they do not represent a high value, and are thus typical B items. Because of the single source and relatively high volume to value ratio of the two components, S1 is considered to be a strategically important supplier.

I-1.1.2 The dyadic business processes

The purchasing process

C1 makes products based on delivery schedules/call-offs and on specific customer orders. The accuracy of the forecasts received from OEMs is considered high, but the forecasts of the other customers' demands are less accurate. Still, the demand for S1's components is quite even and stable. Company C1 sends annual forecasts and 12 weeks' rolling delivery schedules to supplier S1, which are updated once a month. The schedules are frozen within the transportation time, plus one day. Orders arrive weekly, with one order line per order. There is an almost daily contact between the responsible material planners at the two partners.

The order-to-delivery process

Company S1 freezes its orders the same morning that production starts. The raw material (tube or bar) is often decided by the customer, although this is purchased based on forecasts, as delivery times can be up to 8 months. Express raw material deliveries can also be arranged thanks to the good relationship with the suppliers, and due to S1 being one of their largest customers. In order to produce the most important product for customer C1 (a so called DRS, a motor component) the raw material is grounded and hardened. During the production process a number of quality appraisals take place to satisfy the rigorous quality demands. The internal lead-time at S1 is 11 days, most of which time is taken for the hardening process. A minor safety stock of finished goods is kept for customer C1, as supplier S1 has a larger production capacity than C1 demands.

The distribution process

Deliveries are bought Ex-works, i.e. customer C1 is responsible for the transportation, but the supplier books the transport. Deliveries take one day and express deliveries are hence not possible.

I-1.1.3 The PM process

Defining on-time delivery; supplier company S1

Definitions of metrics have never been discussed between the partners in the dyad in question. For S1 the most important performance metrics, set centrally, are safety and environment, quality and improvement, and on-time delivery and cost. These targets are deployed throughout the organization. Company S1 uses the delivery service metric on-time delivery in the dyad with C1. The content of this metric has been developed in order to achieve the demands and requirements from the company's customers, but its parameters are also a reflection of what its ERP system is capable of handling. When S1 conducts measurements of its on-time delivery towards the customer C1 the measurement object is order line, and the time unit used is the day. The company performs its measurements when the goods are available for transportation to C1, and this includes not only all the physical handling of the goods, but also all the necessary paper work, such as shipping notes. When conducting the measurement of on-time delivery, S1 compares the date the goods are accessible for transportation to the day C1 its order requires to have them delivered; thereafter S1 deducts one day as a reasonable

time period for the transportation to C1. When one of the partners in the dyad wishes to change the date for the goods to be delivered, S1 updates the compared day the goods should be ready in its ERP system, but it does not register the cause of the change. Both parties change the desired day every now and then; company S1 regards this as a positive possibility, and considers the companies´ relationship to be flexible and fairly close. The two companies are often in contact with each other by telephone, and the people involved in the relationship know each other well.

In summary, in order for supplier company S1 to receive 100% on-time delivery metric it needs to get all its order lines in an order from customer C1 manufactured and available for transportation one day before the day requested in the order (figure I-1.1).

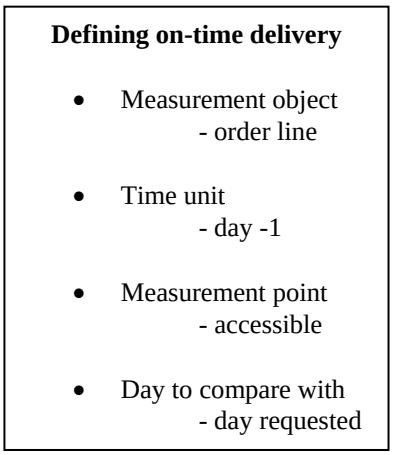

Figure I-1.1 The definition of S1's on-time delivery metric

Defining on-time delivery; customer company C1
C1 uses metrics showing on-time delivery and quality levels for its suppliers. Several internal metrics are also used, for example, ITR, production to a specific schedule, takt time and on-time delivery to customers.

In its supplier relationships with S1, customer C1 also uses on-time delivery as its delivery service metric. The metric is measured by every order line and the measurement point is when the goods have been accepted by the receiver and registered into its ERP system. Every now and then the in-coming goods' reception does not have the time to handle and register all the deliveries, which causes some of the orders to be registered a day or two later than when they actually arrive. C1 is aware of the problem with the workload at S1's goods' receptions, and its being responsible for the transportation from S1; it therefore uses as its measurement point the moment when the goods have been registered. They therefore use a time unit in their on-time delivery metric of minus three to plus one day. This means that the goods may be registered by C1 three days earlier or one day later than the day requested on the order. With this delivery window the

interviewees at C1 believe that they compensate for any potential problems with the transportation or/and the goods' reception, and by so doing have a fair metric with which to evaluate S1's performance of on-time delivery. The reasons behind C1´s definition of its metric for on-time delivery are a combination of a wish to be able to measure its suppliers, and old habits. C1 wants to use the day of dispatch from S1 as its measurement point; it will be able to do so in the future, but has not yet had the recourses to introduce this system.

It is agreed that the requested date on an order from C1 is the day that the goods should arrive, but every now and then this day is changed. If C1 makes the change in the requested day it registers a new delivery day in its ERP system. If, however, S1 wishes to change the day, and gets C1´s approval, the new delivery day is not always registered in C1´s ERP system. C1 does not have a metric showing the relationship between original requested delivery day and the definitive delivery day.

In summary, in order for supplier company S1 to fully meet customer company C1´s requirement for on-time delivery, it needs to ensure that all the order lines in an order from C1 are accepted and registered at C1 as early as three days before, or at the latest one day after, compared to the day requested in the order (figure I-1.2).

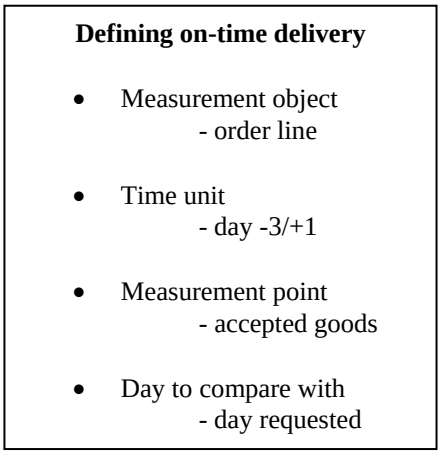

Figure I-1.2 The definition of C1´s on-time delivery metric

Target setting

There is no logistics agreement between the companies. Although supplier company S1 has a 100% target for on-time delivery to its customers, the targets are not communicated between the organizations in any formal way. Customer company C1 has an on-time delivery target of 98%, which is the same requirement as the OEMs put on C1.

Measurement
Supplier company S1's average performed on-time delivery for all its customers is 96%. It measures on-time delivery in three ways. First, a weekly manual measurement per customer based on data from the ERP system is entered in Excel. Secondly, a web based measurement is generated automatically each week on the average on-time delivery per production unit. Thirdly, a monthly deviation or monitoring report per production unit on problematic customers is made. C1 measures on-time delivery and internal performance metrics.

Analysis
C1 uses the measurements internally in order to make decisions about suitable actions. The main measurement focus is on the internal productivity measures and its own delivery service to its customers. These metrics are measured and communicated internally on a daily basis. Daily investigative meetings are used to identify the causes of any low performances. S1 considers measurements critical for improvement work.

I-1.1.4 Consequences

Consequences for supplier S1 in dyad 1
Company C1 is responsible for the transportation of the goods from S1 to C1, so that those interviewed at the supplier company S1 believe their metric for on-time delivery to be very accurate as a tool for evaluating the company's delivery service towards C1. Supplier S1 is aware of the fact that customer C1´s measurement point is not when the goods are accessible for transportation, which S1 experiences as a problem that causes uncertainty for the company. The interviewees at S1 think that since they do not use the same definition of this metric as does C1, S1 as the supplier often gets a lower result in its on-time delivery than it deserves. The interviewed people at S1 recall a number of times when the responsible carrier has not had room in its truck for all the ordered goods and has therefore been forced to make the transportation one day later. This gets reflected in a negative manner in C1´s on-time delivery metric for S1. Another example of this kind of problem, with different measurement points and a lower on-time delivery rating than S1 deserves, is when S1 has received calls from C1 asking it for an order; the goods have in fact been delivered, but have then been held up in C1´s own goods' reception and therefore not been registered into its ERP system. Yet another example of how S1 can get poor results without deserving them is when transportation to C1 takes longer for reasons such as the truck breaking down, or becoming late due to bad weather.

Another consequence of different ways of handling the PM process, according to the interviewees at S1, is that the misleading on-time delivery figures that C1 has for S1 results in a poorer reputation as a supplier than S1 deserves. This could lead to a decrease in sales for S1 or in a loss of potential customers that have noticed C1´s supplier rating.

Consequences for dyad 1 according to S1

C1 does not report its on-time delivery figures in a regular manner to S1. When the companies have meetings and communicate different on-time delivery results, the interviewed persons at S1 believe that a consequence of the different methods in the handling of the PM process is simply extra work. This extra work often constitutes discussions of;

> *"how the partners' measures, what the differences in their operations are, and which partner has the most accurate metric."* (quote by logistics and flow responsible at S1 for production to C1, translated by the author).

These are all examples of non value-adding processes. The interviewees at S1 think that this can cause conflicts to arise, but this is not usually the case in the relationship with C1 because of the relatively close connections between the companies.

S1 and C1 do not use any long-term contracts in their relationship. The persons interviewed at S1 think that a consequence of different ways of handling the PM process places the company in an inferior position at business negotiations between the partners, since each partner tends to believe its own figures and opinions. This sometimes results in an atmosphere of "us-and-them" instead of a preferable win-win situation and a focus on the supply chain's competitiveness. The opinion of the interviewees at S1 is that C1 focuses more strongly on price, rather than on developing closer relationships with its suppliers, and that this results in negotiation situations about price instead of improvement in mutual dyadic processes.

Consequences for a supplier in general according to S1

The interviewed persons at S1 believe that different ways of handling the PM process can result in misleading figures that may cause the managers of the companies to react in a negative manner. S1 reports its figures for its on-time delivery to the management, and if management should see figures from a customer that differs from the ones S1 reports, a process of investigation may be initiated, since customer satisfaction is of importance for any supplier. This can result in internal discussions about S1's efficiency and accuracy of measurements, and other extra work. Another consequence when a customer reports a lower result in on-time delivery metrics than the ones S1 has, can be that it has larger safety stocks than are necessary, or that it make changes in its logistical processes in order to be able to be over confident in keeping its delivery dates and perform high customer satisfaction.

Some customers that have a low figure for performed on-time delivery times from S1 are dissatisfied and may report that they demand changes in the performance from S1. If the figures differ from the ones S1 has, the company has to react and a process of extra work reporting the documentation of each order manufactured and delivered to the customer begins. The interviewees at S1 believe that as a supplier you cannot ignore a complaint from a customer; they

worry, however, that partners in a dyad do not communicate their results of the PM process unless the customer is displeased.

S1 often experiences that the customers do not communicate their on-time delivery results to S1, which is a cause of worry. This unawareness of customer satisfaction may be an even bigger problem, since S1 runs the risk of being replaced as a supplier.

Consequences for a dyad in general according to S1
The interviewed persons at S1 consider different ways of handling the PM process to be an example of such matters that press companies in a supply chain to have efficient communications. Furthermore, these ways lead to difficulties in improving of the effectiveness or even identifying the mutual processes in the supply chain. When the companies do not understand each other, the atmosphere that tends to arise makes a really close collaboration hard to attain. In order for supply chain dyads to be as competitive as possible the interviewees at S1 believe that the partners in a dyad at least needs to understand each other's processes and be able to compare the results of these processes based on this understanding, even though they may not be the same.

Although the partners in a dyad have a very close relationship with each other, and have an understanding for each other's handling of the PM process the interviewees at S1 say that different definitions of metrics make it impossible to evolve the best possible relationship.

Consequences for customer C1 in dyad 1
The interviewed persons at C1 say that by using the registration of goods at reception as the measurement point their on-time delivery metric causes uncertainty in the organization. Since goods' reception sometimes misses registering goods, or has a high workload, figures for S1's on-time delivery may be lower than they deserve. The interviewees at C1 think, however, that the different way of handling the PM process;

> *"has often caused C1 to be too nice in its handling of S1 as a supplier."* (quote by logistics manager at C1, translated by the author).

The uncertainty of what the correct figure is for S1's on-time delivery makes the personal opinion of the people responsible for the contact with S1 to be C1´s opinion of S1 as a supplier. This may cause internal conflicts in the company, as people on a higher strategic level believe that S1 should be treated as C1 is being treated by their customers, which is with high demands on on-time delivery. Since C1 has a fairly close relationship with S1, delivery dates are often changed, and the interviewees at C1 think that this gives S1 an excuse of not being as precise as it could. This result in changes in the manufacturing process plans at C1, and in its need to keep higher than necessary safety stock levels for

products manufactured and ordered from S1. As a result, customer company C1;

> *"becomes the buffer for the supply chain which is economically negative for the company."* (quote by global logistics manager at C1, translated by the author).

Another consequence of different ways of handling the PM process which cause uncertainty in the organization is that C1 has a hard time knowing who is responsible for the goods getting registered too late. The one responsible could be one of any three, S1 as the supplier, the carrier, or goods' reception at C1. This causes conflicts where actors blame each other, and C1 experiences internal conflict which results in mistrust.

Consequences for dyad 1according to C1

According to the interviewed persons at C1, different ways of handling the PM process make the partners in the dyad to talk at odds with one another. C1's experiences are that sharing on-time delivery figures with S1 often results in a discussion of who has the more accurate figures, instead of how they could become higher. C1 means that the partners tend to believe their own opinions, and this makes communication with C1 less effective.

The interviewees at C1 think that not talking about the same thing, even though both partners in the dyad call the metric on-time delivery, causes the partners not to be as efficient as possible, which is negative for the supply chain's performance.

> *"In a highly competitive market such as the automobile market, the performance of each member needs to be as high as possible."* (quote by global logistics manager at C1, translated by the author)

According to the interviewed people at C1 there is a danger in having a lower figure for S1's on-time delivery than the company deserves, since people unfamiliar with the relationship and its characteristics may consider S1 to be a poorer supplier than it is, that in the end should be replaced as a supplier.

Consequences for a customer in general according to C1

Uncertainty in supplier's performance in on-time delivery makes C1 maintain a higher safety stock then it needs to. The difference in the handling of the PM process also creates internal uncertainty, which in turn makes it harder for C1 to recognize early trends in supplier performance. Often the company only has time to work with the suppliers that have a very low on-time delivery, instead of trusting its figures and working with suppliers while problems are insignificant and only minor actions are necessary.

The interviewees at C1 believe that when the handling of the PM process differs in a supplier relationship, communications become strained; this can cause extra work in several ways. Having different ways of handling the PM process causes confusion for all parties involved in deciding who is responsible for what. When C1 does not know which actor is responsible for a late delivery, it is hard to react

and make the necessary improvements in order to avoid similar situations occurring again. The interviewees at C1 also say that if the ways of handling the PM processes were the same they would be able to apply fines for suppliers that were late with their deliveries. This would probably make the supplier work at a higher on-time delivery rate, and this in its turn would make C1 able to lower its safety stocks. Today C1 uses safety stocks in order to prevent any problems with its on-time delivery towards its own customers.

Consequences for a dyad in general according to C1
The interviewed persons at C1 believe that the delivery window in its handling of the PM process may give the suppliers the apprehension that the company does not consider accurate delivery dates as very important. This leads to consequences such as extra work in keeping track of any supplier that may abuse the window for its own profit. This kind of behavior creates suspicion in the dyads, and close relationships are thereby hard to obtain.

Since C1 is the customer, it thinks that suppliers should be the ones making the adjustments to its demands, just as it does in its customer relationships elsewhere. When the partners in a dyad do not have the same way of handling the PM process the actors tend to have a hard time working with improvements to mutual business processes. The interviewees at C1 say that when the partners in a dyad have a hard time communicating, the relationship gets strained, and neither customer nor supplier wants to work closer with the other. This is negative for both success and profitability.

According to the interviewees at C1 another consequence in a dyad, caused by different ways of handling the PM process is that it is hard to develop and improve an already good supplier into becoming an outstanding supplier. C1 means that when the partners do not fully understand each other, the ever-so-vital communication and trust suffer.

I-1.2 Dyad 2

I-1.2.1 Company characteristics

S2 - the supplier company
Supplier S2 is a small mechanical engineering firm with 20 employees and an annual turnover of 2.5 Million Euro. It is localized a one-hour's drive from its customer company C2. Supplier S2 has 70% of the market in which three actors exist. The total customer base consists of some larger industrial customers, where C2 is the largest and stands for 15-20% of S2's total turnover. Customer company C2 is a strategically important customer because of its large purchasing volume. However, neither of the companies is dependent on the other in order to survive.

C2 – the customer company
Customer company 2 is an OEM making a broad range of air treatment products, mainly to contractors and building consultants. It has an annual turnover of about

18 Million Euro and employs 140 people. It has a 20% market share in the Swedish market and competes with two other actors. The purchased items stand for a large proportion of the overall costs. C2 buys 500-600 different punched and bended metal components from the supplier S2 i.e. items that are simple and of low value, but with a high total volume. S2 is the seventh largest supplier and has been such for almost ten years. C2 is not dependent on S2 and could possibly switch to another supplier for the actual items, without too high a cost. The relationship between the companies is however well developed, not least because of the long-term cooperation and S2's flexibility and ability to adjust to C2's requirements.

I-1.2.2 The dyadic business processes

The purchasing process

There is no long-term purchasing or logistics agreement between S2 and C2. However, in order to be a contract manufacturer supplier S2 has to be located within one-hour's driving distance of customer C2. There is a continuous person-to-person communication between the respective purchasing and sales personnel regarding expectations and long term volumes, engineering changes. About five purchasing orders per week are sent by fax from C2 to S2. Each order contains five to twenty order lines, with a delivery time of two to three weeks. Due to engineering changes and the phase-ins of new products, some orders contain prototypes with shorter delivery times.

The order-to-delivery process

The products for C2 are made to order based on standard metal kept in the raw material stock. The manufacturing time varies from a few days up to a week, and manufacturing starts as late as possible in order to keep a low stock of finished goods. C2's products get high priority in the production planning. A low utilization level in the factory also results in high volumes and delivery flexibility. Order acknowledgement is sent from S2, and is checked by C2 when an order is sent and received.

The delivery process

Supplier company S2 is responsible for the distribution of the goods between the companies. Transportation is bought from a third party and conducted once a week, but express transports with its own vehicles are also possible.

I-1.2.3 The PM process

Defining on-time delivery; supplier company S2

S2 measures on-time delivery in the dyad with its customer C2. S2 believes that C2 determines the prerequisite of the relationship which is reflected in S2's on-time delivery metric, since its content has been developed in order to meet C2's demands. S2 measures its on-time delivery towards C2 by using the order line as its measurement object, and the day as its time unit. Furthermore, the measurement point is when the goods are dispatched from S2, who compares the day to the date that S2 has acknowledged when C2 has placed an order. Since S2 is lo-

calized only one hour's drive from C2, the companies believe that their definition of on-time delivery gives them both a correct picture of the situation.
In summary, in order for the Supplier Company S2 to attain 100% on its on-time delivery it needs to get all the order lines in one order from C2 manufactured and dispatched from the company the day it has itself acknowledged (figure I-1.3).

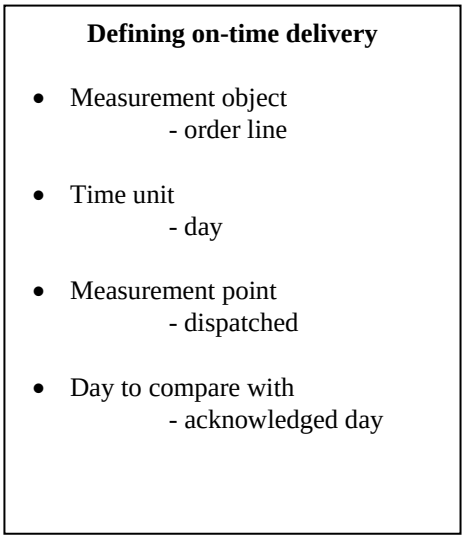

Figure I-1.3 The definition of S2's on-time delivery metric

Defining on-time delivery; customer company C2
Customer company C2 uses the delivery service metric on-time delivery in the dyad with S2. The content of this metric is to a great extent determined by its ERP system and the standards it has for the metric. The measurement object in C2's on-time delivery metric is the order line, and the time unit is the day. The ERP system has a time period for transportation included in the definition, which gives the measured time unit a window of one day back or forth. The company's measuring point is when the goods have been accepted and registered from S2, and since the department sometimes has an overload of work the order delivered from S2 may go unregistered for a day or two.

In summary, in order for supplier S2 to attain a 100% rating in its deliveries to customer company C2 it needs to deliver all the order lines in an order to C2 and for them to be accepted and registered there within the period of one day before or one day after the requested day in the order placed by C2 (figure I-1.4).

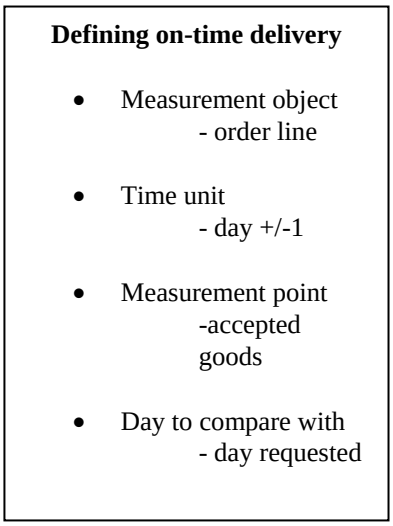

Figure I-1.4 The definition of C2's on-time delivery metric

Target setting
C2's target for on-time delivery is 100%, but it also has targets for inventory turnover and cost reduction, however not quantified. S2's target for on-time delivery is 100%, and it also has cost reduction targets, there again not quantified.

Measurement
Customer company C2 measures its suppliers' on-time delivery figures every month and makes supplier evaluations once every 24 months or so, or when necessary. The responsible purchaser judges on-time delivery, delay information, documents, labeling, claims and lead-time flexibility. C2 can reconstruct on-time delivery for a specific supplier if problems occur when it is necessary to have specific data to base discussions upon. If it constructs a report on the average performed on-time delivery from the suppliers it extracts data from its ERP system and creates a report in Excel. C2 has a weekly average of 55% on-time delivery to production, which is considered acceptable as long as long safety times are being used. S2 measures its on-time delivery to customers in its newly implemented ERP system, and means that it has a 100% on-time delivery to C2, which C2 confirms subjectively.

Analysis
Customer company C2 has supplier meetings initiated by problems, with qualitative discussion, but no comparison of performance results between the partners is made. Supplier evaluation is archived by the purchasing manager.

I-1.2.4 Consequences

Consequences for supplier S2 in dyad 2

The interviewed persons at S2 consider their relationship with C2 as very good. They think that they have a close relationship, and S2 and the responsible material planner at C2 often communicate with each other. Furthermore, C2 has invested in production machinery at S2 that makes it able to produce and develop the products which C2 requires, and S2 can thereby meet its own customers' demands.

The interviewees at S2 do not think that the differences in the partners´ handling of the PM process have any consequences for them as a supplier in the dyad. The interviewed persons at S2 believe that the reason for this is that the company maintains a high percentage in its on-time delivery towards C2, and disputes between the partners have never existed. Thus the metrics and the figures have not been compared.

> *"As long as problems with deliveries have not occurred there is no reason for a comparison in the handling of the on-time delivery measurement process in the relationship."* (quote by production manager at S2, translated by the author)

Consequences for Dyad 2 according to S2

As mentioned, customer company C2 has made investments in the production machinery at S2. This has resulted in a feeling of loyalty from S2 towards C2, and S2 prioritizes C2's orders. Furthermore, C2 is the only customer to whom S2 is a sub-contractor. S2 does not have a stock of products manufactured for C2 as it does for its other customers, and by this it has been able to focus on C2's demands and product developments. This has resulted in a high on-time delivery towards C2. The persons interviewed at S2 believe that the company meets C2's requests; as figures have not been compared, no consequences have therefore appeared due to a difference between the partners' handling of the PM process.

Consequences for a supplier in general according to S2

The interviewees at S2 think it does not matter if the supplier has a high percentage in its own figures for the on-time delivery if the customers´ metric shows otherwise. They believe that the supplier in a dyad has a responsibility to satisfy the customers and to listen to their demands. If the handling of the PM process differs between the partners, and the customers consider their figures as a problem, the supplier needs to react. The interviewee at S2 say that a supplier needs to investigate what the difference results from and what is required to be done in order for the costumer to be satisfied. Thereby, the difference in definitions may in consequence cause extra work for the supplier, even though the low figure is not its fault.

The interviewed people at S2 think that if the handling of the PM process differs, and the supplier does not take responsibility for meeting the customers' demands for the metric's level, as seen from the customer's perspective, the ever so im-

portant reputation of the supplier may be damaged. A consequence of this could be that a supplier is replaced and income lost due to lost sales when potential customers choose to buy from another supplier with a better reputation.

Consequences for a dyad in general according to S2

The interviewees at S2 consider planning ahead as a vital tool in keeping high on-time delivery standards, and thereby a dyad relationship without friction. Furthermore, they think it is vital that the partners in the dyad can communicate and mean the same thing in their conversations. If a problem with an unsatisfied customer over a supplier's on-time delivery arises, even though the supplier itself can show a high figure, the partners need to be able to share information with each other and work mutually to focus on improvement. Otherwise the dyad may suffer consequences such as lost competitiveness in the supply chain and end market due to the companies' poor performance and problems in communicating with each other.

Consequences for customer C2 in dyad 2

The definition of C2's on-time delivery metric is, as stated, decided by the ERP system at the company, and this makes the personnel feel somewhat restrained by the system. An example of this is the previously mentioned delivery window of + 1 day. This window is just one reason that makes the personnel rather confused about the accuracy of the figures of the on-time delivery metric for their suppliers. S2, for example, has a transportation time of only hours to C2, and the confusion about the accuracy of the on-time delivery metric makes C2 uncertain of its own metric, which results in the company often not using the metric as an evaluation method for its suppliers. The interviewees at C2 are aware of this and state;

> *"We want to, and need to, become better in our performance measurements of our suppliers."* (quote by production manager at C2, translated by the author).

Instead the company focuses on the personal opinions of the people who work closely with the supplier, and their view of whether the supplier delivers the right products of the right quality at the right time. Since C2 tends not to rely on its on-time delivery metric, and holds its suppliers responsible when it might as well be the goods' reception that is late in registration, there are of course consequences. Examples of this are when the company chooses to make internal adjustments and take responsibility within the company's lead-times in order to fulfill its commitment to its customers. This sometimes creates internal conflicts, and may also cause some disturbances in the regular production flow and planning, but the company usually meets the demands of its customers.

The interviewees at C2 wish that the company was better at understanding its on-time delivery metric, since this would make them able to handle their relationship with S2 and other suppliers in a better manner. If the company could trust its on-time delivery figures it would know who is responsible when the figures are lower than those that C2, as a customer, demands. This would make the

company able to work with the suppliers that need the attention and at the same time prevent unnecessary internal conflicts and extra work from occurring. An example of this could be that the company would not be forced to rearrange its logistical flows within the company, and thereby cause unnecessary pressure and stress on the personnel.

Consequences for Dyad 2 according to C2

Customer company C2 does not have any safety stock of the products manufactured by S2. The biggest reason for this is that the relationship and communication between the partners is very good. Deliveries from S2 seldom cause any trouble at C2, and the interviewees at the company believe that even though the partners may have different ways of handling the PM process there has not been any reason to compare the partners figures since there have not been any disturbances in the deliveries. Those interviewed at C2 believe that the investments they made at S2, their supplier, and the close collaboration between the partners in the dyad, bring the partners become closer and more able to communicate about their problems, as well as opportunities for improvements. The interviewees at C2 feel that S2 is flexible and gives priority to C2 as a customer; the good personal contacts that the companies have makes comparisons of figures unnecessary.

Consequences for a customer in general according to C2

The interviewed persons at C2 believe that a consequence of differing ways of handling the PM process is when extra work is being done in order to sort out what the differences are, and how to handle them. This kind of work makes the personnel spend time on focusing on other things than the core business of the company.

The interviewees at C2 say that when the handling of the PM process differs in a dyad the customer tends to become insecure, even if the general view is that the supplier should change its definition to fit the customer. An example of a source of insecurity is when suppliers use weekly delivery windows in their on-time delivery metric. This results in a high on-time delivery figure reported from the supplier, but makes customer hesitate about if and when different orders are delivered. Consequently the customer builds security stocks which tie up capital, which in turn leads to other consequences such as not being able to adopt a Just-In-Time philosophy throughout the company. This kind of consequences could result in the supplier being replaced.

Consequences for a dyad in general according to C2

Customer company C2 works continuously with its suppliers. It does not report its on-time delivery metric to its supplier unless a problem in the relationship occurs. If the customer's and supplier's ways of handling the PM process differ, the consequence is extra work in the form of discussions until a compromise solution is found.

The interviewed people at C2 think that suppliers should adjust to their customers, and if the suppliers do not they should be replaced by someone with whom it is easier to collaborate. Otherwise it could be hard to build a closer relationship with the supplier and make improvements in product development processes and other competitiveness building processes in the dyad.

Another consequence that the interviewees perceive could occur because of different ways of handling the PM process is that it would become more difficult to communicate in the dyad with the supplier. This would mean that the partners would risk misunderstanding each other, and negotiations about price and so on would become more complicated.

I-1.3 Dyad 3

I-1.3.1 Company characteristics

S3 - the supplier company

Supplier company S3 makes fabricated metal components and acts as a supplier to component manufacturers and OEMs in the aerospace and turbo machinery industries. It has about 100 employees and a turnover around 20 Million Euro. The studied customer C3 is S3´s second largest customer, and its purchases make up about 10% of S3´s total sales. The largest customer stands for about 60% of the annual sales. There is consequently a high dependency on this company, but still there is a mutual dependency between C3 and S3. Not only is supplier company S3 dependent on C3 because of the high purchasing volume, but also because C3 is an important subcontractor to S3. C3 is dependent on S3 because it does not have S3's in-house competency for manufacturing technology especially a very specific laser technology which makes S3 unique as a supplier. The business now operated by S3 was once outsourced from C3. Several of the people at supplier S3 have previously been employed by C3 and consequently know C3's organization and several of its employees. In addition to these two customers, S3 supplies components to a large aerospace OEM and also a couple of gas turbine manufacturers. S3 and C3 are located in the same city with a driving distance of just 15 minutes between the plants.

C3 - the Customer company

Customer company C3 is a division within a larger group of companies. They have about 4000 employees and a turnover of about
800 Million Euro; the company is a first tier supplier of aerospace engine components. Its major customers are Pratt & Whitney, Rolls Roy and GE, three aerospace engine OEMs, but several other customers also exist.

I-1.3.2 The dyadic business processes

The purchasing process

C3 has 110 active suppliers with problems in acquiring certain raw materials (titanium) with very long lead-times (1-1.5 years). A large safety stock of raw material inventory is therefore necessary. The aviation market is moreover sensitive for cyclical demand variations. 85% of its orders come from the U.S. Customer

company C3 cannot choose all its suppliers, but has to use those that are accepted by the OEMs. C3 has long-term manufacturing program agreements for specific engine programs with the OEMs and other strategic component manufacturers. These agreements include the future production volumes of the engine program for decades ahead. These overall production volume agreements and more detailed delivery schedules received from the OEMs are used as demand input to the production and purchasing planning. C3 generates purchasing plans and delivery schedules with a one to two years' planning horizon for its suppliers through internal MRP calculations. These are printed from the ERP system and faxed or scanned/emailed to S3.

The order-to-delivery process

There is a schedule agreement between the companies, stating the technical requirements for the product, the handling and other critical operations. The delivery schedule that S3 receives from C3 has a two-year horizon. The total quantity is more or less fixed, but the delivery times are changed continuously. Material purchases, production planning and the booking of subcontractors at S3 are based on the delivery schedule data. The average production lead-time at S3 is several months. It depends very much on the delivery lead-time of bought material that could exceed 10 weeks, but the internal through-put time is also long, sometimes more than 10 weeks. The lead-time variation is high. This is a result of not only long queue times in its own production, but also uncertain lead-times through the processes subcontracted to C3. S3 cannot guarantee a fixed delivery date for a customer order, but sends information about the "worst case delivery date" to C3. Likewise customer C3 cannot guarantee a fixed delivery time for a subcontracting order, but gives an order acknowledgement saying, for example, "delivery 10 to 30 days after receiving material".

The distribution process

There are two transportations of components per day from S3 to C3. The transportation time between the two facilities is only 15 minutes and transportation occurs whenever there is a finished order to be transported.

I-1.3.3 The PM process

Defining on-time delivery; supplier company S3

Both companies consider the delivery service metric on-time delivery to be very important, but neither of the companies conducts any measurement of this metric. The supplier S3 will however quite soon begin measure its on-time delivery towards C3. This metric will contain the order line as measurement object, and have a + three to five days window as its time unit. Its measurement point will be when the order is dispatched from S3, and the company will compare this to the day it has acknowledgment dispatch to C3. The metrics have been developed in order for S3 to evaluate and improve its performance internally as well as externally towards its customers.

Defining on-time delivery; customer company C3

At customer company C3 logistics demands are scattered in many documents, but sales people do nothing to consolidate them. The most important demands are on on-time delivery, on providing information on delays, and on delayed deliveries. In principle, five different definitions of on-time delivery are tested at C3, but none is used in practice. C3, as mentioned earlier, has not been conducting any measurements of the on-time delivery provided by S3. The company has however tested several different metrics, and has just developed a metric called on-time delivery that will be measured in near future in order for C3 to be able to evaluate its suppliers. When the measurement process has started, the figures will be distributed to the supplier in question every month. The newly-developed on-time delivery metric will probably have the order line as the measurement object, even though there have been discussions about whether this kind of object will have too great an impact on the figures when a supplier is late in its deliveries several times. The metric will have a time unit of a two-week window, and the measurement point will be when the delivery is accepted and registered in C3's goods reception, even though C3 is responsible for the transportation from the supplier. The requested day on the order placed by C3 will be the compared to the day in the newly-developed on-time delivery metric.

When a partner in the dyad changes the delivery date, C3 does not always register the changes in its ERP system. Instead it makes a note in a file, but as this is not used in the coming measurement process the on-time delivery metric will be affected negatively when delivery dates changes. In C3's ERP system it will however be possible to look at the ratio between C3's requested date on an order, and the acknowledgment by the supplier. If a supplier is late in its deliveries C3 has a fine system which, however, is not used, since C3 every now and then has problems of its own with its on-time delivery.

Target setting

C3 does not measure on-time delivery or any other logistics performance, and consequently does not have any performance targets. The supplier company S3 has an informal internal target of 95% on-time delivery for the deliveries of components to C3's subcontractors, and also for the finished products to C3. It also has an internal requirement on C3's subcontractors of 95% on-time delivery. S3 is not aware of any on-time delivery goals or requirements at C3.

Measurement

Both C3 and S3 consider product quality to be the most important performance measure, and this is the only performance measured by C3. Even though C3 does not measure on-time delivery, it observes that on-time delivery received from suppliers, including S3, is low. On-time delivery from C3 to the OEMs is not measured by C3, but by the OEMs. S3 does not measure on-time delivery, but considers them to be about 65-70% for components and products sent to C3, and 55-60% for components received from C3.

Analysis
Delivery performances are continuously discussed between the responsible material planner at C3 and the logistics manager at S3. Normally they have daily contact by phone. Any problem is solved in a dialogue between those two, but no delivery measures are formally measured or used in any way at S3.

I-1.3.4 Consequences

Consequences for supplier S3 in dyad 3
Since neither partner in the dyad measures on-time delivery performance, the interviewed persons at the supplier company S3 think that the relationship has become somewhat unprofessional. A consequence is that C3 often does not respect the day S3 acknowledges on an order from C3; instead it tends to contact S3 and try to push the order for completion the day they originally requested. This forces S3 to re-schedule production plans and put pressure on the manufacturing staff. The result is a stressful working environment and disturbances in the logistical flow within the company. Furthermore, other customers get affected by dint of S3 not being able to focus on its planned production, and of C3 undesirably becoming its prioritized customer. If S3 is late in its deliveries to other customers it often gets fined or even worse by risking getting a bad reputation as a supplier, which could mean losing both sales and potential customers.

Since the relationship with C3 is much unstructured, and the respect as supplier and customer does not really exist, C3 seems to take the liberty of contacting S3 and trying to force its orders through production. This strategy is often successful, but it also causes internal conflicts at S3 about which order from which customer should have access to the bottleneck resources within the company. The rescheduling at S3 also creates longer lead-times, since changes have to be made continuously and in the end additional costs are created for which the company does not get reimbursed.

C3 has reported that its perception of S3 is that S3´s performance as regards on-time delivery is poor. This makes top management for the group of companies S3 belongs to question the performance at S3, which results in extra work in trying to find explanations and implement improvement plans.

The interviewees at S3 worry about how an unacquainted party may perceive the relationship since the relationship is so disorganized. The outsiders´ perception could give S3 a bad reputation as a supplier, which would harm its competitiveness in the marketplace.

Consequences for dyad 3 according to S3
The interviewees at S3 describe their relationship with C3 as;

> *"Very close and almost sister-and-brother-like, making the partners help each other by having a greater understanding of one another, while simultaneously arguing every now and then."* (quote by production technician at S3, translated by the author).

Since no-one yet measures on-time delivery in the relationship, the interviewed persons at S3 think it is hard to implement any improvements in the mutual processes. They argue that without real figures the companies do not have a common starting point from which to begin their discussions.

When the partners negotiate, the interviewed persons at S3 believe things get more complicated when there are no figures to show performance, since both partners just tend to have different views on how each one performs. The partners often talk at cross-purposes, and misunderstandings in the dyad are not unusual.

Consequences for a supplier in general according to S3
If the way of handling the PM process differs, the interviewed persons at S3 think that the supplier needs to analyze its definition and devote resources in order to investigate where the differences are, and whose way of handling gives the more correct picture of the situation.

According to the interviewees at S3 there is a danger in having different ways of handling the PM process in a dyad. The supplier could believe that it is performing at a high level, whereas the customer's figures show otherwise. This could cause the supplier to be replaced, no matter which partner is measuring correctly.

Consequences for a dyad in general according to S3
The interviewees at S3 believe that different ways of handling the PM process between partners in the dyad constitutes an obstacle in the creation of a really efficient and highly performing relationship. This belief stems from the fact that S3 and C3 are examples of companies that are close but who lack figures that could be a part of a common starting point in their discussions for improving the mutual processes between the partners.

Consequences for customer C3 in dyad 3
When C3 and S3 are negotiating situations may occur, according to the interviewees, whereby the companies have different opinions about how each partner performs in on-time delivery. Since the relationship is complicated, and both companies are both each other's supplier and customer, discussions may be become unproductive, at least from C3's point of view.

The people interviewed at C3 fear that the fact that C3 does not measure S3´s on-time delivery, and can present them with actual figures, may give their suppliers an excuse to perform at a lower level than they could. The perceived level for S3´s on-time delivery is quite low, but C3 takes some of the responsibility for this since demand has risen and the material so required is somewhat difficult to source.

The disturbances in deliveries from S3 have made the management at C3 react. The partners are however depending upon each other, and reaction from C3's management has therefore resulted in extra work when those responsible for

supplies at C3 have been forced to spend time and other resources explaining and justifying the relationship with S3.

> *"The on-time delivery from S3 may be dreadful, but somehow the relationship works anyway."* (quote by quality and process managing methods manager at C3, translated by the author).

Consequences for dyad 3 according to C3
The interviewed people at C3 state that the dyad with S3 is very close and almost familiar, and that is what makes the relationship work, even though it is characterized as very unstructured.

C3 does not have any figures for the on-time delivery performed by S3, but they have a perception of them, and even though S3 may disagree with this perception, C3 prefers to believe its own opinion. This may cause discussions between the companies, although these do not usually result in any improvements in any process.

The interviewees say that if the dyad had a mutually conducted PM process the partners could focus on becoming more efficient together and thereby improve their competitiveness in the marketplace. Today the supply chains compete with each other, while the members in them ought to cooperate.

Consequences for a customer in general according to C3
The interviewed persons at C3 claim that in general the supplier should adjust its ways to the customer. If the way of handling the PM process in the dyad differs, the supplier should adopt the customer's way since it is the one paying for the products.

If a supplier presents different figures for an on-time delivery metric other than the one C3 had, the interviewees say that resources should be used in order to investigate what the cause behind the differences is This would probably also result in meetings and discussions about who is responsible for what at C3 and in the supply chain.

Differences in the ways of handling the PM process presented by the supplier and the customer usually result in insecurity at the customer company, according to the interviewees at C3. This causes the customer to create safety stocks which are very costly. Safety stocks also make it harder to detect problems in processes and internal and external improvement.

Consequences for a dyad in general according to C3
The interviewed persons at C3 believe that the different ways of handling the PM process is a source of argument between the partners in the dyad. They also argue that in order for the partners to become close enough to understand each other's processes, and to be able to improve them, they need to talk about the

same concerns in their communications. When differences exists between the partners, a feeling of “us and them” easily occurs.
According to the interviewees at C3 it is difficult for a dyad to perform at a level as high as possible when differences in the ways of handling the PM process exist in the relationship, since it becomes obvious that the partners have different views and points of departure.

I-1.4 Dyad 4

I-1.4.1 Company characteristics

S4 – the supplier company

Supplier company S4 is a small pump manufacturer, localized geographically close to its customer (in the same city). It has a turnover of 2 Million Euro, has 30 employees and makes a wide range of industrial pumps. Its main customers (representing 60-65% of its turnover) are 6-7 larger industrial customers, including C4, each buying special pumps. Consequently, C4 is a strategically important customer for S4, both because it has been standing for a large proportion of S4’s turnover for a considerable time, but also since product development is conducted jointly with customer C4.

C4 - the customer company

Customer company C4 is a division within a larger multinational company. The turnover for C4 is 52 Million Euro and there are about 240 employees. C4 is an OEM and is global market leader within its niche of dishwashers. C4 buys two types of circulation pumps from supplier S4 to be assembled in the washers, each representing 10-15 different variants. The pumps are specially designed by customer C4, in cooperation with engineers from S4. C4’s products require higher temperatures and less water than traditional dishwashers. This puts special quality requirements on the purchased pumps. A close engineering-based relationship has therefore been developed with S4, and as a consequence of this there has been more than 20 years’ cooperation, and S4s’ engineers visit customer C4 frequently.

I-1.4.2 The dyadic business processes

The purchasing process

C4 does not accept shorter delivery times to its customers than four weeks, which is equivalent with their internal lead-time. A delivery plan is developed at C4 and communicated to S4 through electronic data access at C4’s intranet. The delivery plan is a 12 months’ rolling plan with a 10 day frozen time zone. The plan within the frozen zone is a fixed customer order. The perceived accuracy of the delivery plans is considered high in terms of total annual volume, but the volumes and delivery times of the variants can differ between the monthly planning periods.

The order-to-delivery process

The average time between receiving an order from industrial customers through to final delivery is 14 days, but shorter times are possible since the through-put

time from component stock to delivery is shorter than a day. In order to assemble a pump S4 buys a mix of cables, molding goods, electrical engines and plastic components to an inbound stock. The molding goods have a delivery time of 10-12 weeks and are further manufactured in-house and put into a semi-finished component stock. Electric motors also have longer purchasing lead-times than the average time from customer order to delivery. The final assembly time (including assembling, testing and painting) for the pumps sold to C4 is 4 to 8 hours. Standard components are used in the C4 pumps, but the final product is special for the unique customers. The products sold to industrial customers are normally assembled to order, but 1-2 weeks on demand is on average available in the spare parts inventory.

The distribution process
Deliveries take place weekly. Terms of delivery are free C4, and transportation is bought from a third party.

I-1.4.3 The PM process

Defining on-time delivery; supplier company S4
In its relationship with C4, as well as all its other suppliers, S4 uses the metric on-time delivery. The metric's content is somewhat decided by the ERP system used at the company, but it also reflects S4's requirements in measuring its performance. The metric has the order as its measurement object, and S4 measures the day the order is accessible for transportation to C4. The day compared is the day S4 acknowledges to C4 when the order is placed, but the company does not have any information about the ratio between its acknowledgment dates and C4's desired delivery day.

If C4 chooses to change the delivery date, S4 changes the compared day in its ERP system, but if S4 needs to make a change it does not change the delivery day. In this way S4 gets a negative impact in its on-time delivery metric which acts as a reminder to the company to keep its performance at a high level, and that acknowledgment days to its customers should be upheld. When changes are made S4 does not make a note of the reasons behind the changes.
In summary; in order for supplier S4 to get 100% in its on-time delivery it needs to get an order placed by C4 manufactured and accessible for transportation the day they have acknowledgment it to their customer (figure I-1.5).

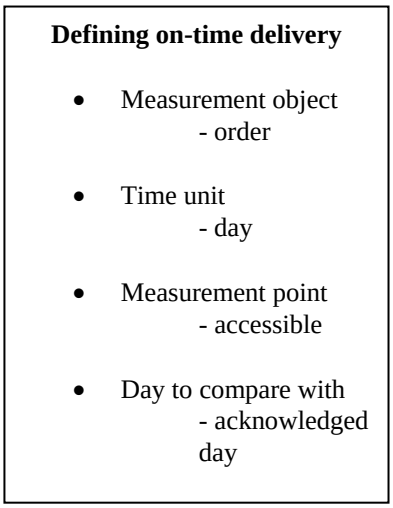

Figure I-1.5 The definition of S4's on-time delivery metric

Defining on-time delivery; customer company C4
For C4 the most important performance variables in its supplier relationships are metrics that show lead-times, on-time delivery, costs and product quality.

C4 has the metric on-time delivery that it uses in the dyad with supplier S4. This metric has been developed in order for C4 to be able to evaluate its suppliers´ performances. C4's definition of on-time delivery contains the order line as a measurement object, and it compares the day, give or take two days, to the date acknowledgment by supplier S4. In the relationship with supplier S4, C4 is responsible for the transportation, but the measurement point is when the goods reception at C4 has accepted and registered the delivered goods from S4 into its ERP system. Every now and then the workload at the goods reception is high, which may cause deliveries to be accepted and registered the day after they have arrived. In the on-time delivery metric the day compared is the date acknowledgment by S4, and if any of the partners changes the date C4 registers the changes in its ERP system.

In summary; in order for supplier S4 to get 100% in on-time delivery to C4, it needs to get all the order lines in an order from C4 to be accepted and registered at their goods reception as early as two day before or two days late compared to the day acknowledgment from S4 (figure I-1.6).

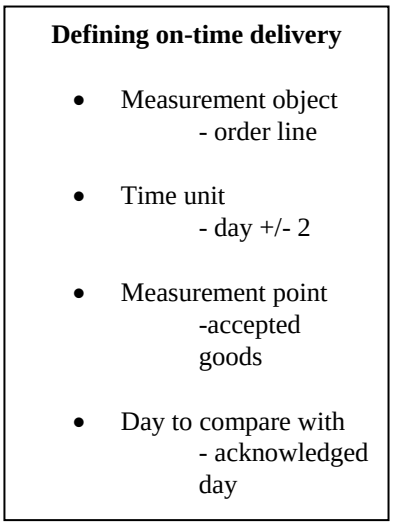

Figure I-1.6 The definition of C4's on-time delivery metric

Target setting
Customer C4 has a 95% target for all suppliers' on-time delivery, and that the supplier shall be able to lower C4's costs by 5% annually. Supplier S4 has an average target for all its customers of 96%. The targets are not communicated between the organizations in any formal way.

Measurement
C4's average on-time delivery for all suppliers is 90%, but it does not know the exact performance from supplier S4. C4 also makes supplier evaluations annually, based on qualitative and quantitative information, e.g. on delivery performance and opinions of other departments. S4 does not measure on-time delivery for specific customers, but has an average of 97.6%. It believes that its on-time delivery to C4 is almost 100%. Both companies have good possibilities to generate measurement reports from their ERP systems, based on the available data, but they have not prioritized this. Still, both mean that measurement is important.

Analysis
There is no feedback on performance from C4 to S4 (which S4 gets from other customers). Both C4 and S4 mean that metrics must in the first instance be easy to understand and communicate, rather than perfect. C4 wants changes to be driven and supported by the PM system.

I-1.4.4 Consequences

Consequences for supplier S4 in dyad 4
The interviewees at S4 say that they never compared their way of handling the PM process with C4's method. C4 reports their on-time delivery figures to S4 regularly, but S4 does not report its own figures in return.

The two partners;

> *"have never had any arguments or other problems in the supply flow from S4, so there has never been a need for the companies to compare their on-time delivery figures."* (quote by CEO at S4, translated by the author).

This circumstance has resulted in that S4 does not perceive any consequences caused by the different ways of handling the PM process in the dyad.

Consequences for dyad 4 according to S4
As mentioned, the two partners in the dyad have never compared their on-time delivery figures, so neither partner really do not knows if his handling of the PM process even differs or not. This fact makes the interviewed persons at S4 to state that the dyad between the companies does not experience any consequences caused by the different ways of handling the PM process for on-time delivery.

Consequences for a supplier in general according to S4
If a supplier and a customer handle their PM process differently, the people interviewed at S4 say that there could be serious consequences. If the customer's on-time delivery figure shows a bad performance by the supplier, and the supplier's figure show otherwise, the supplier's reputation could be harmed without it having a chance to react. If a supplier's reputation becomes bad its sales could go down, and potential customers would not risk doing business with that supplier.

Consequences for a dyad in general according to S4
The interviewees at S4 state that the partners in a dyad could experience difficulties in becoming really close and efficient in their mutual processes, due to communication problems caused by different ways of handling the PM process. Thereby the consequence is a lower competitiveness which could produce a negative effect in many areas.

Consequences for customer C4 in dyad 4
The interviewees at C4 say that since S4 does not report any performance figures;

> *"they do not even know if S4 measures on-time delivery or not."* (quote by ERP manager at C4, translated by the author).

There have not been any problems in the supply from S4, and the interviewed persons assume that S4 would react if C4's presented figure was in conflict with S4's opinion of its performance. As a result of this C4 does not experience any consequences caused by possible differences in the partner's ways of handling the PM process.

Consequences for dyad 4 according to C4

> *"Since there have not been any disturbances in the supply from S4, C4 has not had any reason to compare its way of handling the PM process with S4´s way of handling."* (quote by purchasing manager at C4, translated by author).

C4 has so far only had resources to work with trying to improve the supply flow from suppliers with whom the company experiences problems, but its wish is to be able to improve all supplier relationships in the future. The interviewees at C4 therefore say that the company does not perceive any consequences of possible differences in the partner's metric definition.

Consequences for a customer in general according to C4
If the figures for metrics such as on-time delivery differ between the supplier and customer it may cause conflicts in the relationship which, the interviewees at C4 believe, could result in insecurity in the dyad. This could make the customer take in safety stocks in order to handle any potential problems in the supply of goods, since no company wants to experience a stop in its production process. Safety stocks are expensive and act as an excuse for not being as efficient as possible.

The persons interviewed at C4 say that if there are differences in way of handling the PM process between them and a supplier, and C4 is not satisfied with the resulting performance, the company would rather replace the supplier. This causes extra work for the company since they would have to initiate a search process.

Consequences for a dyad in general according to C4
If a conflict caused by differences in the ways of handling the PM process occurs in a relationship with a supplier, the persons interviewed at C4 will naturally state that they tend to believe their own figures.

The interviewees at C4 agree that a consequence that occurs if the partners report different on-time delivery figures is discussions within C4, as well as with the supplier about causes for the differences, and how to handle them. This is time consuming, and could hurt the relationship if the partners do not find a solution with which both parties are satisfied.

According to the interviewees, another consequence of the different ways of handling the PM process, as presented by the partners in a dyad, is that negotiations and contract writing gets more complicated when the partners do not have the same points of view on the supplier's performance. Good communications and mutual points of views are vital in a dyad for the partners´ commitment to and confidence in each other.

If there are problems with the transportation from the supplier to C4, and a delivery is late, the supplier could get a negative result in its on-time delivery, even

though C4 is responsible for the transportation. This could result in different figures being shown by the partners, which in turn could lead to situations of conflict in the dyad, instead of holding the carrier responsible.

The interviewees at C4 say that a prerequisite of continuous improvements in a dyad is that the partners have an understanding and knowledge of each other's processes. If the partners cannot agree on a solution where different ways of handling the PM process are presented, the dyad will have problems in performing as well as possible.

I-1.5 Dyad 5

I-1.5.1 Company characteristics

S5 - the supplier company

Supplier company S5 has 1290 employees, of which 300 work in the plant studied in this thesis. The plant manufacturers aircraft components and has a turnover of 40 Million Euro; geographically it is only one hour's drive from company C5. C5 is its largest customer and stands for about 40% of S5's turnover. The dependency on C5 is however decreasing.

C5 - the customer company

Customer company C5 is an OEM of military aircrafts with a turnover of 580 Million Euro; it has about 4500 employees. C5 buys 20-30 different electronic and hydraulic items from the supplier for use in aircraft control systems. The supplier is a system supplier in the sense that it is responsible for developing components for a complete control system, but also for assembling them to complete systems, based on functional specifications received from C5. The commercial contracts normally include both phases of a specific system, and cover the entire planned life cycle of the specific system. S5 is one of C5's largest suppliers, and is responsible for developing and manufacturing one of the most expensive systems in the completed aircraft.

I-1.5.2 The dyadic business processes

The purchasing process

Order and delivery specifications are included in a logistics agreement. The present agreement contains a delivery schedule for 107 aircraft, with monthly planning batches to be manufactured over a period of seven years. The monthly manufacturing figures are fixed for each three-month period, but can be changed +/- one product per quarter. Larger volume changes must be negotiated six months in advance. The annual manufacturing volumes are allowed to vary between 12 and 22 aircraft.

The order-to-delivery process

17-18 people work at Supplier S5 full time with assembling the hydraulic systems delivered to C5. Changes in manufacturing volume consequently have a direct effect on the company's manufacturing load and utilization. S5 makes and/or buys smaller components to stock. Electronics are bought and the final

system assembly conducted as late as possible, based on the delivery schedule. Assembled and tested systems are kept in a finished goods' stock for about 3-4 weeks before delivery to C5.

The distribution process
The components made at S5 are delivered to C5 on a just-in-time basis, i.e. delivered on the day when the respective item is planned to be assembled into an aircraft. This results in daily deliveries. S5 orders the transportation from a third party and C5 pays for it.

I-1.5.3 The PM process

Defining on-time delivery; supplier company S5
S5 uses on-time delivery in the dyad with C5. This metric's content has been developed in Excel by S5 itself in order for the company to be able to measure its own delivery service towards its customers. The result of the measurement is used internally in a Balanced Score Card, but the figures are also shared with the company's customers at meetings. In the dyad with C5 S5 does not share its on-time delivery figures with C5 in a structured continuous manner, whereas C5 informs S5 of its figures every six months. S5´s on-time delivery are measured by order line, and usually this means one full order, since the products manufactured for C5 are quite large and often constitute one order each. The measurement is conducted the day the manufactured order is tested and quality inspected, has all the necessary papers attached to it and is ready for transportation to customer C5.

The deliveries extend over a long period of time, as they usually do in the aircraft construction business; thus S5 knows a long time ahead what is required, and when C5 wishes an order to be delivered. Sometimes the delivery plans change and S5 writes down its reasons for the changes in order to have full traceability of all products. S5´s experience is that if C5 wishes to make a change, then both partners change the requested shipping day in their respective ERP systems. However, at times when S5 is the partner who wants to change the delivery day, it alone makes the change in its ERP system. This has resulted in poor figures in the on-time delivery metric for S5, as shown by C5 at its meetings. In most of S5´s other business relationships the content of on-time delivery is stated in the contract, which makes both partners aware of how to conduct their measurements in the PM process.

In summary; in order for S5 to get 100% on-time delivery it needs to get all the order lines in an order from customer C5 manufactured and accessible for transportation on the requested shipping day (figure I-1.7).

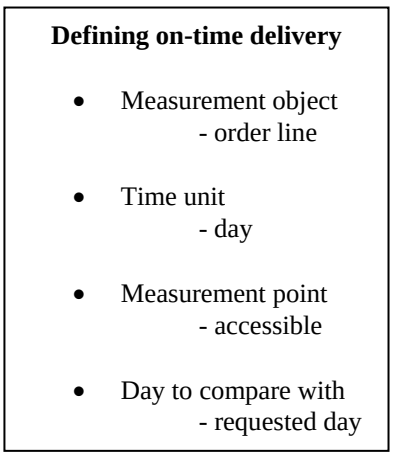

Figure I-1.7 The definition of S5´s on-time delivery metric

Defining on-time delivery; customer company C5
C5's demands are on product quality, on-time delivery and cost/tied up capital. C5 also relates internal on-time delivery to production. C5 uses on-time delivery in the dyad with S5. The content of this metric was developed long ago in the company's ERP system as it was then.

> *"It is an old habit to use this definition of on-time delivery, and there is a need for it to be re-evaluated."* (quote by logistics manager at C5, translated by the author).

One example of this is the time unit used, which creates a delivery window of three weeks. When C5 conducts measurements of S5's on-time delivery towards C5 the measurement object is order line. In the dyad between customer C5 and supplier S5, C5 is responsible for the transportation between the partners; however it is not until deliveries arrive at C5's goods reception that the order gets accepted and registered. The department accepts and registers the deliveries before they perform a control, and this is usually done within the same day as the arrival of the delivered order; sometimes however the goods' reception is late in its registration. C5 measures S5´s on-time delivery against the requested shipping day placed in the order, and it has a fine for suppliers that are late in their deliveries, even though it does not usually enforce this penalty.

In summary; in order for S5 to get 100% in customer C5's on-time delivery it needs to manufacture and ship all the order lines in an order. Each delivery should be accepted and registered at C5's goods' reception as early as one week before, and no later than one week after, the required shipping day as in C5's order (figure I-1.8).

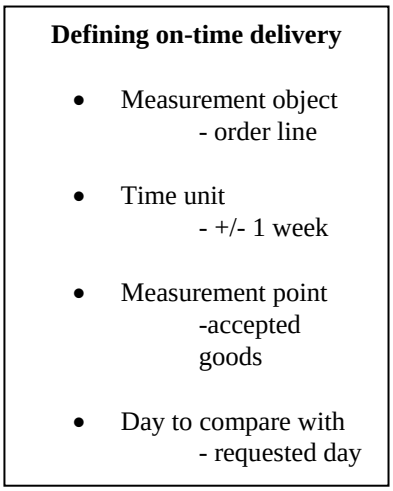

Figure I-1.8 The definition of C5's on-time delivery metric

Target setting
C5's target for on-time delivery to S5 is 95%. S5's target for on-time delivery to C5 is 100%. Targets are seldom discussed in the dyad. Contracts between the partners on targets exist, but it may well be as old as 10-15 years.

Measurement
Company C5 means that the current on-time delivery figure from S5 is only 60%. C5 has an old ERP system which makes it difficult to measure such figures, measuring inaccurately to boot; it means that it is difficult to use measurements in a "technically heavy" company. The material controller can influence how on-time delivery is registered when they are entered in Excel. S5 takes data continuously from its MRP system and enters it into Excel. There is a difference of a couple of weeks between S5' deliveries and C5's registration of same. Both companies measure on a monthly basis. C5's relates internal on-time delivery to production, which is high.

Analysis
Customer company C5 communicates on-time delivery to S5 on a monthly basis. Annual meetings take place between C5 and S5, but are rather focused on comparison of measurement results than on constructive discussion on solutions. S5 uses trend analysis/managerial analyses of their PM process results. C5 does not do this systematically; still C5 mean that on-time delivery is increasing when performance results are communicated to the supplier.

I-1.5.4 Consequences

Consequences for supplier S5 in dyad 5
The interviewees at S5 think that a consequence of the fact that the handling process of the PM by themselves and C5 differs is that S5´s reputation as a sup-

plier could be harmed. One example is that C5 measures S5´s on-time delivery at its own goods' reception when it is the one responsible for the transportation. Furthermore, C5 has several times forgotten to change the new delivery dates that both partners have agreed-upon in their respective ERP systems. Both examples have;

> *"resulted in poor on-time delivery figures for S5, which they find unfair."* (quote by program office manager at S5, translated by author).

A supplier who has a bad reputation can lose potential customers in the marketplace, but luckily the aircraft construction business is a small market where companies know each other's capabilities well, and S5 believes it has not lost any potential sales.

S5 has a safety stock for the components used in the manufacture of the orders placed by C5. This is however not a consequence of the differing ways of handling the PM process, but rather a consequence of the business itself. A safety stock is held for every customer at S5 in order to keep on-time delivery figures at 100% to all its customers, since several other customers besides C5 implement high fines if deliveries are late.

Consequences for dyad 5 according to S5

Even though S5´s and C5's ways of handling the PM process differ, the two companies maintain a close relationship. The personnel involved in the dyad know each other and communicate well. Several meeting between the partners have, however, ended in merely stating the fact that the partners have different figures for S5´s on-time delivery. The interviewees at S5 believe that this is consequence of the extra work and time being wasted on discussions that do not result in any changes or improvements of the dyad's performance. On one occasion C5 reported its on-time delivery figure to S5;

> *"which were so low that S5 was shocked."* (quote by product division manager at S5, translated by the author).

This caused an investigation at both companies in order to find what was causing the partners to have such differing figures for the same metric. The extra work of searching for explanations was not the only consequence of the companies' different ways of handling the PM process for on-time delivery. The dyad also suffered from uneasiness, and both parties questioned the other's metrics and content. The situation was however solved when C5 realized that it had some internal problems with delays in the registration of the deliveries from S5. In the end, with the partners having a close relationship (since they both are within the same group of companies), they ultimately worked for the same goal.

Consequences for a supplier in general according to S5

The persons interviewed at S5 state that suppliers who are conducting the PM process, and measuring on-time delivery which are defined in an incorrect way, risk getting poor on-time delivery figures that they have not deserved. This is a

serious consequence for a supplier, since many customers within a business area talk to each other, and a supplier's reputation is a kind of marketing tool, and of great importance in getting new customers. Even though a relationship with a customer may work very well, and incorrect on-time delivery figures do not matter to the people involved, those in higher management may only see the figures, and reach their own conclusions on the supplier's performance.

The result of the PM process conducted by S5 is used internally in order to give feedback to the personnel and to improve processes. Since the staff is not informed of the differing way of handling the PM process at C5, the interviewed persons do not believe there are any internal consequences at S5. Otherwise the interviewees think that differing figures could cause internal conflicts and discussions about which partner is measuring the right way, or who could be responsible internally for the company's poor figures in the customer's measurements.

Consequences for a dyad in general according to S5

The interviewees at S5 believe that it is important for both the supplier and the customer to have the same way of handling the PM process in a dyadic partnership. This would mean that there would be no consequences in the form of extra work, with unnecessary discussions where the companies only talk at cross-purposes and misunderstand each other, instead of focusing on improving the performance in the marketing channel. As a result the companies would be able to become closer in less time and create a well-working dyad.

Consequences for customer C5 in dyad 5

The interviewees consider on-time delivery and it's the PM process to be of importance, and would like to see a standardization of these kinds of processes used in their relationship with S5, as well as in C5's whole supply chain. An example of this is the standards developed by Society of British Aerospace Companies; SBAC.

The differences between C5's and S5´s handling of the PM process have, according to the interviewees at C5, resulted in the partners not having had the same starting point in discussions.

> *"The collaboration in a dyadic relationship is always harmed when the partners do not have the same starting point."* (quote by logistics manager at C5, translated by the author).

This has not only made improvement projects between the partners more complex to carry out, but also sometimes made internal improvements and implementations more difficult to attain at C5 because of the insecurity in the metrics used. When differences and insecurities exist, the different departments cannot agree upon where problems occur, or how to handle them. This results in safety stocks, re-planning and possibly other unforeseen consequences, and before the problems can be solved, time and other resources have been wasted.

Consequences for dyad 5 according to C5

The relationship between C5 and S5 is perceived by the interviewed persons at C5 as being very close. Some situations have occurred when the partners in the dyad have disagreed because of different figures in on-time delivery, and this has caused both discussions and insecurity in the relationship. However, the problems have been solved thanks to the partners being as close as they are. The interviewees agree that the differences in the handling of the PM process have created extra work in the dyad that has not really resulted in anything productive such as improvements.

The interviewed persons at C5 say that, from a logistical point of view, the differences in their and S5´s handling of the PM process has made it harder to make the processes between the companies more efficient.

> *"The difference in the handling of the measurement process is negative for both partners and, in the end, the group of companies they both belong to."* (quote by project leader at C5, translated by the author).

Sometimes, when the supply of products from S5 does not flow smoothly, the people at C5 have to contact S5, and instead of improving the situation the involved people tend to misunderstand each other, which results in arguments and the comparison of each other's metric figures.

Consequences for a customer in general according to C5

When a customer's on-time delivery figures differ from the supplier's, an uncertainty arises which often results in an increase in safety stocks being held. This binds capital and has a negative impact on the efficiency in a company.

The aerospace business usually works at a lower production pace and with longer delivery plans than businesses such as the automobile business. Furthermore, the aerospace business is characterized by complicated products with short manufacturing sequences. These prerequisites results in a low and unstable production pace which, according to the interviewees, tends to make the actors in the supply chain somewhat unfocused on lead-times and efficiency in the processes. One example of this is the fact that C5 is able to make notes in its ERP system when and/or why a supplier is late in its deliveries. This is however not always done, which makes the company unable to make follow ups and evaluate the suppliers thoroughly in order to make improvements in the supply chain. As it is now, C5 has a tendency to work with the suppliers that, according to C5's measurements, have a very poor on-time delivery rate, and the elements in the dyads have not received the same attention.

If the partners in the dyad had the same way of handling the PM process it would be easier to communicate with each other. The interviewees at C5 all agree that the company's big delivery window of three weeks in its PM process produces a negative attitude in its suppliers. This kind of window could send undesirable signals to suppliers that they do not have to perform as high as possible, that C5

doesn’t really care about deliveries being on time, and that the supplier can therefore prioritize other customers´ orders instead. As a customer C5 does not want orders to arrive too early, as it then becomes the partner keeping stock in the supply chain. At the same time the company does not want orders to arrive too late either, since this forces the company to hold safety stocks and/or make changes in the production schedule. This in its turn could affect C5’s ability to keep its on-time delivery towards its own customers. If C5 does not keep its performance in on-time delivery at a high level, its reputation may be harmed, which could mean lost sales and a negative impact on its competitiveness in the marketplace.

On some occasions C5 has had on-time delivery figures for suppliers that have somewhat misrepresented the suppliers´ performance. This could be a result of internal process problems, such as not changing delivery dates that have been changed by the supplier and/or C5, but also as a result of problems in the registration of orders delivered into the goods’ reception. Management has sometimes reacted, and the individual material planners have been forced to defend the supplier’s performance. In situations like this time is wasted on extra work and internal conflicts where different departments want to handle the situation in different ways.

If there existed a mutually agreed way of handling the PM process in the supply chain, the interviewed persons believe it would be easier when C5 negotiated with its suppliers, since every partner would, for example, then have a correct picture of each member’s performance.

The people interviewed at C5 think it is important for a company to be able to present reliable results from the PM process that all the supply chain parties understand the meaning of. Not only does this make all forms of communication with one’s supply chain partners easier, but it also helps to motivate co-workers by giving them concrete goals to work towards, as well as eliminating personal assessments and relationships.

When the interface between two companies in the supply chain does not work properly, then according to the interviewees the problems of insecurity, complications in communications and so on get spread throughout the supply chain. The credibility between the partners and within the companies gets impacted which, for example, produces a negative effect on the working environment for the employees. This in its turn makes it hard to optimize the supply chain’s flow, and in the end this may result in fewer market shares.

Consequences for a dyad in general according to C5

The interviewees at C5 think that the partners should be clear about how each member of the supply chain handle its PM process; otherwise the whole chain may suffer negatively. Examples are that partners in dyads that should be in close collaboration with each other, and not talk past or purposely misunderstand each other. If they do, the consequence can be that it will be harder to accom-

plish improvements in the value adding processes. Furthermore, friction may arise in the relationship when it becomes a battle of whose way of handling of the PM process is the better, instead of finding solutions and becoming more efficient. The interviewed people at C5 say that differing ways of handling the PM process in a dyad is not the biggest issue, but “many a mickle makes a muckle” and the interviewees find it is strange that an issue that has several negative consequences, and that at the same time is quite easy to handle, has not been dealt with.

The interviewees think that the partners in a dyad need to mean the same thing when they discuss metrics and figures if they are going to become really close and coordinated. The same way of handling the PM process is a prerequisite for this to happen.

If C5 and a partner in a dyad show different ways of handling the PM process C5 usually believes its own results rather than its supplier’s. Since the supplier often tends to believe its own results, a feeling of conflict may arise. The consequence is that the partners need to investigate the different views and find a solution. This not only takes time, but may also cause friction to remain in the relationship.

When a dyad’s partners have different ways of handling the PM process and presents different figures for on-time delivery, the interviewed people at C5 agree that it is difficult to hold the carrier accountable for possible mistakes. Sometimes the difference in the partners´ figures is not only a result of the carrier being late, but also because of the uncertainty in the metrics; the partners in the dyad just establish different figures instead of collaborating in holding the carrier responsible.

I-1.6 Dyad 6

I-1.6.1 Company characteristics

S6 - the supplier company

Supplier S6 is a division responsible for product development, sales and production of new steam turbines, but also for the service workshop where spare parts are manufactured and service is performed. Altogether, supplier S6 has a turnover of 700 Million Euro and employs 1500 people. The service workshop has a turnover of 13 Million Euro and employs 160 people. The service workshop performs 180 000 hours of production annually, of which 50% is service. The service orders and the orders for manufacturing are not handled within the same flow. Also related to the focus of this study is S6´s purchasing function (for stocked raw material such as bar and plate), goods reception, and material inventory (which contains some 330 000 item codes, of which 15 000 -20 000 are active).

C6 - the customer company

Customer company C6 is a division responsible for selling and conducting service on steam and gas turbines. The turnover for customer company C6 is about 100 Million Euro, and the number of employees is 450. The primary customers can be found e.g. in the oil and gas industry, and those who have already invested in turbines, that need scheduled or un-scheduled service. The flow that is in focus in this study is the spare parts and planned service flow for the steam turbines. Related to this flow are C6´s marketing/sales teams (who have the final customer contact), the purchasing function (for order-related purchasing) and the logistics function.

I-1.6.2 The dyadic business processes

The purchasing process

Customer C6´s logistics function makes forecasts for both material (for their own purchasing function) and capacity (for the service workshop); this is a newly-implemented routine. Material forecasts are made on a three-year perspective, and are perceived to be fairly good. Capacity forecasts are more difficult to make and require a lot of experience. 50% of the service volume is predictable and contracted. 30 days before the purchasing lead-time, the marketing/sales teams are asked whether the planned material will be used or not. Lead-times from suppliers can be as much as 18 months. The teams then have 30 days to make definite orders for materials to purchase, and for service to the service workshop. The ERP system handles all the information flows.

The order-to-delivery process

The service workshop converts the order to a production order. Material checking, process planning, possibly drawing and pre-costing, precede the actual start of production. As the production is rate-based at a standard rate for all types of production, spare parts must be “chased” through production by certain employees called spare-parts operators. The last operation is the final approval, and then the service workshop considers the spare parts to be ready. The finished products are then transported to a forwarding partner who is responsible for packaging. This is an operation with capacity problems, for which reason a further two weeks can often be added to the lead-time. First after packaging is ready are the products available for C6.

The distribution process

80% of the deliveries are “ex works”. The forwarding partner is also responsible for distribution. It does not, however, use the ERP system to explain why products can get “lost” and not be traceable when they have left the service workshop. Instead, documentation is prepared manually.

I-1.6.3 The PM process

Defining on-time delivery; supplier company S6

The most important performance variables agreed between C6 and S6 are on-time delivery, process capability (actual vs. requested), length of lead-time and cost. Supplier company S6 uses on-time delivery in its relationship with C6. The

definition of this metric has been developed in order to give S6 the information it needs to assess its performance in the dyad. The measurement object in the on-time delivery metric used is the order, which usually consists of an order from C6 for some 20-100 replacement parts. The measurement is conducted when the order is registered in the material inventory's system as accessible for C6. When customer C6 has a shortage of time S6 sometimes deliveries the order right to the production line at C6 as soon as it is ready. On occasions like that, the administration work of registering the finished order is done afterwards. In the dyad supplier S6 acknowledges the orders that are placed by C6, and this day becomes the one that S6 assesses its performance against its on-time delivery metric. If S6 wishes, it is possible to change the acknowledgment day in a placed order, but this is seldom done.

In summary, in order for supplier S6 to get its on-time delivery to 100% it needs to get the order manufactured and available in the material inventory for customer C6 the day it has acknowledgment the order (figure I-1.9).

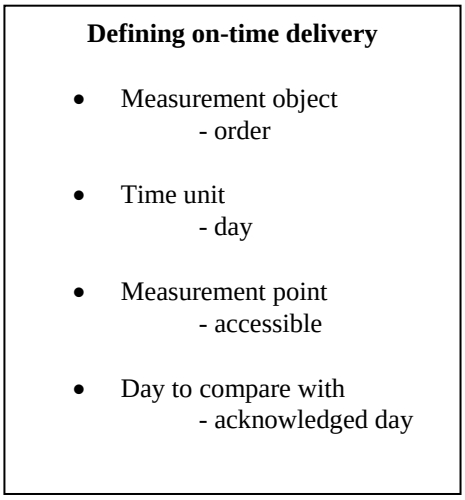

Figure I-1.9 The definition of S6´s on-time delivery metric

Defining on-time delivery; customer company C6
As mentioned earlier only supplier S6 conducts measurements of the on-time delivery between customer C6 and supplier S6. C6 uses however the monthly figures presented by S6 at meetings between the partners. The reason why C6 does not measure the on-time delivery performed by S6 is that the partners used to be within the same division in the company, and when they became separated neither the measurement processes nor the contracts between the partners were implemented. Lately management at the group of companies S6 and C6 belong to has expressed its wish for C6 to begin measuring all its suppliers in an equal manner.

Target setting
The specific target for on-time delivery at customer C6 by supplier S6 is 90%. The target for on-time delivery in the dyad with C6 is for S6 95%. These targets are agreed by both customer C6 and supplier S6.

Measurement
S6´s average external on-time delivery is 81%. On-time delivery in full for C6 is 90% over an 8 week period, and 96% over 6 months. On-time delivery from suppliers is 65%, and with a grace of 7 days, is 80%. Data is taken out of the ERP system and is "washed" before reports are generated in Excel.

Analysis
Measurement results from S6 are reported to management and are communicated at various meetings. Major changes are discussed and causes are looked into. One result can be that a Six Sigma project is assigned. Measurements are seldom questioned between the partners.

I-1.6.4 Consequences

Consequences for supplier S6 in dyad 6
In the dyad between S6 and C6 only S6 measures the on-time delivery performed. The interviewees at S6 think that this has consequences in the form of a lack of feedback from an important customer. When a supplier does not get information about how it performs, and only has its own figures to look at, it tends to get a bit conformable; S6 sometimes feels as if it could use more input from C6 in its work of becoming more efficient in its internal processes. It gets harder for S6 to detect problems and opportunities of improvement when it does not get questioned in its performance, which could be the case if C6 measured its on-time delivery. If there were extensive problems in the deliveries from S6, the interviewees are convinced that C6 would begin to conduct the PM process, but as for now that has not happened.

Consequences for dyad 6 according to S6
Even though it may seem obvious that S6 is C6´s supplier, this is not the case. C6 could choose any supplier, and if S6´s performance is not good enough it would be replaced. The dyad between the two partners works very well, however, and this motivates C6´s selection of supplier even to the management of the group of companies they both belong to.

Since the two partners are within the same group of companies, and are localizes next to each other as well, the collaboration in the dyad is very close. The interviewed people at S6 say that the two partners work closely in order to improve the processes between the parties. C6 has, however, other suppliers that it needs to focus on because of problems with deliveries, which give limited resources left to work with S6, since its on-time delivery rate is high. If both partners had conducted the PM process and the figures had differed, the interviewees at S6 are convinced that management would have reacted and demanded an investigation.

The interviewees at S6 can worry that the fact that only S6 measures the on-time delivery could have consequences by dint of the dyad not performing as well as it could. This worry falls back on the fact that S6 does not get any feedback and C6 accepting its measurements without question.

> *"The strength in the dyad is in the common server and the weakness of the dyad is that only one partner conducts any measurements."* (quote by factory manager at S6, translated by the author)

Consequences for a supplier in general according to S6

The interviewees at S6 agree that when the figures for the on-time delivery metric differ in a dyad due to different ways of handling the PM process, consequences such as extra work and unnecessary resources are wasted internally on discussions and analyzing how the differences have arisen. If a customer is dissatisfied with S6´s on-time delivery, and it has a high figure for its on-time delivery, insecurity could spread within in the company, which could result in safety stocks and arguments about responsibility. If the partners cannot find a solution fast enough, S6´s reputation as a supplier could be harmed.

If the partners in a dyad have different definitions of metrics used in the relationship it becomes hard to hold the carrier responsible when it, and not the supplier, is the reason for late deliveries. Low on-time delivery figures for a supplier could, according to those interviewed at S6, lead to a bad reputation which could mean that potential customers might not be so interested in doing business with the suppler in question.

Consequences for a dyad in general according to S6

According to the persons interviewed at S6, the partners in a dyad need to mean the same thing in their communications in order for the dyad to be successful. If the way of handling the PM process differs between the partners, it is hard at an early stage to detect trends in the performance, which in turn makes it harder to react and implement improvements.

Consequences for customer C6 in dyad 6

The interviewees at C6 state that there is a danger in their not conducting any PM process concerning S6´s on-time delivery or any other performances. One example of this is the fact that S6 measures against the day it has acknowledgment receipt of the goods, which results in figures that show its performance, but possibly not the performance C6 requires.

> *"None of the partners has any figures showing the ratio between C6´s desired day on orders, and S6´s acknowledgment day."* (quote by logistics manager at C6, translated by the author).

Furthermore, the interviewed persons at C6 have the impression and find it strange that S6 measures its on-time delivery against acknowledgment day, but does not get a negative figure in its metric until after seven days. If C6 should experience problems in its supply from S6, there is a danger in that C6 could not

hold S6 responsible by presenting S6 and its management with suitable figures as an argument for the perceived performance. As a result, C6 has to answer to customers' complaints about problems in the supply, even though they are caused by S6.

Since customer company C6 has no figures for S6´s on-time delivery based on their requested days for delivery, the interviewed persons at C6 say that there have been occasions when S6 has prioritized new orders needing to be manufactured, instead of the service orders placed by C6. Without any figures C6 cannot really evaluate S6´s performance as a supplier, and if C6´s orders are not prioritized C6 could become late in its deliveries to its own customers, which would be negative for its competitiveness in the marketplace. As the situation stands today, C6 has functioned as a buffer when S6´s workload has been high. This has occasionally resulted in internal conflicts at C6 about C6's roll as the customer, and of S6´s responsibility as a supplier.

Another risk which the interviewees point out is that, with C6 not conducting the PM process concerning S6´s performance in on-time delivery, S6 is allowed to act as it wants, and that C6, the customer, does not get the opportunity to present the demands it has and to create incentives to its supplier to develop improvements.

Consequences for dyad 6 according to C6

The people interviewed at C6 think that the relationship with supplier S6 is very close and works well. They believe that the biggest reason for this is the fact that the two companies are within the same group of companies, and know that in the end they are both aiming towards the same goals. Furthermore, the people involved in the dyad know each other very well and see each other every day at work, which allows them to have an open and honest dialogue.

Consequences for a customer in general according to C6

The interviewees at customer company C6 say that in general the customer needs to conduct the PM process for its suppliers in order to be able to evaluate them in a correct way.

Consequences for a dyad in general according to C6

If the partners in a dyad do not have the same way of handling the PM process the interviewed persons at C6 think that it would be more difficult to become really close in the relationship. Furthermore, differences in presented results lead to extra work, both internally and in the dyad, of analyzing the source to the gaps and how to handle it.

The interviewees at C6 argue that different ways of handling the PM process in a dyad could result in irritation and conflicts that, even though solved, may leave the partners somewhat suspicious of each other. This in its turn harms the dyad's competitiveness, possibly leading to lost sales.

If the partners in a dyad have different ways of handling the PM process, and therefore have different points of view regarding the supplier's performance, the interviewed persons at C6 say it would be difficult to work with continuous improvements in the mutually conducted processes.

I-1.7 Dyad 7

I-1.7.1 Company characteristics

S7 - the supplier company

Supplier company S7 acts as a subcontractor and supplier of aluminum components to companies in the electronics/telecoms, automotive and furnishings sectors, as well as a number of other product areas. It has 470 employees and a turnover around 90 Million Euro. The studied customer company C7 is a small customer in terms of turnover, but when considering all C7´s plants, the company is one of the largest customers. Supplier S7 has 1000 customers and almost all of them are small – they are hence not dependent on any one customer. The distance between the companies is about two hours' drive.

C7 - the customer company

Customer company C7 makes trailers, safety systems and roof racks for transport vehicles. Its customers are mainly OEMs in the automotive industry, and deliveries are conducted as daily batch or sequence deliveries. The company has several plants; the one studied here has a turnover of about 100 Million Euro and employs 300 people. It buys about 50 different aluminum profiles used in several of the products from supplier, S7. The product life cycles are often a few years, but engineering changes may occur more frequently. S7 is one of the largest suppliers and considered a strategically important supplier; however, customer C7 also has two other suppliers of similar aluminum profiles, one of whom is larger than S7.

I-1.7.2 The dyadic business processes

The purchasing process

Customer company C7 makes products to order and to stock. It accepts order-to-delivery times of 5 weeks from supplier S7, and delivers in large batches equaling a full manufacturing batch. Purchasing orders are placed every or every second week. No forecasts are communicated from C7 to S7 in advance of the orders. However, plans for the future are to send rolling delivery schedules and decrease required delivery times from 5 weeks to just 5 days.

The order-to-delivery process

The average production lead-time at S7 is 5 weeks, and the production batches are large. Customers' orders are made to order. The first operations are therefore to make a semi-finished stock. The final manufacture and assembly then takes 5 days.

The distribution process
Supplier S7 is responsible for distribution, and uses a third party for its transportation services.

I-1.7.3 The PM process

Defining on-time delivery; supplier company S7
S7 measures on-time delivery in its dyads with its customers. The metric's content is, above all, decided by the standards in the ERP system used at S7, and provides information to the company in its evaluation of its performance as a supplier. The measurement object in the metric is the order line, and S7 conducts the measurement on the day the ordered goods are dispatched to the customer. In the metric, S7 compares the date to the day they have acknowledged to its customer when an order has been placed, although the company does not register any information about what delivery date their customer originally requested in the order.

In summary; in order for supplier S7 to attain 100% in its on-time delivery, it needs to get all the order lines in an order manufactured and dispatched to the customer on the day S7 has acknowledged (figure I-1.10).

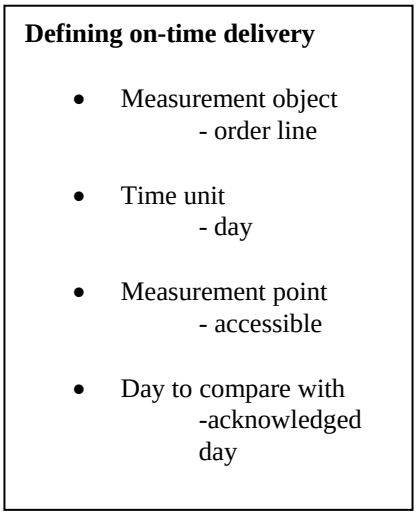

Figure I-1.10 The definition of S7´s on-time delivery metric

Customer C7 has demands on product quality/finish, on-time delivery and inventory turnover. It defines on-time delivery per order line, and compares the date of acknowledgment with the arrival date.

Target setting
Logistics contracts are being developed right now, and will be applied soon. Customer C7 has an official 100% target for on-time delivery, but an unofficial

target of 98%. Supplier S7 has not objected to this target, and has a target of 95% in general.

Measurement
Neither C7 nor supplier S7 can measure on-time delivery in their old ERP systems, so they use Excel involving a lot of manual work. C7 means that S7 now has an on-time delivery rating below 90%, which S7 confirms. Supplier S7 also complements on-time delivery by tracking delayed deliveries. That makes it easier to explain any lower on-time delivery. The on-time delivery percentage can hide information which is transparent when tracking delayed deliveries, such as when the customer has asked for a delay. It is also perceived to be a better metric in a continuous improvement perspective, as patterns of causes can be identified and action can be taken.

Analysis
Customer company C7 communicates graphics to preferred suppliers on a monthly basis by email, but there is no time to meet and talk. S7 seldom responds to this communication of results. C7 shows results internally, but does not use performance results in its own business (e.g. for the dimensioning of safety stocks). Its sales staff discusses on-time delivery with suppliers when necessary.

I-1.7.4 Consequences

Consequences for a supplier in general according to S7
The interviewees at S7 say that every now and then their customers report on-time delivery figures that are lower than the figures S7 has for the deliveries in question. The differences are often due to the customer not changing the compared date in its metric measurement to the one it has changed to itself. This makes the responsible persons at S7 upset, since they feel as if the company's high customer service has a negative effect rather than a positive one. Differences in the way the PM process result in extra work at S7; the company has to investigate why the results differ, and then contact the customer and report its findings. If customers show a lower level in performed on-time delivery from S7, the reputation as a supplier could be harmed which as in previous instances would mean a loss of sales, even a loss of potential customers.

S7 registers the discrepancies between customers´ figures and its own for the company's on-time delivery, both to keep track of them, and to have complete information when the partners communicate. The work with registering discrepancies takes time and makes extra work for the company, but the activity needs to be done in order for the company to be able to defend its reputation when the figures have been faultily measured, with poor figures in on-time delivery as a result.

When the partners´ way of handling the PM process in a dyad differs, the interviewed persons at S7 believe that a feeling of insecurity spreads within the company. As a supplier, the company needs to react when a customer is dissatisfied

or in general shows lower performance results than S7´s measurements show. This may result in the supplier trying to overcompensate, which in turn causes higher safety stocks to be held, as well as rescheduling and internal conflicts around which customer's orders that should be prioritized.

Consequences for a dyad in general according to S7

The persons interviewed at S7 think that the negotiation process between partners in a dyad is affected in a negative manner by differences in the ways of handling the PM process in the partnership. Differences may even cause conflict in the relationship, and if the partners do not find a common view the dyad's atmosphere may become more characterized by an "us and them" attitude, instead of a sense of togetherness.

According to the interviewees at S7, the partners need to;

> *"mean the same thing when they are communicating if the dyad will be able to be as successful as possible."* (quote by logistics manager at S7, translated by the author).

When differences in the outcome of the PM process are presented, meetings may just result in a confirmation of differences, instead of solutions. This makes it more difficult for the partners to become closer and cooperate in order to improve the mutually conducted processes such as holding the carrier of the deliveries responsible for delays.

As there has not been any opportunity to interview anyone at customer C7, no further empirical data exists about the company and the dyad in question.

Appendix II; Questionnaire 1

Nulägesbeskrivning
Utgångspunkten är leveransservicemåtten d v s sådana mått som berör logistikprestationer mellan företag. Dessutom är eventuella kostnads-, kapitalbindnings-, och flexibilitetsmått som involverar mer än det egna företaget intressanta att följa upp.

Del 1. Mål och mätsystem
Detta avsnitt syftar till att beskriva ert nuvarande mätsystem.
Vilka mål och prestationer är viktiga att följa upp?
Vilka logistikrelaterade mål och prestationer är viktiga att följa upp? Vilka interna logistikmål och prestationer? Vilka försörjningskedjerelaterade logistikmål och prestationer?
Beskriv era mätsystem (mätprocessen och viktiga mått) för att mäta och följa upp målen och prestationerna, särskilt de logistikrelaterade.
Vilken roll har mätsystemet för att initiera förbättring, särskilt logistikrelaterade? Internt? Externt i försörjningskedjan?

Del 2. Hur fördelas ansvar inom givet mätsystem?
Detta avsnitt bygger vidare på beskrivningen i del 1 – vilka mätrelaterade aktiviteter finns och hur många aktörer finns att fördela ansvar på? Både aktör (dvs företag) och befattningshavare/position.

Mål och strategier	Hur härleds? Vem genomför? Vad fungerar bra? Vad är problematiskt?
Definition av mått	Val av mått? Definition av mått? Vem definierar/gemensamt? Tidsenhet? Orderrad/order? Vad fungerar bra? Vad är problematiskt?
Målsättning	Uppdateringsfrekvens av kunds förväntningar? Uppdateringsmetod av förväntningar? Kontaktperson hos leverantören? Kontraktssituation? Målformuleringsansvar? Vad fungerar bra? Vad är problematiskt?
Mätning	Mätningsansvar? Mätningsfrekvens? Mätningsteknik? Vad fungerar bra? Vad är problematiskt?
Analys	Utfall? Spridning av utfall? Vem gör? Metod? Vad fungerar bra? Vad är problematiskt?
Utvärdering	Vem gör? Metod? Vad fungerar bra? Vad är problematiskt?
Ständig förbättring	Metod? Vem ansvarar? Fördelning av kostnader? Fördelning av vinster? Vad fungerar bra? Vad är problematiskt?

Del 3. Användbarheten av mått för logistikrelaterad flexibilitet

Detta avsnitt handlar om responsiva mått i det lilla perspektivet, t ex med avseende på leveransflexibilitet (att kunna hantera förändringar i liggande order) och

andra dimensioner av logistikrelaterad flexibilitet. Syftet är att beskriva era mål, mått och erfarenheter.

Vilka mål för logistikrelaterad flexibilitet förekommer?
Vilka mått används?
Vilka fungerar bra och varför?
Vilka är problematiska och varför?

Appendix III;Questionnaire 2

The studied phenomenon in this thesis is characteristics in the handling of the PM process concerning on-time delivery in supplier-customer dyads. The problem addressed in the study is that companies do not know what consequences differing ways of handling the PM process concerning on-time delivery may result in.

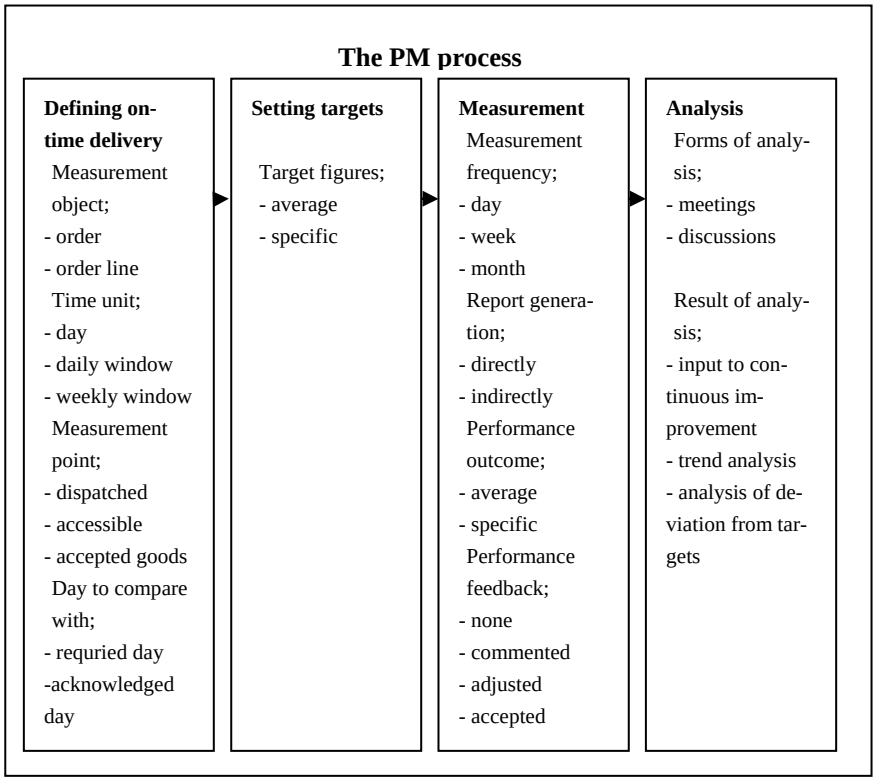

Figure III-1.1 The content of the PM process

Target setting has to do with the need for the PM process to have formulated targets (Basu, 2001). This activity is not simple, but ideally members of a supply chain should come together and mutually set the targets in order for the targets to reflect customer's needs (Holmberg, 2000). When it comes to the activity of measurement, unsuitable measurement systems in a supply chain may be the cause of several problems (Byrne and Markham, 1991; Keebler *et al*., 1999). It is

often not clear which member in a supply chain should conduct the measurements, but a mutually conducted measurement activity between supply chain members is recommended according to researchers such as Stank *et al*. (1999) and Holmberg (2000). The last activity in the PM process is the one of analysis. During this step it is important that the variance from targets are analyzed and that the metrics used are reviewed. The results from this analysis should be used as input in the process of monitoring and seeking continuous improvement (Forslund, 2007).

An example of a definition of the content, of the activity of defining metrics, is the division according to the four parts of; measurement object, time unit, measurement point, and day to compare with. Figure III-1.1 illustrates the content of the activity of defining metrics in the PM process. Furthermore figure III-1.1 gives examples of which measurement parameters that may be used in the four separate parts of the activity.

1. Name, position?
2. What is the content of each activity in your PM process concerning on-time delivery (figure III-1.1)?
3. What are the reasons to your way of handling the PM process concerning on-time delivery?
4. What consequences have you encountered due to differing ways of handling the PM process, concerning on-time delivery, in a dyadic partnership?

   As seen from;
   - your company's perspective
   - the studied dyad's perspective
   - general experienced consequences for your company
   - general experienced consequences for the dyad you are a part of
5. Are there any other persons you consider important to interview considering the questions asked?