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UNDERSTANDING COMPLEXITY OF PRODUCT DEVELOPMENT IN SMALL COMPANIES – A CASE STUDY

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Abstract: *Small industrial companies in Sweden have difficulties growing and stay competitive. These small companies often lack of resources [5], [6] [7], this prevents the companies from performing e.g. product development. The aim of the paper is to examine and identify critical factors that are influencing the success of product development in a small company. Common general critical factors when developing products are often connected to the organization. Such factors could be top management support, project teams and training/experience of staff. The case study shows that product development in a small company is complex and that critical success factors are the requirement specification and technical competence. The case study also shows that small companies are not collaborating with external partners and thus, a more collaborative product development process is proposed.*

1. INTRODUCTION

Today's global and fast changing business environment requires high-speed product development and manufacturing[1] to maintain and increase the competitiveness of companies. Due to the rapidly changing market, products and processes introduced to the customers are sometimes already old or obsolete [1]. The still increasing globalisation leads to greater customer demands which results in situations were companies are forced to customize. Thus, the product specifications become more variable, consequently new technology is needed. To be competitive, companies' dynamic and complex product development process has to become more efficient [2]. When a company perform product development it is an active choice with the goal to gain competitiveness through new products. Few companies can handle this all by their own without any help of external parts [3].

Small industrial companies in Sweden have difficulties growing and stay competitive. Many of these companies do not even want to grow, especially in the case of entrepreneurs [4]. Still, they have the willingness to be active on the market and be competitive by developing new products. Unfortunately small companies often lack of resources [5], [6], [7], this prevents the companies from performing e.g. product development. Thus, small companies have difficulties to perform product development by their own. Trying to achieve their goals, numerous companies choose to collaborate with other companies in different stages of the product development process, i.e. collaborative product development.

The focus of this research is not on managing product development in general but on small companies and their product development in specific. The scope of it is to discuss and bring out the complexity involved in product development in small companies, and further discuss collaborative product development as a way to overcome some of these problems.

Relatively little research has been conducted with the focus of small companies acting in the design process, therefore this research focuses on small companies with specific needs. When talking in terms of small companies, this paper refers to the European Union definition; companies with less than 50 employees and a turnover of € 10 million or less [9].

Thus, the topic of small companies and their product development has only been discussed briefly in academic research; however, the topic of complexity of product development in large companies has been discussed more extensive. The aim of the paper is to

[1] "The purpose of manufacturing is to serve the company-to meet its needs for survival, profit, and growth. Manufacturing is part of the strategic concept that relates a company's strengths and resources to opportunities in the market. Each strategy creates a unique manufacturing task. Manufacturing management's ability to meet that task is the key measure of its success." [8]

examine and identify critical factors that are influencing the success of product development in a small company.

The outline of the remainder of this paper is as follows: in part two (2), a literature review will be presented. Part three (3), research method, presents the case and the methodology chosen for the particular research question and the tools used within the case study. Part four (4), results, consist of the results from the case study and finally the (5) discussion and (6) conclusions are presented.

2. BACKGROUND

To form a picture and gain some initial ideas about the complexity of product development in small companies, literature on small companies' issues, product development methodology, and critical factors in product development were primary studied.

First, there is a need to define the concept small company. A small company is according to the European Union a company that has less than 50 employees and a turnover of € 10 million or less [9]. About 99 percent of all Swedish companies have less than 50 employees and employs two fifths of total labour in the private sector. That is an essential part of the Swedish economy [10].

2.1 Small companies acting in the design and manufacturing process

There are various reasons why small companies are not able to compete with larger organizations. Carlson-Skalak [11] characterizes small companies dealing with design and manufacturing, those characteristics are often obstacles for small companies (see list below):

- Limited resources
- Engineer's time spread across multiple projects
- Informal communication among personnel and often little or no input from manufacturing into the development process
- No sense of ownership, design methods governed by rules of thumb
- Little documentation of designs and of lessons learned
- Few formal project management and planning skills
- Low priority of trial runs and prototyping
- Concentration on short term goals
- Minimal stand-alone influence on industry as a whole.

Small industrial companies also focuses on current products, solving problems as they arise on the market and spends little time on customizing products, a so called "fire-fighter" mentality [11].

Today, many small companies in Sweden have difficulties growing and stay competitive. Many of these companies do not even want to grow, especially in the case of entrepreneurs [4]. The creative capacity to survive as a company can be compared with the product development in the company. Without this capacity to survive the company can be put in crisis and be ruined. Therefore, product development may be seen as one of the most important factors for success within a company. Generally, about 30% of all small companies in Sweden are missing their own product development. In the rest, 70%, the budget for product development come to 2,1% (1988) of the total turnover [12].

Successful product development in small companies is basically dependent upon three factors; marketing, design- and manufacturing-knowledge. Most of the small companies have large problems to live up to the role of developer of new products and as marketer on the international market. Resources for such implementation are also often missing [13].

A study shows that the product development process within a small company can be very complex and informal. When there are not enough resources, sufficient special skills and a suitable product development model or strategy, the product development is difficult to cope with and benefits from as a competitive priority. The company that the study was conducted at was a high tech company[2] with only five employees. Therefore, they did not have an organization divided into functions [14].

To be successful with product development, especially in small companies, it is important to; engage the right competence in the project, decide upon the requirement specification, question if the internal resources are sufficient, have a product development model and be aware of that the actual time taken and costs, tend to overdraw budget [13].

The success of small companies is also a great deal dependent upon whether the company can meet deadlines in the development project and less on which strategy that is used within product development [15].

2.2 Critical factors for success or failure in product development

Much has been written about factors for success and failure in the product development literature. In Balanchandra and Friar [16] an extensive survey is undertaken to map success factors within product development. After reviewing over 60 articles where they studied whether there exist a general agreement

[2] With core competence within sensor technology and position tracking systems primary for industrial robots.

about factors leading to success or failure in product development. They found four major categories and some 72 factors in existing literature. The major categories were *market*, *technology*, *environment* and *organization*. The analysis of the extensive data showed that most critical factors were found in the organization category. Factors cited by four or more studies were presented as factors that literature in some way had agreed upon as critical. Three of those were cited by two types of studies, see table 1. Balanchandra and Friar [16] also suggests that there are contextual variables for success or failure in product development, such as; nature of innovation; nature of market and nature of technology. Other authors that latter have addressed critical factors of product development are Connell et al. [17] and Ledwith [6]. Connell et al. presents a pyramid model of how critical factors influence project success, see figure 1. They present five important factors that must be managed to succeed in product development; *executive direction* – top management support and participation, *project team* – employing strong project cross-functional team, *innovation strategies* – using appropriate strategy for each different case, *internal factors* – to obtain correct internal infrastructure and organizational design, and *external factors* – as economics, political, customers, creditors etc. They emphasize on securing the management support, to have the "right"-people needed, to have the appropriate strategies and understanding the environment.

Ledwith [6] also presents categories of critical factors similar to other authors, those are:

- Organizational factors
- Development process factors
- Marketing and new products characteristics
- Skills and capabilities

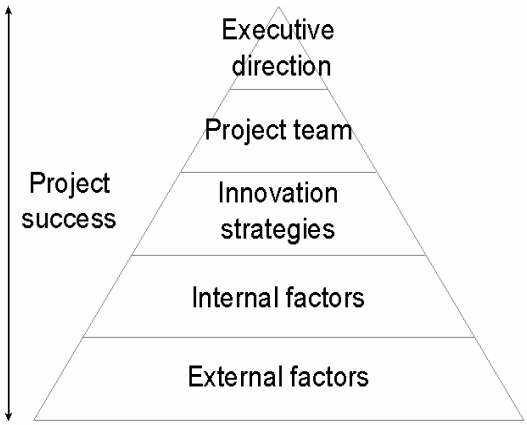

Fig. 1. The pyramid of critical factors. Factors that there must be competence in and consideration of in a project, to succeed [17].

Table 1. Critical factors for product development success and how many studies they were cited in [16].

Factors	No. of studies citing
R&D project studies	
High level management support	6
Probability of technical success	5
Market existence	4
Availability of raw materials	4
Need to lower cost	4
Timing	4
Commitment of project staff	3
New Product Development Studies	
Emphasize marketing	6
Marketing and technology are strengths	5
Competitive environment	4
Technology strategy tied to business strategy	3
Cited by both types of studies	
R&D process well planned	6
Create, make, market interface	4
Training and experience of own people	4

Ledwith [6] compares small and large firms, factor by factor, establishing what differentiate the two organization sizes when dealing with product development. Significant findings connected to success in small firms were; in the organizational category, top management support (compare to [17]); in development process category, proficiency in prototype development, market development and concept development; in marketing and new product characteristics category, customer need of the particular product; in new product characteristics category, compatibility for the product. Other interesting findings were that small firms reported a lower level of collaboration with external organizations than the large firms.

2.3 Collaboration – a way to compete

Today, many large companies have realized the importance of collaborating in several different stages and phases of business [6]. The concept of outsourcing emerged during the 90's and has since then gotten a strong hold in industry. Lately, it has also starting to be rather common to outsource the R&D function. Pronounced focus on core competence has given scope for suppliers and other collaborative partners to take a larger responsibility for the customer's or the OEM's development of products and/or systems. In many aspects this trend has been successful; industry uses it and research sup-

ports it and a lot of research is published within the area. This is mostly the case when dealing with large companies with fragmented organizations.

The case is considerably different when dealing with small companies (<50 employees, ≤€10 million in turnover [9]). In small organizations the fragmentation is not that prevalent [14]. Here, it is evident that the same persons often possesses different positions and is involved and pursues many different tasks within the company. Dealing with concepts as in-sourcing, outsourcing or even rightsourcing [18] is not even an option for these companies. In many of these cases there exists lack of experience in how to develop the organization and how to stay competitive by performing product development.

The trend is strong when it comes to collaboration concerning manufacturing, but weaker when it comes to the development of the products. This trend could be compared to the latest year's trends that have occurred in the larger organizations, whereas an increased collaboration about R&D has been perceivable. It is rather common that small companies have a tighter focus whereas important strategic functions as development are excluded. Small companies often do not have enough resources to both develop and manufacture.

However, a large amount of small companies within the manufacturing industry have the willingness to grow and tries to do so by collaborating with others. These companies have a need to stay competitive. To do so these companies have to bring home the large customers and get the opportunity to do parts of, or be entirely responsible for the development of a customer's product or system, this is nearly impossible for a single company.

Mostly, a small company cannot do that alone; they have a need to collaborate with others to gain the large projects, or as a manager of a small company says: "*– To grow, we need to get hold of the large elephants, not the small birds!*" [19]. As it is today many small companies only goes for "the small birds". There is an increased interest to collaborate in the product- and manufacturing process. To jointly create right conditions to keep and increase the ability of competitiveness. By collaborating in forms of virtual companies or temporary matrix-organizations problems as for, e.g. lack of resources, may be solved [13].

Small companies do not have the same conditions and cannot compete with the large companies considering specialist knowledge. Instead it can be rational to collaborate within a specific field, e.g. product development. Companies with a high degree of collaboration are most likely to manage to grow and develop products [10].

Small companies that collaborate, often do that with its local surrounding and in informal networks. The interaction between two or more small companies is both businesslike and social like and demand mutual norms and values with social behavior as an important factor. This is shown in studies conducted in the north of Italy and in Gnosjö, Sweden [20], two areas that is known for their entrepreneurial and collaborative atmosphere.

To succeed with collaboration, thus product development, each company or organization of companies should have a functioning product development process. Generally a process can be described as a sequence of steps that transform input to output. It can be compared to the black box principle with the exception of the black box containing a process instead of a function [21]. The product development process is different for every company that has one, although, the similarities are many. Some organizations follow a precise process while others have difficulties describing its process, just as with the black box. Models of the design process are mainly founded upon Simon's theory on rational problem solving from 1969 [20], where the process of solving problem in a sequential matter with the help of a model is described. The principles of product development are in many ways similar to his model of explanation, they are sequential and either descriptive or prescriptive [21]. In addition to Simon's model, for a long period the most common way of conducting product development was sequentially, and many times, this is also the case when small companies develop products today [20].

The sequential process is both time and money consuming and inefficient, which further leads to lack of competitiveness due to delayed market introduction. Today, the ways of approaching product development has changed. In the early 1990's Womack et al. [22] described the Japanese manner of thinking, *Lean Product Development* in "The Machine that Changed the World". This method is some of a semi parallel development method. However, the development of the concept of parallel or Integrated Product Development (IPD) has been much more extensive, and further, dynamic product development (DPD) [23].

Many companies have their own process, but, it can be perceived as somewhat fuzzy and not supported by the whole organization. Such problems may cause even larger problems with the performance of product development.

3. RESEARCH METHOD

As mentioned earlier the mainly used strategy to collect primary data to this paper has been by performing a case study. The aim of the case study has been to identify and map key factors within the product development process in a small company.

Here, the case study is the preferred strategy when 'how' or 'why' questions are posed. The case study is used as the strategy since it is a qualitative research method which is suitable for investigating current phenomenon in its natural context [24], to better understand the dynamics of systems [25] and a relatively easy way to investigate networks and other inter-organizational relations [26]. A case study copes with typical technical situations and has the advantages to rely upon multiple sources of evidence.

The company in which the case study was carried out is situated in a mid-sized city in Sweden. It had, at the point of the performance of the case study, 25 employees, but was expected to grow. The core competence lies within electronic technology development. The company consists of a project organization, with top management, quality assurance team and project teams. The quality assurance team consists of senior engineers. The top management is besides from leading the company also involved in the product development process. The company has mainly customer oriented product development, meaning that the customers come up with the idea and the company is realizing it. The requirement specifications are varying from customer to customer, more or less thorough.

The selection of this specific case was based upon which factors that affect the performance of product development in small companies. The company fitted, the in advanced formulated, conditions: a small sized company dealing with industrial product development located in Sweden.

The choice of product development projects to study was made in co-operation with the management of the company, on behalf of the criteria that the studied projects should consider; new development, the product should be a success to the customer but unsuccessful for the company due to overdraft in budget or inability to keep to the time schedule, and last, the projects must not be finished later than three years ago. The reason why these criteria were chosen was due to the complexity of the study; there can be various reasons why projects are successful or unsuccessful. When narrowing the conditions and delimitating the study, some tracks may be eliminated, thus facilitate the analysis of the data. Therefore, the result can only be considered to be valid for projects with similar conditions, structures, as those studied. However, this type of selective choice was necessary.

3.1 Case study as a method

The process when performing a case study includes defining and designing; preparing, collecting and analyzing; and last concluding. During this process there is a need to: develop a theory; select cases and design data collection material; conduct the case study; put together a case report; draw conclusions; modify theory, and write the final report. The process of case study research also deals with several components that must be included in the research design. The most important are: a research question; its proposition, its unit of analysis; the logic linking of the data to the proposition; and criteria for interpreting the findings [24].

The collection of data is possible by using several different sources. The list of sources can be made long, e.g. documentation (material for decision making), archival records (stored over time), direct observation, participant observation, physical artifacts, and interviews.

Interviews are one of the most common tools when collecting qualitative data [25]. The power of interviews is that it focuses upon the case study topic, with the opportunity to guide the respondent into the right area. The weakness that follows is that the respondent could give the answer she/he believes the interviewer wants to hear (reflexivity) or that the interviewer leads the respondent to a specific answer [27], [28], [25]. The questions during the interviews could also be poorly formulated and not given the expected answer due to misunderstanding or the interpretation of the interviewer (response bias). Nevertheless, interviews provide in depth knowledge about the phenomenon studied [28].

3.2 Data collection

The data collection was made through opened interviews, half-structured interviews and an overview of project documentation. A literature review was conducted mainly within the field of product development in small companies to facilitate the identification of interview areas and critical factors in the case study.

Interviews

Interviews as data collection method was tested in the beginning of the research project during a pilot study[3]. The purpose with the study was to investigate the phenomenon of inter-organizational relationship between main and sub suppliers in product development. During the pilot study interviews were held with management people and design engineers on several industrial companies, both large and small, who had close collaboration with suppliers in the R&D process (see [29]). The result from the pilot study showed that interviews could serve as suitable method when investigating the outcome of product development projects and inter-organizational relations. Seen from this, interviews were prepared and held according to obtained knowledge. The interviews were held with the assistance of a questionnaire with in advanced defined

[3] The pilot study was conducted during a higher course with the participation of 30 master students; see Olsson et al. [29].

areas of questioning (see [30]). The analysis of the interviews was performed according to Kvale's [27] so called, sentence concentration[4]. The most essential in the interviews were summarized and interpreted according to this method of analysis.

The interviews were made in two turns. First, interviews were held with people from the steering board; the MD and vice MD, to further identify interview areas and to complement the data gathered from the project leaders. During these initial interviews six key areas could be identified. Those were the ones that presumably would include factors that influence the outcome of the product development projects most (see results).

Second, five project leaders were interviewed considering eight different product development projects. The half-structured interviews were prepared by sending an opened questionnaire to the respondents in advanced, dealing with the key areas. In that way the respondents had the time and ability to comprehend the questions about to be asked and the opportunity to clear out question marks and misinterpretations before the actual interview. During the interviews the respondent had the opportunity to freely discuss about and around the questions asked. Thus, both the respondent and the interviewer could follow the prepared questionnaire and in that way make the interview more structured. Totally, 12 interviews were conducted.

Documentation

The documentary information has been important during the case studies; the collection of data has considered administrative documentation as: management documentation; project plans; other project documentation etc. With the help of the documentary information a background to the cases has been founded and understanding of the system reached.

Analysis of data

The analysis of data was carried out in two turns; after initial interviews and reviewing of documentation, and after in-depth interviews. During the first analysis six interview areas were identified based upon how frequent and of which magnitude a particular phenomenon did appear in the data. The six areas: product requirement specification; customer relation; technical competence and resources; project closure; project management and quality assurance where neither compared nor weighted in relationship to each other in this first analysis.

The second turn of analysis was performed after the more profound interviews. The analysis was carried out with support of a matrix where every project was analyzed by key area. A total of 48 analyses were made, six in each project. For every project a synthesis was formulated based upon the analyses. When an overall view of each project had been achieved synthesis where created for each key area. The twelve syntheses grounded the identification of the key factors, influencing the product development projects. In the case where a key area had great influence on the outcome of a project or a majority of them, this area was concluded to be a key factor. Two key factors were identified from the key areas.

3.3 Validity of the findings

In this research the construct validity has been secured by using multiple sources of evidence, that is to say interviews and documentation. During the compiling phase of the case study, drafts of the interviews have been reviewed by the respondents. The finally report has been reviewed by a manager and a project leader in the involved company to eliminate confusions and misinterpretations.

4. RESULTS

This part presents the results from the case study; a presentation of the situation in the company and a presentation of the project studied.

4.1 The case study company

As mentioned before, the company in which the case study was carried out had 25 employees, and with core competence in electronic technology development. The company consists of a project organization, the company has mainly customer oriented product development, and the requirement specifications are varying from customer to customer. The project teams often consist of 2-4 people from different areas (software, hardware, design, management etc.).

The company is in the situation where they have a, according to top management, functioning product development process. However, they have the will to reduce the failure rate and critical activities that some times causes money consuming delays and thus, overdraft in time plan.

When observing the company the feeling is that it is has a low hierarchy, with top management working close with the others; an informal atmosphere with closeness between designers, manufacturing people and idea creators.

The small company has limited capacity, thus developing limited batches of each product. The products vary from customer to customer and are mostly high tech products to large companies in Sweden.

Eight projects were chosen to be studied on behalf of a number of criteria earlier presented in Research method. The products differed from project to project.

[4] Sentence concentration implies reduction of material through concentration of sentences and that the most important information is kept [27].

4.2 The outcome of the projects

Project 1 concerned the development of an electrical control system. The project did not keep its time schedule because of a poorly prepared test specification. There was also a lack of the right human resources during the software development. The project turned up to be fragmented with no continuity.

Project 2 concerned a magnet card to a larger system. This project did not keep the time schedule due to failure in tests. Here, the problem also lies in the preparation of specifications.

Project 3 concerned an electrical control system to an electronically stock. The project did not keep the time schedule due to a poorly prepared requirement specification with no clear plans for when to terminate the project; lack of technical competence in some areas which resulted in lack of quality assurance; and lack of involvement of the top management.

Project 4 concerned the development of an I/O-unit for a high-voltage contact-break. The project failed because of an incomplete requirement specification from the customer. This could have been solved with the right directives from the management.

Project 5 concerned the development of a printed circuit card for a car transmission. The project did not keep the budget but did keep the time schedule. The most important factor why, there was an overdraft in budget, were; new technology. Due to the new technology involved in the project the competence were lacking in the project team, also the requirement specification became fuzzy.

Project 6 concerned the development of an electronic control system for air-compressors. The project exceeded the time schedule primary due to a bad customer relation. This problem could have been solved if the management had taken their responsibility when settling the business with the customer. Here, the test specification and the technical competence did also were reasons why the project failed.

Project 7 concerned the development of a testing system (software). The project did not keep the time schedule due to lack of technical competence which resulted in a need of education within the area. The requirement specification was also incomplete. This project carried small margins; therefore it was sensitive for changes.

Project 8 concerned the development of a high-voltage contact-breaker for extreme environments. The project did not keep the time schedule mostly due to external factors, e.g. component failure. But, there was a lack of resources, due to low capacity in the company at the moment.

5. DISCUSSION

This part of the paper includes the discussion of the results presented in chapter 4.

5.1 Key factors influencing the development process

The analysis showed (see table 2) that *product requirement specification*, the design of *test specification* and *technical competence*, are the factors that affect the rapidity in the product development process the most. Product requirement specifications and technical competence have a dramatically influence on the development time. However, both the management steering (involvement of top management) and the customer relation have a strong influence on the product development in the projects and may therefore be considered as critical factors too.

The study also shows that small projects carries small margins and therefore is sensitive to changes. Changes in a small project can thus bring problems and affect the development time. It is most likely that it is important to have a closer relation to the customer in small projects than in large for this specific company. Small margins make the project vulnerable and thus, demands fast and precise decisions.

To eliminate possible problems in the termination of the projects, which has found to be problem in projects but not so critical, a number of criteria that have to be fulfilled in the termination process have been defined; (1) all tests must have been finished and approved by the customer, (2) a complete production documentation must exist, (3) the product must have been delivered and (4) the customer should be satisfied.

The scheduling of resources and time in the projects is one stage that can be seen as critical. It seems like the problem with product development time is initiated here. That would imply that it is not anything wrong with the company's product development process, it is rather a question of the establishment of the project plan and time schedule. The planned development time should instead be based upon earlier successful projects with corresponding plans.

5.2 Summary of the results

Below, there will be a brief summary of the results from the case study:

(1) The requirement specification is important when performing customer oriented product development. The customer and the company must agree on the specification.

(2) The product development process in a small company is complex and hard to describe with a generic model.

(3) The small company has recurrent problems allocating enough and the right resources to their projects. This corresponds to findings in the literature [5], [6], [7].

(4) There are little or none collaboration between the company and their customers in the projects.

(5) The small company has few close partners in the product development process. The same phenomenon is described by Ledwith [6] when examining product development in small electronics firms.

Table 2. The 8 projects listed and the characteristics of them, summarized. The requirement or test specification has caused difficulties in 7 of the 8 projects.

Project	Customer business	Product	Characteristic factors influencing the project
1	wood industry	control system	lack of resources test specification
2	pharmaceuti-cal	magnet card	requirement and test specification
3	pharmaceuti-cal	control system	requirement specification technical competence top management
4	electronics industry	I/O-unit	requirement specification top management
5	car industry	printed circuit card	technical competence requirement specification
6	software industry	control system	top management technical comptence test specification
7	manufacturing industry	testing system	techinal competence requirement specification small margins
8	electronics industry	contact-breaker	lack of resources

(6) The small company is surprisingly independent but is confronted with common small company problems, e.g. limited resources, engineer's time spread across multiple projects, and little documentation of designs and of lessons learned; which is also the case when Carlson-Skalak [11] describes product development in small companies.

6. CONCLUSIONS

The aim of the paper has been to examine and identify critical factors that are influencing the success of product development in a small company.

The contribution of this case study to the overall research project, "*Managing collaborative product development in small companies*" has mainly been of an introductory art. It has been a first glance of the context and the complexity within a small company dealing with product development. A first comparison of the theory and empery has been made, and some critical factors have been sorted out.

Some reflections upon the study are that the company has recurrent problems allocating enough and the right resources to their projects, and there are little or none collaboration between the company and their customers in the projects. They have few close partners. The company is surprisingly independent but is confronted with common small company problems, e.g. limited resources, engineer's time spread across multiple projects, and little documentation of designs and of lessons learned.

When the right resources are at hand, the small company has a flexible organization that in an efficient way can help to develop products. Small companies do have great competences but, maybe not in all required areas, thus many of those companies need collaboration. Collaborative product development is the event when two or more companies have decided to collaborate in means of product development as mutual partners [31]. A theory is that collaborative product development can be a suitable approach for small companies to implement, to increase their competitiveness and strive for a more concurrent product development process.

Whether a company, like this one, is capable to fulfill the deadlines in a product development project depends a great deal upon the ability to formulate and communicate the specification of requirements, both internal within the project team and external to the customer or with the suppliers. The technical competence/knowledge within the product development team has also evident influence on the development time. Small companies do not have the time to let team members be educated in a tool or method during the project, however with the lack of resources that small companies can experience it is not always possible to have the most suitable person at a specific task. Thus, requirement specification and technical competence are seen as important critical factors that must be taken into account to succeed with product development in a small company, as the one presented included in the case study.

Due to the fact that the case study was conducted within one company and a limited amount of projects were studied (8 projects) the result cannot be generalized to fit product development projects in

small companies in general. However, the qualitative methodology used in this case study aim to seek structure and circumstances [32] which is considerable important when studying processes, and that is what makes such a case useful and interesting.

With the purpose to validate the findings, it would be necessary to try to replicate the case study presented in this paper, as future research. Further, it would be interesting to implement the ideas of a more extensive collaboration between such companies.

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