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Process for defining critical components in product development project

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ABSTRACT

Tampereen ammattikorkeakoulu
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Process for defining critical components in product development project

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Spare part sales are an important part of business for any company producing large machines. Companies should be able to offer spare parts for the machines they have sold to their clients as quickly as possible. This thesis researched the possibility of identifying critical components during new machines development projects. The objective was to recognize these critical parts which are needed in the day-to-day operation of the machines, so the company can offer spare parts to the customer without long lead times. In order to do this there needs to be a strong communication network between the service and product development department.

Data were collected by interviewing designers working on product development projects, in order to get an insight of the current level of communication between the service and product development units. Designers gave their views on the issues at hand. Much useful feedback was gained on how the service unit could help product development projects. As a result of this study, the actual process for defining critical components in product development is similar to the concurrent process. However, the cooperation between the service and product development departments was enhanced.

All confidential material was omitted from the public version of this thesis.

Key words: product development, aftersales

TIIVISTELMÄ

Tampereen ammattikorkeakoulu
Konetekniikka
Tuotekehitys

Manu, Jesse:
Prosessi kriittisten komponenttien määrittämiseen tuotekehitysprojektissa

Opinnäytetyö 19 sivua
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Varaosamyynti on iso osa bisnestä kaikissa isoja koneita valmistavissa yrityksissä. Yrityksen täytyy olla valmis tarjoamaan varaosia myytyihin koneisiin mahdollisimman nopeasti. Tämä opinnäytetyö tutki mahdollisuutta tunnistaa kriittiset komponentit uuden koneen tuotekehitysprojektin aikana. Ideana on tunnistaa kriittiset osat, joita tarvitaan koneen päivittäisiin operaatioihin, jotta yritys voisi tarjota varaosia asiakkaille ilman pitkiä toimitusaikoja. Jotta tämä olisi mahdollista, tarvitaan tietyn tason kommunikointia varaosaosaston ja tuotekehitysosaston välille.

Ideana oli haastatella suunnittelijoita tuotekehitysprojektista ja saada käsitys siitä, kuinka paljon osastot kommunikoivat keskenään. Suunnittelijat kertoivat näkemyksensä ongelmasta. Paljon hyvää palautetta saatiin siitä, miten varaosaosasto voisi auttaa enemmän tuotekehitysprojekteissa. Itse kriittisten komponenttien tunnistamisen prosessi ei muuttunut paljoa tämän opinnäytetyön ansiosta, mutta opinnäytetyö auttaa havainnollistamaan kommunikoinnin tarvetta osastojen välillä.

Tämä opinnäytetyö on sensuroitu ja salattu materiaali on poistettu julkisesta raportista.

Avainsanat: tuotekehitys, jälkimyynti

CONTENTS

1 INTRODUCTION

The commissioner of this thesis is Kalmar. Kalmar is one of Cargotec's business areas which offers cargo handling solutions all around the world. The writer of this thesis report is part of Kalmar's technical support team. Technical support is part of the service department which handles the spare part business for Kalmar machines. This thesis is focusing on the need of getting the service department and the technical support team involved in product development projects.

Kalmar produces machines for terminal cargo handling. These machines are complex and consist of many individual parts and some of which are critical for the normal functionality of the machines. If these parts break down, the service department will be responsible for supplying the customer with the new parts as soon as possible to minimize the machine downtime. The problem is that the service department does not know all the critical parts before they are needed.

The main purpose of this thesis is to find a way or a process to define critical parts during product development projects. In order to do this, the service department must be involved in the product development project at an early stage.

Knowing the critical parts shortens the time between ordering and receiving the spare parts for the customer. Fast delivery time is important for customer satisfaction and keeping the machine downtime to a minimum. This also has an impact on the machine lifecycle and it reduces cost of ownership through reducing the machine downtime. This thesis is one step in developing better communication between the product development and the service department.

First, this thesis looks at and introduces the project model. The designers of product development project are interviewed to identify any potential solutions for providing the service team with the critical component information.

2 SERVICE DEPARTMENT

This thesis is done for Kalmar© service departments technical support team. The main goal of the thesis is to find a way to define critical parts during product development project. In this chapter the Kalmar© service department is introduced. The benefits of defining critical parts during the product development project is discussed.

2.1 Functions inside of service department

The service department's main goal is to sell and provide spare parts for customers who have bought Kalmar© machines. Selling spare parts is an important part of Kalmar's business. The service department helps the customers to find the correct spare parts for their machine and supports them in any problems related to spare parts.

Service department has several functions inside:

- Area Sales Support
- Technical Support
- Integrated Logistics & Planning
- Item Management
- Forwarding
- Purchasing
- Documentation.

2.2 Technical support and spare part recommendations

The main tasks of the technical support are:

- parts support
- programming of components
- equipment upgrades
- new development projects
- warranty management.

This thesis focuses on the role of technical support in the product development projects. The service needs must be understood early in the product development projects, so the service department can provide better support for the customers.

One goal of technical support is to make spare part recommendations for Kalmar machines. The spare part recommendations are lists of the spare parts which are needed in machines (picture 1.) early lifecycle. Defining these critical parts early in the product development project helps in identify the spare parts which are most likely in need of replacement. In order to do this, it is important to familiarise product development process to know when services input is needed in the process.

PICTURE 1. Kalmar straddle carrier is one of the many machines that Kalmar makes (https://www.kalmarglobal.com/equipment/straddle-carriers/)

2.3 Uses to service and Kalmar

There are several risks in the service processes, e.g. availability risk, distribution risk, buying risk, delivery risk, deteriorate risk and so on. These risks are dependent and influence each other (Matsui 2008, 380). Making services© needs part of the product development project will help to reduce these risk and benefit the service business in Kalmar.

Defining the critical parts prolongs the machine lifecycle, shortens the spare parts© lead time to the customers, shortens the machine downtime and enhances the technical support© spare part recommendation process. These are some of the benefits of defining the critical parts.

3 PROJECT MANAGEMENT

In order to implement the service© needs in the product development projects, it is important to understand how the projects are managed in Kalmar and what project model Kalmar uses. First in this chapter there is basic information about what is a project, what is project management, how Kalmar manages its projects and what is Kalmar's project model.

Details about Kalmar's project model are classified for public report.

3.1 Project and Project management

Project is a temporally limited one-time job to accomplish a common goal. A project includes various different people with different tasks to achieve in a certain time period. These tasks are usually assigned in the early steps of the project and described in project documentation. There are many factors in the projects these include:

- schedule
- budget
- scope
- quality
- risks
- resources

(PMBOK guide 2013.)

Project management simply put means that “there is one goal that need to be achieved and a series of tasks to reach the goal”. In project management you need knowledge, tools, skills and techniques according to what is required by the project. Project management is accomplished through five different project management processes:

- initiating
- planning
- executing
- monitor and controlling
- closing

These project factors are in relationship with each other in project management. In a way, if one of these factors changes, there is a possibility that it will affect one or more of the other factors. For example, if the schedule is shortened, increase in the budget may be needed or the scope of the project needs to be reduced. It is also possible to lower the quality, if budget increase is not possible, so the cost of the project remains the same. The importance of these factors is usually determined by the stakeholders. Changing these factors during a project creates new risks and the project team needs to balance these changing factors to carry through a successful project. (PMBOK guide 2013, chapter 3.)

As these projects have potential to change, also the project management plans are changing during the project life cycle. Progressive elaboration is present continuously during projects and more specific information and accurate estimations are needed. Progressive elaboration, good information and communication allow the project management team to take the project to the next level. (PMBOK guide 2013, chapter 3.)

3.2 ABC Project Model

ABC project model is Project Institute Finland Ltd's project model that they offer for companies. Project Institute Finland Ltd is a Finnish company which provides project management solutions.

The ABC project model has been in use for over a decade and is used in more than 70 countries by over 50 companies including: Fortum, Solteq, Orion, Wärtsilä, Fennia, Paroc, Stockmann, Empower, Kekkilä, Sirius, Cargotec and many more. The ABC project model is also used in Kalmar. The ABC project model is by far the most commonly used project model in Finnish organizations according to the PMO study in 2014. (Project Institute Finland Ltd website 2020.)

3.2.1 Project life cycle

PMBOK guide describes project lifecycle as below.

> A project life cycle is the series of phases that a project passes through from its initiation to its closure. The phases are generally sequential, and their names and numbers are determined by the management and control needs of the organization or organizations involved in the project, the nature of the project itself, and its area of application. The phases can be broken down by functional or partial objectives, intermediate results or deliverables, specific milestones within the overall scope of work, or financial availability. Phases are generally time bounded, with a start and ending or control point. A life cycle can be documented within a methodology. The project life cycle can be determined or shaped by the unique aspects of the organization, industry, or technology employed. While every project has a definite start and a definite end, the specific deliverables and activities that take place in between will vary widely with the project. The life cycle provides the basic framework for managing the project, regardless of the specific work involved (PMBOK guide 2013, 2.4.)

Project lifecycle in ABC project model is divided into four main phases. Similar as mentioned in the PMOK guide (figure 1).

- preparation
- planning
- executing
- closing

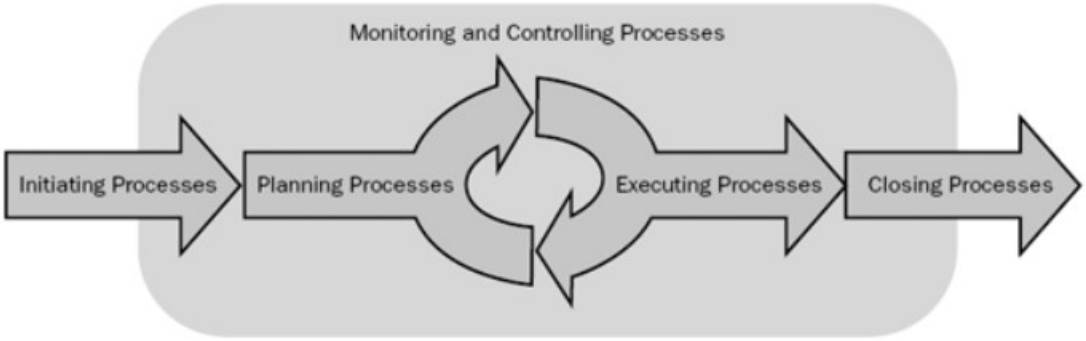

FIGURE 1. Project phases (PMBOK guide 2013, 2.4)

4 CRITICAL COMPONENTS IN PRODUCT DEVELOPMENT PROJECT

The spare parts are not a priority for Kalmar© product development projects. The focus of the projects is to get the new machines up and running. It would be important to focus more on the aftersales and spare part perspective when working on a product development project. There are obvious challenges when it comes to aftersales and spare parts in the product development projects. To get insight on the product development process, experienced product development project design engineers were interviewed. The results of these interviews are described in this chapter.

4.1 Critical parts and parts classification in product development project

The critical parts are the parts of a machine that are determinative for the machine to run properly. The critical parts can also have a long lead time from the suppliers especially if the parts include new technology. In the big product development projects in Kalmar top of the line new technology is used for the new machines.

Kalmar's personnel was interviewed to get more insight in the product development process. The purpose of the interviews was to get more insight on the product development process, understand what the product development personnel would want from the service department in the product development project, including what information. A conclusion drawn according to the interviews is that the course of the project does not correspond to the ABC project model. Every project is unique and there really can't be single guideline to follow.

The persons interviewed were, Chief Engineer and Senior R&D Engineer, from the Intelligent Horizontal Transportation Solutions. Interviews was done through a google hangouts call. Interviews style were open conversation about the service and the product development department's cooperation and possibilities of defining critical components.

One question to the interweaves was about spare part classification. According to the interviews, there is no classification of the parts during the design process. Classification means that different parts fall in different categories depending on the type of the part. For example bolts, screws etc. The bigger parts that are more complex and harder to produce, might have a longer lead time and these parts could be in their own category. This would help the spare parts sales of the service department, by being able to recognize the critical parts sooner.

There is not really anything built in to the product development projects that would allow the service department to see the machines critical parts easily without substantial effort. In an ideal world there would be classification for every spare part. This would make the process of identifying critical parts in product development much easier.

4.2 Parts list and critical parts

In order to out find what are the critical parts of certain a machine, you need to have knowledge of the parts that are used in the machine. Thus a person from the service department is needed to be involved in the product development project from its early stage. Every project is unique, but being involved already in the early stages of the product development project is important.

When the person joins the meeting of the project, he/she needs to ask for the parts list of the machine as soon as possible and explain why the service department needs this and also ask what other departments would want from the service. One conclusion gotten from the interviews was that the design department does not have a lot of information on how the service department functions. This could be a result from lack of communication between the departments and one way to fix this is to communicate more.

5 SUGGESTIONS AND SERVICE IN PRODUCT DEVELOPMENT PROJECT

The persons of the product development teams gave feedback and suggestions on how the service department and product development teams could work better together. Feedback was collected through interviews.

Last chapter is the solution to defining critical components in product development project. The solution for defining critical components is simple solution, that is really similar to the concurrent process, but there were not found any other possible solution.

5.1 Spare part quality

One of the talking points was the spare part quality. In the new product development projects the designers try to use the same parts for the new machine as were used for the older ones. One of the requests was to have reports about the flawed spare parts, so the product development would not use spare parts that brake easily or are bad quality. This could be done through the spare part warranty claims. If there are parts that get claimed by warranty a lot, then these parts should be reported to the designers in the product development projects so they would not use bad quality parts for the new machines.

Product development can use custom tailored parts in the machines that will have a longer lead time from the suppliers. These parts should be reported to the service department for them to be able to get prepared for the demand. There should be shared view and recurring communication between departments. The communication between departments could be done by having more meetings.

5.2 Shared view between departments

An important aspect of working together is a good communication. The personnel of the product development can not know what the service department needs and the service department can not know what the product development needs, if

there is lack of communication. It is important to communicate and give feedback. If some spare parts are hard to get for service. Then there should more communication between departments, so service can prepare better and more optimal spare parts can be used in product development projects.

5.3 Service in product development project

Kalmar has process for implementing the service's needs into product development project and it is very similar to this solution. A chosen person from the service department must be involved in product development project from the early stages of the project. The ABC project model that is used for Kalmar's project development projects, has phases from 1 to 4. The first phases from 1 to 2 are finance oriented and not important from service point of view. The dedicated person form the service department should join the product development project meetings around the second phase (planning phase). After the planning phase the projects costs start rising and machine designing starts to get to the full speed.

When the person from the service department joins in the project meetings he/she needs to demand and rationalize the need to get the parts list of the machine under development as soon as possible. The person also needs to explain why it is important to the service department and for Kalmar to get the parts list as soon as possible, so the critical parts can be identified from the machine© parts list by the technical support team (figure 2).

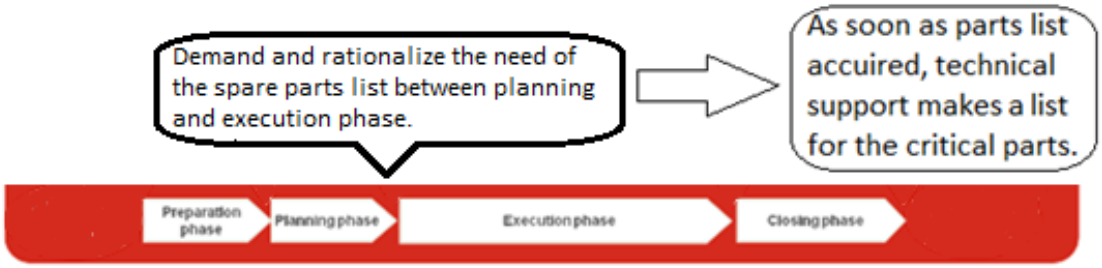

FIGURE 2. Project lifecycle phases (Cargotec Project model & NPD@Services, 2019) Recreated

After parts list is acquired it also makes possible for early spare parts recommendations and critical parts list from technical support team. Spare parts recommendation list and the critical parts list makes possible to buyers check if some essential part for the machine has a long lead time. Parts with long lead can be stored to storage so when customer needs this essential part it is ready to be sold without the long lead time.

6 DISCUSSION

The purpose of this thesis was to find a way to define the critical parts during product development projects in Kalmar. Defining the critical parts during the product development project shortens the time between ordering and receiving the spare parts for the customer. Fast delivery time is important for customer satisfaction and keeping the machine downtime to a minimum. This also has an impact on the machine lifecycle and it reduces the cost of ownership through reducing the machine downtime.

Getting to know the project model helped to have better understanding about how product development projects move forward and helped understand when service could join the product development project.

Interviewing designers gave insight in the product development projects and in understanding what the designers want from the service department. The designers gave good feedback on what service department could do more to support the product development process.

As a result of this thesis a process for identifying the critical parts during the product development projects is presented. It is suggested that a dedicated person from the service department is assigned to join the product development meetings at early stage. The person will request for the parts list for identification of the critical parts. Identification of the critical parts would be the responsibility of the technical support team.

This thesis helps to understand that there is need for better communication between service department and product development department. Spare parts are big business and the next step is to continue the good daily work in the service and product development units.

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