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**BETTER PRODUCTIVITY FOR SMEs BY USING QUALITY MANAGEMENT
SYSTEM**

Master's Thesis 2019

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ABSTRACT

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Name of the study: Better Productivity for SMEs by Using Quality Management System	
Year: 2019	Place: Lahti
Master's Thesis. LUT University, Industrial Engineering and Management. 96 pages, 29 figures and 8 attachments Supervisors: Professor Helinä Melkas PhD Satu Pekkarinen	
Keywords: Quality, Quality Management System, ISO 9001 standard, Business Performance Measurement, Continuous improvement	
<p>The aim of the study was to design a quality management system based on ISO 9001:2015 standard for the SME that markets the car wash equipment and services. The target company operates in a strong competitive and labour-intensive sector, where the control and self-direction of service installers in field work are key elements in terms of performance, reliability and corporate quality. The study gathered material based on theory and company action plans, as well as through interviews, and examined how to build a process improvement quality management system that increases the performance of the target company, self-directed and performance. The meter selections made for The Quality Management System are based on the processes of the target company's operational control system and the critical success factors assigned to them in this study. In addition, the study identified and investigated the potential problem points expected to be generated in the implementation of the system. The result is a completed quality system model, up to the implementation phase, consisting of a practical application to the target company's needs, including the 1. version of The Quality Manual.</p>	

TIIVISTELMÄ

Tekijä: Joonas Ruoho				
Työn nimi:	Parempaa	tuottavuutta	pk-yritykselle	
laadunhallintajärjestelmän avulla				
Vuosi: 2019		Paikka: Lahti		
Diplomityö. Lappeenrannan-Lahden teknillinen yliopisto LUT, Tuotantotalous. 96 sivua, 29 kuvaa ja 8 liitettä Tarkastajat: Professori Helinä Melkas FT Satu Pekkarinen				
Hakusanat: Laatu, laadunhallintajärjestelmä, ISO 9001 standardi, suorituskyvyn mittaaminen, jatkuva parantaminen				
<p>Työn tavoitteena oli suunnitella autonpesutoimintaan kytkeytyviä laitteistoja ja palveluita markkinoivalle pk-yritykselle ISO 9001:2015 standardiin perustuva laadunhallintajärjestelmä. Kohdeyritys toimii kovassa kilpailutilanteessa ja työvoimavaltaisella alalla, jossa kenttätyötä tekevien huoltoasentajien ohjaus ja itseohjautuvuus ovat keskeisessä osassa tuloksellisuuden, luotettavuuden ja yrityksen laatukuvan kannalta. Työssä kerättiin aineistoa teorian ja yrityksen toimintasuunnitelmien pohjalta sekä haastattelujen avulla ja tutkittiin, miten rakentaa prosessien parantamiseen perustuva laadunhallintajärjestelmä, joka lisää kohdeyrityksen suorituskykyä, toiminnan itseohjautuvuutta sekä tuloksellisuutta. Laadunhallintajärjestelmälle tehdyt mittarivalinnat perustuvat kohdeyrityksen toiminnanohjausjärjestelmän prosesseihin ja niille tässä työssä määritettyihin kriittisiin menestystekijöihin. Lisäksi työssä kartoitettiin ja tutkittiin potentiaalisia ongelmakohtia, joita odotetaan syntyvän järjestelmän implementoinnissa. Työn tuloksena on implementointivaiheeseen asti valmis laatujärjestelmämalli, joka muodostuu käytännön sovelluksesta kohdeyrityksen tarpeisiin, sisältäen laatukäsikirjan 1.version.</p>				

ALKUSANAT

Haluan kiittää Prowash Oy:ta saamastani mahdollisuudesta tehdä diplomityöni käytännönläheisestä aiheesta, mikä antoi minulle paljon uutta tietoa ja eväitä tuleviin työtehtäviini. Erityisesti haluan kiittää Prowash Oy:n toimitusjohtaja Rudi Steineria ja projektijohtaja Jyrki Lasosta työni suorittamiseen tarvittavasta tuesta ja materiaalista. Työn loppuvaiheissa haasteita toi siirtymiseni päätoimisesti työelämään, mutta sen mukana tuoman tämän työni kannalta itsenäisemmän vaiheen koen olleen minulle erityisen kehittävää. Haluan kiittää myöskin työni ohjaajana toiminutta Helinä Melkasta ohjeista työni edetessä. Toivon, että työni toimii hyvänä perustana ja suunnitelmana Prowash Oy:n laadunhallintajärjestelmäksi. Lopuksi vielä kiitokset avopuolisolleni tuesta diplomityöni ja päätoimisen työni aikana.

Lahdessa 17.10.2019

Joonas Ruoho

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List of abbreviations used:

QMS = Quality Management System

ERP = Enterprise Resource Planning System

CRM = Customer Relationship Management System

CSF = Critical Success Factor

KPI = Key Performance Indicator

KRI = Key Result Indicator

NAV = Management system (NAV-ERP, NAV-CRM) Provider for the target company

PDCA cycle (Plan, Do, Check, Act) is a development method and solution model. Other designations include Deming quality circle and PDCA development cycle

Quality Policy = The overall purpose and direction of the organization as expressed by the management.

SFS = The Finnish Association for Standardization (SFS) is a Finnish central organization for standardization. SFS is a member of the European Organization for Standardization (CEN) and the International Organization for Standardization (ISO)

ISO = International Organization for Standardization (ISO)

SME = Small and Medium-sized Enterprise

SWOT = Strengths, Weaknesses, Opportunities, Threats; applied in SWOT analysis

1 INTRODUCTION

1.1 Background

The company's success is based primarily on operational efficiency, innovation and customer-friendliness. It means cost-effectiveness of operations, good quality, anticipation of customer needs and clear benefits to the company's business processes, while also providing value to end-customers. As a result, the company will become more competitive in the marketplace and respond to changes in customer needs and markets in a controlled manner. (Selin & Selin 2005, 52-53)

The companies and organizations in the supply chain are interdependent and the quality that the end-customer receives is the end-result of the quality of the whole chain. In successive operation processes, the result of the previous process is always the input of the next process. (Krajevski et al. 2019, 586-587) A quality management system is used to manage the quality of processes and related products and services. Quality management system aligns process and company-specific operational processes throughout the supply chain. It increases the assurance that the quality received by the end-customer is as expected. A quality management system is also generally a requirement of a customer company and can be utilized in marketing. However, the main benefit comes from improving the processes and quality of organizations and the supply chain. (Lillrank 1998, 132-133) The purpose of a quality management system is to improve the cost-effectiveness of operations, the quality of products and services, and reliability. The ultimate goal is to improve customer satisfaction.

According to ISO 9000 standard, the aim of the quality management system is to increase customer value, customer satisfaction and customer loyalty. In addition, customer relationship continuity, organizational reputation, productivity, growing customer base and market share will improve. (SFS-EN ISO 9000 2015, 8) The actual quality management system is built in the basis of ISO 9001:2015 standard and its requirements. The quality system's intended benefits include the ability to consistently deliver products and services that meet customer and regulatory requirements, improved customer satisfaction, and risk and opportunity management. In addition, compliance with the requirements of the quality management system can be demonstrated to various stakeholders. (SFS-EN ISO 9001 2015,

5) Quality management should be integrated into every function of an organization's management system. A quality management system guides and directs the organization's operations to achieve greater cost-effectiveness and quality. (Lecklin & Laine 2009, 34)

The target company in this study is a supplier of car wash equipment to independent car wash entrepreneurs and chains. The target company provides fully installed hardware and offers different levels of service and maintenance service agreements to customer companies. In addition, the target company acts as a supplier of car wash chemicals and provides car wash building construction and consulting services. Field service technicians in the target company work either under an employee contract or a contractor agreement, and under additional subcontracting for additional resources. This means the different roles of the target company in terms of function and relation to customers and partners. This sets special requirements for the cost-effectiveness of the target company and sets specific requirements for successful recruitment. Multi-disciplinary and multi-functional requirement combined with special skills, self-directedness, motivation, and collaboration and customer service attitude.

1.2 Aims, Definitions and Research Questions

The aim of the study was to make plan for a quality management system according to ISO 9001:2015 standard, which allows the target company to implement the system and implement it. The focus of this study is on the continuous improvement of the operational control and self-direction of field service technicians. The development of self-management is considered important in field work, because the work supervision of service technicians is mainly provided through communication tools and management systems. Service technicians work at the customer interface and as a result, their performance results in the quality on which the customer company evaluates the performance of the target company. The profitability of the target company is also crucially dependent on the functionality of the field work. The study is involved designing and describing processes and a model for a quality management system and building the first version of the Quality Manual. The study does not include actual commissioning, but the target company makes commissioning as their next step. The target company will decide on the possible certification of the system following the internal audits related to the deployment and testing phase. The study is

focused more broadly on possible problems of implementation and their possible solutions. This is especially so because the study does not include actual implementation with experience.

In order to ensure the validity of the study, the correct measurable items in QMS are defined according to the chosen research approach (Kananen 2015, 337-338). Improving the quality and efficiency of processes is aimed at improving and ensuring the profitability of the processes and thus of the entire target company. The improved customer satisfaction of the customer companies leads to customer relationship continuity, new orders and a reliable corporate image. The employee satisfaction improves motivation and commitment to quality, efficiency and productivity.

Realizing the validity of the study (studying the right things) is the basis for realism, which in turn means that the research is reliably reproducible, yielding the same conclusions. Improvement should be seen as an improvement in quantitative business results. Qualitative measurements in QMS should be continuously regular and their effect on quantitative business measurement results should be monitored to ensure reliability. (Kananen 2015, 342-344)

Research questions

The main research question:

How to improve the offeree company's enterprise resource planning from quality aspect (by using quality management system) and converting quality to better profit?

The other research questions:

How to engage the staff for creating better quality?

How to increase the performance of the company and improve the profitability of processes?

How to pay attention to changing operational environment?

1.3 Implementation and Concepts

The ISO 9001:2015 Quality Management System is based on a process-based operating model, the management of operations as processes, their measurement, continuous improvement and the assessment of risks and opportunities (SFS-EN ISO 9001 2015, 6). In this study company-specific activity-specific processes are described and applied to meet the requirements and intended use of the ISO 9001:2015 standard. In the context of this study, the processes and functions of the target company are described in more detail, and critical success factors are identified for the processes, as well as their tracking criteria and metrics, including measurement frequencies. In addition, this study conducts a proactive risk and opportunity assessment of business processes. For the processes, the work is focused more closely on describing the quality management of field-related installation and maintenance processes.

The SFS Handbook (SFS 2017, 8) emphasizes that the target company's existing systems and good practices should be utilized in the quality management system being built. The well-functioning parts of an organization should not be unnecessarily altered, and any changes to the tasks should always lead to the development of the organization.

The quality management system process management are based on the target enterprise resource planning (NAV-ERP) system, which includes the customer relationship management system (NAV-CRM). The ERP system of the target company are founded to have a good basis for managing quality management processes as it is based on a process-based operating model and is linked to financial management. As an additional measure, the Balanced Scorecard, previously built for the needs of the target company, and the SAKE performance measurement and analysis system are also applied as part of this study.

The goals are set up for the processes through the process descriptions of the target company and the setting of the target state. Critical success factors in the processes are identified on the basis of set goals and the performance indicators are built for them. The results of the indicators guide the achievement of the final objectives.

Description of the study execution:

1. Gathering theory material
2. Compilation of the material in the empiric part (Plans of the target company and interviews with the target company's and customer company's representatives)
3. Descriptions of business functions, processes and measurement specifications
4. Configuration of process interactions
5. Determinations of risks and opportunities
6. Integrating the quality management system into the management systems of the target company
7. Quality Manual version 1

Standards defining the quality management system are: The ISO 9000 standard defines internationally accepted criteria and glossaries for a standardized quality management system; The ISO 9001 standard defines internationally accepted requirements for a quality management system; The ISO 9004 standard provides guidance on how an organization can create the conditions for continued success through a quality management approach, and the ISO 19011 standard provides guidelines for Auditing management systems. (SFS-EN ISO 9001 2015, 35-37)

Quality Management System's specific concepts are: "Supply = physical goods, service, information or a combination of these that has been designed and executed for the customer or any other stakeholder for remuneration. The entity offered to the customer; Product = end-result of production process, output, as it is at the end of the production process; Service = planned event or action to bring about an experience, case status, location, etc. change." (Lillrank 1998, 22)

1.4 Research Methods

The research phenomenon (the research problem to be solved) defines the improvement of the profitability of the target company by the quality of the operations and by developing a quality management system for the target company by developing customer satisfaction. The criterion is to improve the quantitative results and improving the profitability of processes,

which is achieved by improving the quality of processes. The research questions are derived from research problem. The objectives and limits are defined, as well as the structure and methodology (Hirsjärvi et al. 2007, 121-124).

A qualitative case study is selected as a study approach. According to Hirsjärvi et al. (2007, 160), in qualitative research, data collection methods are used for discussions and interviews with a deliberately defined target group, as well as for the study author's own participatory observation. As part of the data acquisition, different documents are also used in relation to the case and their analysis. The material for qualitative study is compiled in real situations. The study is applied methods specific to qualitative research, such as thematic interviews and discussions to clarify the specificities of the investigated business sector. The case study, that this study can be categorized as Hirsjärvi et al. (2007, 130-133) is defined, collects detailed information on one or a small set of events. The case study examines, for example, a set of events, the subject being an individual or a group, and the subject being investigated is usually the processes involved in their environment.

Initially, in this study the processes and the means for improving functional quality as well as quality indicators are described and defined. The impact of the improvement of process quality elements on numerical results is monitored through a quality management system (process scoreboards). In the literature review of the theoretical part, the order is parallel with the empirical part of the study. This order follows the order of construction of the Quality Management System.

To determine the operations and practices of the target company the contact person of the target company is interviewed for this study in a total of three times and, in addition, in the form of discussions. The interviews took place between June 2017 and October 2018. The interviews are based on The Target Company's Strategy materials 2017, Corporate governance and Process Description of the Target Company 2017 as a basis for process descriptions and definition. The Interview schema (Attachment 7) is used to determine the specifics of the car wash business, and descriptions and configurations of the QMS processes.

To get the point of view of the customer company and the end-customer, information is collected from the customer company's car wash sales manager in the form of theme interviews and discussions. These interviews took place between June 2017 and October 2018. The car wash sales manager of the customer company is interviewed for this study in total two times, and in addition, in the form of discussions. The theme frame for interviews are used the frame of Attachment 7 from end-customers and a customer company's perspective. The theme interview follows a predefined theme, but the scope and form of the responses are not predefined (Eskola & Suoranta 2008, 86).

This study is explored the everyday life of the company and the research area through interviews and discussions, supported by business plans. According to Kiviniemi (2015, 80), pursuing the mindset characteristic of the target group by means of participatory observation is an intrinsic method of collecting qualitative research data. Study's author's own reflection is marked in the text with a bracket mark [xxx]. (See Hirsjärvi et al. 2007, 116.) The study using field observations is characterized by a degree of involvement in practical events related to the research area (Grönfors 1985, 87). [It can mean full participation in field work, or as in this study, passive follow-up and familiarization with practices through company's materials and discussions.] Through fieldwork and practice familiarization, is reached the stage of focused observation in the research process, where the overall picture exists and focus on exploring and deciding what is relevant to the end result (Grönfors 1985, 100-102). [In this study, this is emphasized in defining the impact and control of the QMS processes.]

2 DEFINITION OF QUALITY

2.1 History of Quality

Earlier the quality was estimated via product's utility and other quality features and there wasn't any systematic measurement or process quality management. The quality has based on competence and skill of the company and company's working individuals. As result of the increasing competition, the comprehensive quality thinking and quality of ownership as a whole process of business and supply has become increasingly significant in terms of continuity and profitability. (Lillrank 1998, 11-13) The previously prevailing concept of activity-oriented quality has meant uniformity of products and service. It has mainly meant minimizing errors and managing quality variations. (Hannukainen et al. 2006, 26) According to Silén (2006, 26), the era of corporate culture and value management began with cautious development in the 1970s. Quality management developed alongside and as a substitute for performance and goal management in the 1980s (Juuti 2013, 94).

Gillett et al. (2015, 174) describes a change in quality management with the starting point being functions drive organization. Separate operations and development processes were intermediate. The result of this development is standardized quality management system processes that take into account each other's interactions. It means standardized customer-driven processes with a standardized approach to learning and continuous improvement. According to Sarala & Sarala (2010, 110-111), the model of comprehensive quality management began to evolve in Finland so, that in the 1950 century, the quality of operations was developed primarily in the process industry to improve the quality of large manufacturing batches. 1960-70s figures for quality development expanded the duration of consumer goods improvement. 1990 century quality thinking expanded to information services and training areas. At the same time, the concept of the product was replaced by the concept of the supply (product + services). 1990s introduced the first quality management systems, such as Total Quality Management TQM and started with ISO 9000 quality standards development. Laitinen (2003, 62-63) describes the change in the position of the accounting staff, instead of tracking financial results, to control the business. This is due to the indirect monitoring of results, non-financial indicators and their effectiveness.

2.2 Current Definition of Quality

From the point of view of quality researchers, the following factors affecting quality can be identified: scientific approach, statistical and scientific methods, human participation, consistent approach, management responsibility, process-oriented, quality cost estimation, minimization of error and customer satisfaction (Sarala & Sarala 2010, 105-106). The basis of customer-oriented quality thinking is understanding the market situation and customer needs. The high quality of operations is based on the "first fix" principle. It leads to better product and service quality through improved cost efficiency. Quality is understood as a high level of customer satisfaction, usability and fulfillment of customer expectations. (Hannukainen et al. 2006, 26, 30)

The division of quality by David Garvin, Harvard Business School, presented by Foster (2010, 30) into five perspectives are: 1. Transcendent: Something that can be intuitively understood but difficult to describe. 2. Product-based: Quality can be experienced as a feature of the product in use 3. User-based: Customer is satisfied with the delivery. 4. Manufacturing-based: The product meets the design requirements. 5. Value-based: The delivery has good value for money in relation to the price.

As it is now increasingly difficult to obtain a clear competitive advantage through a product alone, attention must be paid to operational quality and the management of interaction situations. The total quality is determined by the customer's experience and the ratio of expected and experienced quality. Expectations are influenced by the customer's needs and values, as well as the image created by the marketing communications, sales functions and sales situation. The quality experienced by the customer is influenced by the image of the service provider and the technical and operational quality of the delivery. (Grönroos 2009, 104-105)

The quality image given by the company to its customers determines the customer's interest in the company and its products and services. If the quality of the supplier does not initially correspond to the customer expectations a quality gap is formed. As a result of the quality development measures, the quality exceeds the customer's expectations, which gives the company an advantage over its competitors. The goal is a sufficiently high image strategy to

get customers interested in the company's supply (product and service) combined with the quality of operations that meets and exceeds customer expectations. (Lecklin 2006, 91-92)

Juuti (2015, 24) states that everyone in the organization, regardless of position and function, should think of working for the client. This refers specifically to the external paying end-customer. Juuti (2015, 39) criticizes the fact that customer relationship management has been replaced by the use of an information system and the analysis of its results. This means that using a Customer Relationship Management system will take too much time from the operational development work. The employee should be instructed to recognize that he or she primarily works for the client rather than himself or herself (Järvinen et al. 2014, 36). The employee should be told what is expected of them and what the goals are. The next step is to focus on customer expectations and understanding them. Through feedback and successes, it's aimed for an independent approach to work and self-direction at work. The prerequisite for self-direction is to give the employee the necessary operating powers. However, the employee needs the support of the management and other organization to operate. (Järvinen et al. 2014, 40-50) Success in teamwork requires setting goals for both individuals and the group. The goal is to achieve good results as a team through individual performance and teamwork. (Järvinen et al. 2014, 60-61)

The importance of customer experience grows in the face of tough competition when it is difficult to distinguish between products and services. Customer-centric Human Resource Management means serving customers across the entire organization. It emphasizes the importance of customer experience and its quality. (Juuti 2015, 40, 64) Customer work should be placed at the heart of the organization, alongside technical expertise. Providing experience, developing interaction skills, and focusing on the customer should be a priority in customer contact. (Juuti 2015, 90-91, 110) Juuti lists communication skills as authenticity, honesty, trustworthiness, acceptability, openness, mutual understanding, respect and acceptance of difference (Juuti 2015, 90-91, 110).

The company's quality and company's supply's quality can be defined by how these meet the company's quality objectives. The quality objectives are derived from the company's vision, strategies and goals. On the other hand, quality objectives must be in line with the

customer's goals and needs. Quality management as a process reduces errors, reduces costs and thus improves profitability. (Lillrank 1998, 164-165)

Lillrank (1998, 39) distributes quality management according to the boat model to customer quality, system quality, planning quality and production quality (Figure 1). Performance factors can distinguish the critical success factors that depend on the success or failure of the company. [Critical success factors include for example: skilled workers, low production costs, fast product development cycle, high customer satisfaction, efficient marketing channels, reliable subcontractors, product and service competitiveness and environmentally friendly practices. The goal of improving quality is to improve profitability.]



Figure 1. The Boat of Quality (Lillrank 1999, 39)

The definition and assessment of the quality target can be considered as an objective high-quality imagery strategy for attracting customers combined with the quality of products and quality of service that exceeds customer expectations. Figure 2 illustrates the importance of quality for a company's success and competitiveness. (Lecklin 2006, 25)



Figure 2. Improving profitability through improving quality (Lecklin 2006, 25)

The pursuit of self-directedness, and especially self-directed teamwork, requires the abandonment of excessive leadership and the building of ready-made models. It also requires a service leadership model where the supervisor creates opportunities and guides operations. The supervisor acts as an example. (Juuti 2013, 124, 147) [This requires independent and professionally skilled workers as well as reciprocal confidentiality.] Juuti (2013, 111) describes corporate culture as a hidden and visible part. Company values and basic assumptions are hidden underlying facts. The action based on these is correspondingly visible, perceptible. Sydänmaanlakka (2012, 218-220) describes the future of the company as an intelligent organization with "the ability to continuously innovate, anticipate change and learn quickly". An intelligent organization analyses knowledge and, through understanding, strives for application and development. To be successful, an organization must have a clear vision and strategy that guides decisions and operations.

3 ISO 9001:2015 QUALITY MANAGEMENT SYSTEM

3.1 ISO 9001:2015 QMS principles and benefits to the organization

This section describes the structure and general principles of the ISO 9001:2015 Quality Management System and its benefits. The aim of introducing a quality management system is to take better account of the needs of customers and stakeholders and thus to improve customer satisfaction. Enhanced process efficiency and customer satisfaction will result in better operational profitability and continuity. With a quality system, organization can demonstrate compliance with the requirements to third parties. With the quality management system, the company manages and directs activities that directly or indirectly affect the fulfillment of customer requirements. A process-basic way to manage quality as a basic idea and the goal is continuous improvement. (SFS-EN ISO 9001 2015, 5-6)

According to ISO 9000:2015 standard, seven Quality Management Core Principles are: customer focus, leadership (purpose and direction of the organization and commitment), engagement of people (competence and influence), process approach (consistency and predictability), improvement (responding to changes and understanding the cause and effect relationship), evidence-based decision-making and relationship management (SFS-EN ISO 9000 2015, 8-14). The main purpose of our quality management system is to meet customer needs and exceed expectations. Management must create direction and conditions and ensure the competence and commitment of everyone in the organization. The quality management system is operated and managed through a process-like approach and the principle of continuous improvement by improving processes in response to external or internal changes. Decisions and corrective actions should be taken on the basis of objective evidence. The principles of the Standard also include building relationships with other stakeholders such as suppliers, partners and subcontractors. (Wilson & Campbell 2016, 829-844)

Quality Principles as the company's vision, strategies, goals, and quality policy principles defined by the company management form the basis of the company's quality management system and the related process quality and continuous improvement (Lecklin 2006, 36). The concept of a customer may include the end-user (buyer), the organization's internal

customers, partners, and stakeholders. The interaction between different processes must be ensured and taken into account in measurements and management. (Sile'n 2006, 43)

Management reviews ensure that operations, resourcing and quality management systems are consistent with the strategy of the target company and that the strategies defined for the target company are in line with the quality standard. The quality policy defined by the management of the target company, which is expressed in the vision of the target company and its business idea, is the basis for setting quality objectives. Quality policy includes commitment to meeting requirements and continuous improvement. (SFS-EN ISO 9001 2015, 13-14) The quality system must always be the management's strategic decision. It builds on the leadership's commitment to the process and its success. Processualization of the template helps to identify, manage and guide organization's processes to achieve the desired result. (SFS-EN ISO 9001 2015, 13)

The benefits of the quality management system are higher customer value, better customer satisfaction, better customer loyalty, improved relationship continuity, improved organizational reputation, better customer support and higher income and market share (SFS ISO 9001:2015, 7). Nanda (2005, 20-21) describes the benefits of implementing a Quality Management System for an organization: 1. Developing and refining processes and documentation. 2. Developing improvement measures through process. 3. Directing the organization's activities to the goal. 4. Continuous improvement through process development. 5. Improving delivery quality and Continuous Improvement. 6. Improving Customer Satisfaction. 7. Achieving Competitive Advantages. 8. Verifying Reliability and Quality Performance. 9. Involves and enables participation throughout the organization. 10. Improves resource utilization and minimizes wastage. 11. Improves employee understanding of quality factors and emphasizes quality as an issue. 12. Participation improves commitment and staff satisfaction. 13. Improves external and internal communication, leading to improved efficiency in customer and supplier relationships.

According to Natarajan (2017, 17), the benefits of implementing an ISO 9001:2015 quality management system are: 1. Assessing the organizational structure, defining objectives and identifying new business opportunities and threats. 2. Consistently meeting and exceeding customer expectations. 3. Increasing operational efficiency and reducing internal costs. 4

Improved enforcement and compliance with regulatory requirements. 5. Improved customer confidence as some customers require this standard to exist. 6. Identification and prevention of organizational and operational risks. [It can be conducted that employee engagement and commitment is key to the implementation and success of our Quality Management System. The motivation and competence of staff is crucial in the process of continuous improvement. The commitment of the management of the organization to the effective use of the Quality Management System is a prerequisite for ensuring the full involvement of the staff.] According to Laamanen (2005, 34), leadership is changing the state of expertise. Organizational leadership consists of managing relationships, operating systems and expertise.

A properly designed reward is used as a tool for employee engagement. Remuneration consists not only of basic salary and performance bonuses, but also of the benefits of the employment relationship, the working environment and personal development including career development in the company. Reasonable and motivating rewards require the selection of goals that are internalized and aimed at achieving the company's goals and their indicators. (Liinalaakso et al. 2016, 15) When designing the reward system, it is recommended that half of the reward criteria be linked to the overall performance of the company. In this way, the overarching goal, the overall success of the company, remains. Employees' personal performance goals must align with the company's strategy and performance goals. (Kaplan & Norton 2007, 190, 301)

3.2 Supply in Quality Management System

This section describes The Supply in ISO 9001:2015 Quality Management System, which consists of the products, services, and combinations that the organization provides. A supply may be physical goods, service, information or a combination of these. The supply also includes productization, that is, the sale of the combination of the aforementioned factors. Supply may include for example project work, service, maintenance contract. The service also includes pricing, delivery channels, communication and delivery to the customer. (Lillrank 1998, 22)

Grönroos (2009, 221-226) describes building a supply as developing and expanding the service provided. The starting point is to define the concept of service on the basis of the market and to develop the basic service package. The service package always includes, in addition to services, any products and support services. Vendor-customer interaction can be used to develop additional service packages according to customer needs. They increase customer engagement with the supplier and improve profitability. The supplier should build communication on the service idea and image.

3.3 QMS Process Definitions and Process Interactiveness

ISO 9001:2015 Quality management system is based on processes, critical success factors for them, measurement and analysis of processes, and continuous improvement. This section describes how processes are used to in a quality management system. (See Figure 3 and SFS 2017, 28.) The KPIs and continuous improvement are described in more detail in their own chapters. (See Chapter 3.4 and Chapter 3.5.)

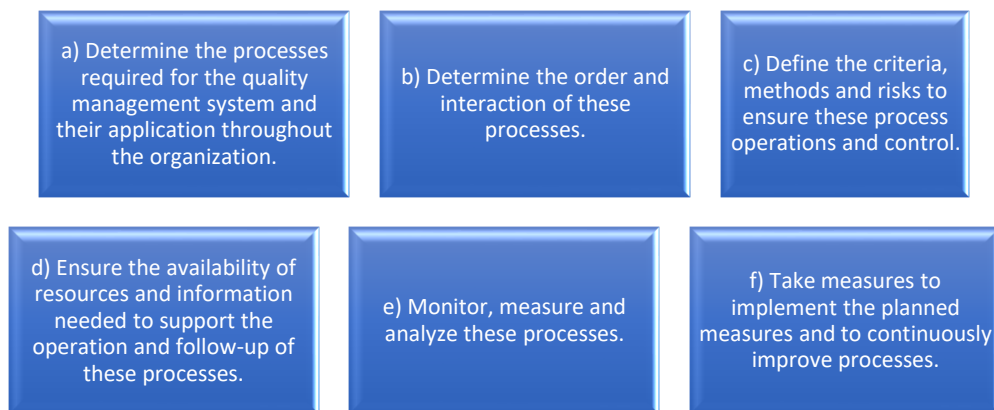


Figure 3. ISO 9001:2015 Quality Management System Process Model (SFS 2017, 28)

The ISO 9001 quality management system is based on processes which has been built in accordance with the functions and objectives and continuously developing these processes. There are several requirements for building the processes. Define the processes required for the quality management system and apply them throughout the organization. It will also be necessary to determine the order and interaction of the above processes, as well as the criteria and methods to ensure the operation and control of these processes. Then, the availability of resources and information needed to support the operation and monitoring of these processes

should be ensured and monitored, measured and analyzed, and decisions made based on facts (measurement results). Finally, steps must be taken to implement the planned measures and to continuously improve the processes. (SFS-EN ISO 9001 2015, 6)

The process consists of the activity, the resource, the output, and the performance that determines their effectiveness throughout the process (Laamanen 2005, 20). Laamanen (2005, 19-22) defines a business process as a series of logically related recurring activities within an organization, supplemented by the resources needed for implementation to deliver the desired results. Process thinking starts with the customer's needs and then must be thought about what kind of supply the customer's needs can be met. To do this, the processes (actions and resources) were designed and were considered that what kind of inputs (information, materials, vendors) are used to implement the processes. Adding value to the organization's supply chain from supplier to internal or external customer is done through processes, by adding resources to the processes that are needed to achieve the desired end-result (Bergman & Klefsjö 2010, 457).

Business processes can be separated into core processes that create value for customers and other stakeholders, and support processes that create the conditions for core processes. The role of support processes is to create value within the organization and act as a feeder to the core processes. (Laamanen 2005, 52-57) Laamanen (2005, 297) identifies the risks of process management as the inability to identify and distinguish between core and support processes, too many processes (over 20) or responsibilities are not clear. In addition, processes may not be fully utilized because they are not recognized, have no goals, are not measured, or are not properly rewarded.

A series of process steps goes through the functions of the entire organization. It is based on the needs of the customer and the desired result is an operation that the customer is satisfied with. The process continuously takes customer feedback into account as a self-improving function. (Laamanen 2005, 22; Grönroos 2009, 57) The horizontal flow of processes from supplier to customers throughout the organization, including suppliers and subcontractors, is described in the process map below (Figure 4) (Gillett et al. 2015, 187-190).

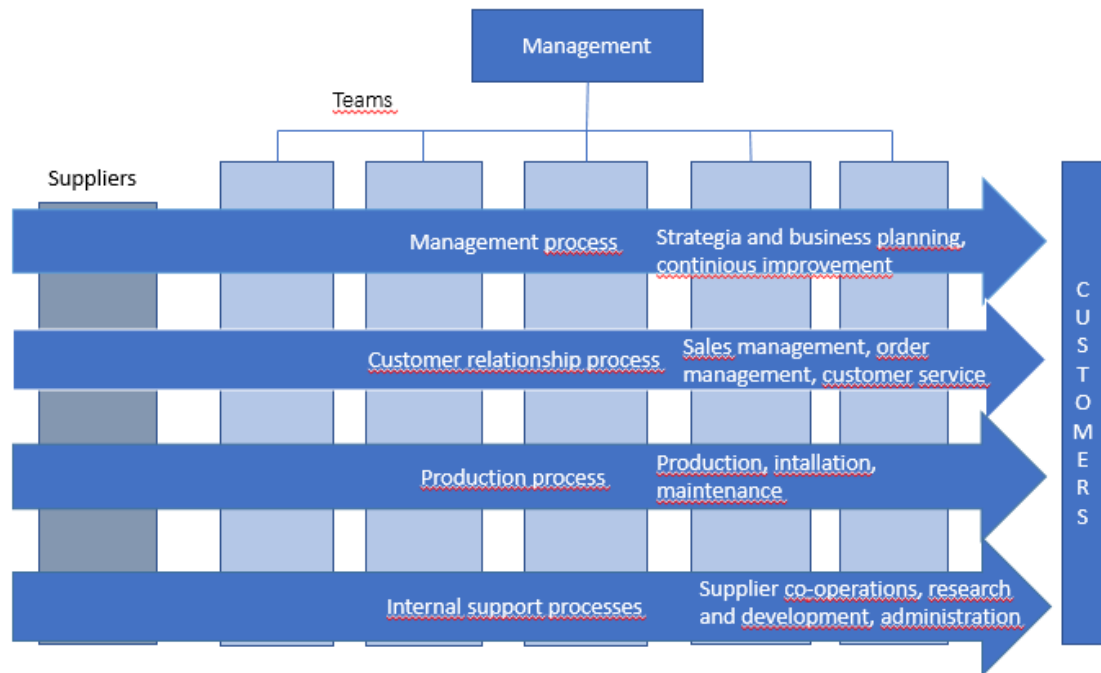


Figure 4. The Process Map of Organization (Gillett et al. 2015, 187-190)

Business processes can be separated into core processes that create value for customers and other stakeholders, and support processes that create the conditions for core processes. The role of support processes is to create value within the organization and act as a feeder to the core processes. (Laamanen 2005, 52-57) Laamanen (2005, 297) identifies the risks of process management as the inability to identify and distinguish between core and support processes, too many processes (over 20) or responsibilities are not clear. In addition, processes may not be fully utilized because they are not recognized, have no goals, are not measured, or are not properly rewarded.

O'Brien (2014, 12-13) lists Common types of supplier relationship: 1. Arm's length supplier is the supplier of individual named supplements 2. Subcontractor is the company's own resources supplier 3. Preferred supplier is the contract supplier 4. Outsourced provider provides a partial service to the company, continuously replacing the same function within the company 5. Critical supplier is a supplier whose activities have a critical impact on the company's operations 6. Strategic supplier is a strategically important partner for the company's development 7. Partner is a contractual partner 8. Group company is a company owned or belonging to the same group. [A company should evaluate the effects of different

types of suppliers on company's own processes. In assessing risks and opportunities, the specificities, importance and criticality of suppliers should also be taken into consideration.] Krajevski et al. (2019, 586-587) depicts integrated supply chains with Figure 5. It illustrates the integration between the company and the supplier and the customers. The goal is to achieve benefits for the entire supply chain through collaboration. As Krajevski et al. (2019, 586-587) states, this is a long-term process, but its benefits are significant in any case.

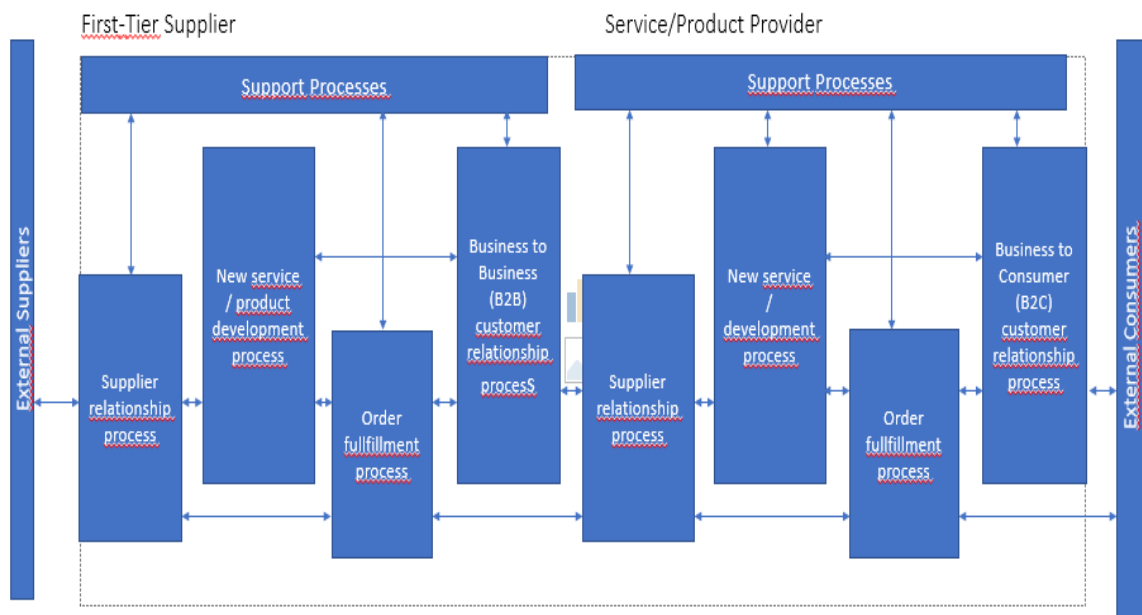


Figure 5. Integrated supply chains (Krajevski et al. 2019, 587)

The process interaction with other processes can be described by the "waterfall model" (Figure 6), where the output of the previous process is the next input. Support processes for core processes are such, as management, personnel, and administration (Pesonen 2007, 134).

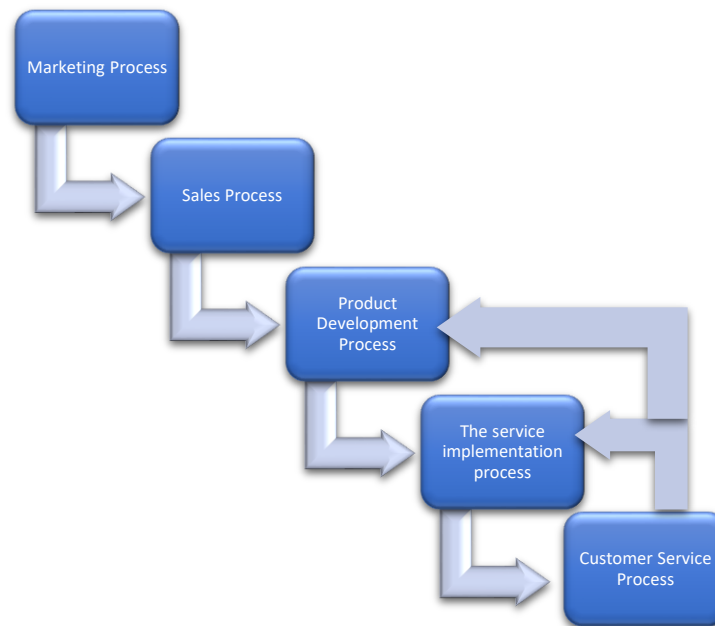


Figure 6. Process Interaction (Pesonen 2007, 134; Kruchten 2003, 54)

Successful use of the interactive development process waterfall model (Figure 6) requires a step-by-step response (Kruchten 2003, 54). The reasons for failure can be, according to Kruchten (2003, 55): 1. Incorrect initial assumptions. 2. Attempts to solve the problem in the wrong context. 3. Incorporation of some irrelevant human factors. 4. Modified approach to wrong. 5. Insufficient experience in the area to be resolved.

The iterative process model repeats the waterfall model all over again (Kruchten 2003, 60-61). It allows you to make changes during the process. The advantages over the traditional waterfall model are faster response, more manageable changes, better response and process improvement, in-process learning and improved end-product quality. (Kruchten 2003, 76) If, in the process of applying the waterfall model, measurement, analysis and corrective action are not carried out at a sufficiently short frequency during the process, any errors in any of the sub-processes will accumulate as a result of the failure. Measurement periods should preferably be 2-6 weeks rather than 6-12 months. The periods must be short enough for an effective response. (Larman et al. 2001, 4-5) A process-like operating model can also be described in the process map of Figure 7, where interactive processes meet customer expectations (Pesonen 2007, 137).

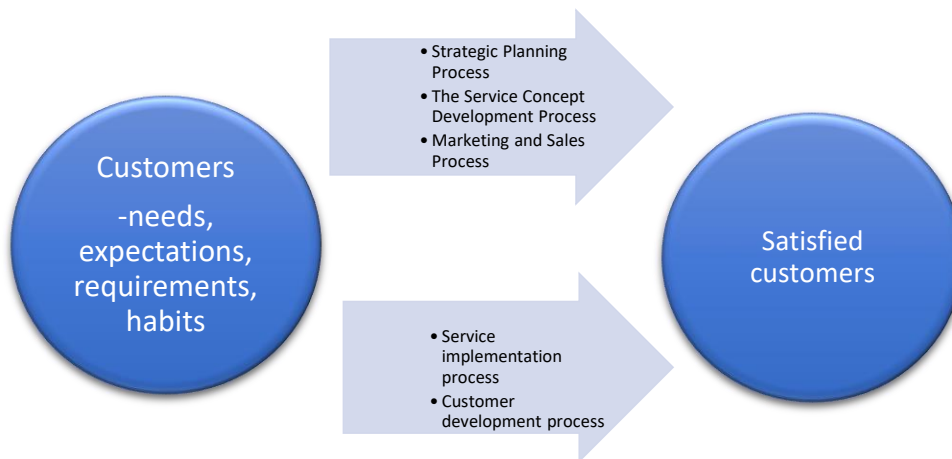


Figure 7. The Process Map of Sales Company (Pesonen 2007, 137)

Corporate management defines a common purpose and direction for the organization and creates conditions and resources. Process planning ensures that they function as interrelated processes within a single system. Processes are used to implement the supply. Measuring, tracking, and controlling anomalies in processes and their sub-functions, as well as analyzing information, ensures continuous improvement of the processes. (Figure 8) (Moisio & Tuominen 2008, 6)

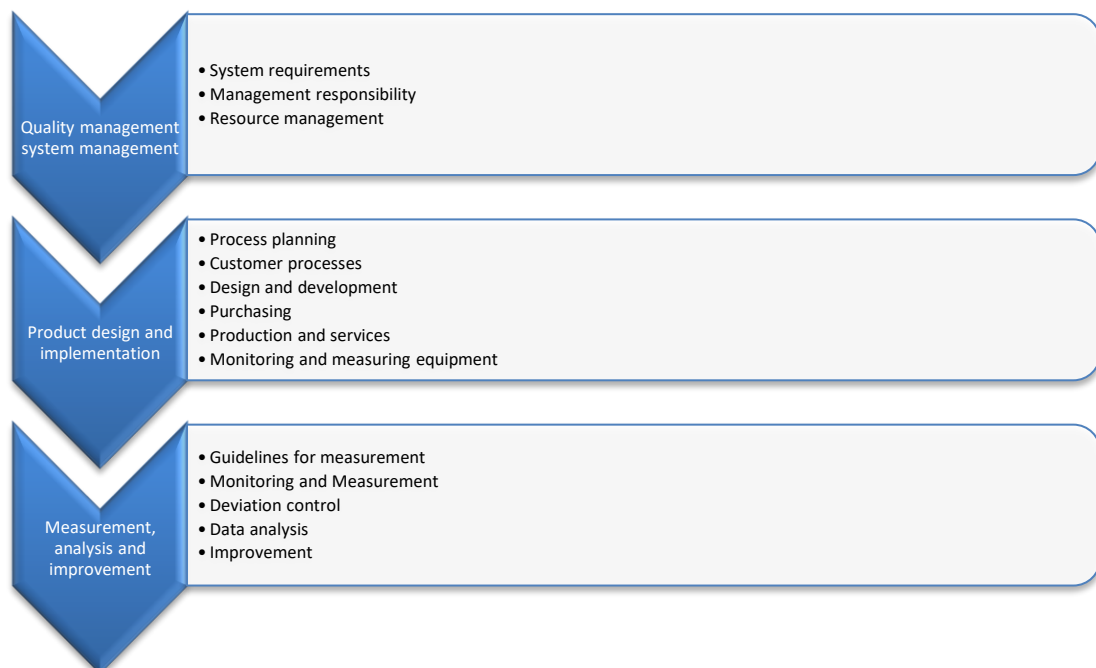


Figure 8. Quality Management System ISO 9001 (Moisio & Tuominen 2008, 6)

3.4 QMS Process Success Factors and KPI Definitions

ISO 9004 standard specifies the following performance requirements for process success factors: 1. Be relevant, accurate, and reliable as a basis for decisions and actions. 2. Be directed at measuring and improving activities that lead to higher-level goals. 3. Be consistent with the organization's strategy and goals. (SFS-EN ISO 9004 2018, 23) Quality objectives should be observable, measurable and consistent with quality policy. When setting quality goals, it should be noted that they meet the requirements of the standard. Quality goals become a continuous process to monitor and communicate with the organization and update as necessary. (SFS-EN ISO 9001 2015, 15)

Anupindi et al. (2012, 14-15) defines the steps that will allow the success of the processes as follows: 1. The process design phase defines the processes based on the organization's vision and goals. 2. Defining process metrics, starting with customer and stakeholder needs and the organization's goals. 3. Managing processes through continuous short-term monitoring and response. 4. Improving long-term process design by process management.

The starting point for the measurements should be to identify the greatest opportunities to increase the overall impact of business processes. Should be to eliminate unnecessary factors from measurable issues and focus on the most successful and profitable success factors (Robson 2004, 511). Morgan (2004, 523) describes the temptation to place too much emphasis on information from economic systems as a basis for decision-making. It can be compared to "driving a car through the rearview mirror". The purpose of this information is to provide information on how successfully the strategy has been implemented. ERP systems should drive management reactions to be proactive.

According to Parmanter (2015, 1-5), Key Performance Indicators (KPIs) are indicators that are designed to improve the performance of an organization and are the most critical to its current and future development. Key Performance Indicator's features are: 1. Non-financial, 2. As continuous as possible (for example 24/7, daily or weekly), 3. Management must have a strong focus and commitment to the goals, 4. Simple, so all staff understand the indicators and what corrective actions are required, 5. Responsibility may be assigned to teams or teams

working in close cooperation, 6. Significant impact, 7. Driving effectively to the goal what were wanted.

Lönnqvist et al. (2006, 53-54) defines quality of supply, time management, knowledge and skills, knowledge utilization and development, knowledge sharing, collaboration with key customers, and satisfaction of employee and organizational needs as the most common success factors for an expert organization. Knowing the processes and their causal relationships helps people to understand the whole. Understanding enables action development and self-direction. Without an understanding of the whole, there is a risk that self-steering will lead to wrong decisions and actions (Laamanen 2005, 22-23).

As a tool for identifying the success factors of the processes, the fishbone diagram model (Figure 9) can be used, which takes into account the conditions (environment, equipment, methods) and accordingly increases the resources (information, people, materials) to achieve the desired result (Laamanen 2005, 176). The fishbone diagram, also known as the Ishikawa Cause and Effect Diagram, is a tool for solving problems and for identifying the success factors, for example, through teamwork (Hannukainen 2006, 41-44).

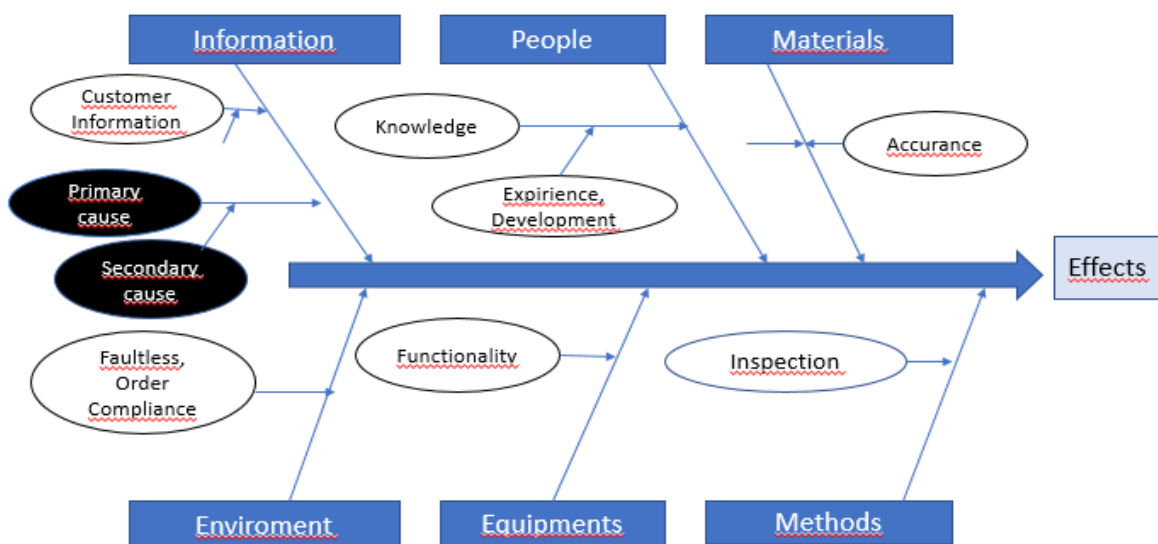


Figure 9. Ishikawa's Fishbone (cause-effect) Diagram Model. (Laamanen 2005, 176)

Process performance is measured, analyzed and evaluated as a continuous activity and this should lead to the necessary decisions and corrective actions. The ultimate goal is better

customer satisfaction and productivity. Processes interact and produce results according to goals and across the boundaries between different functions. For the purposes of measurement and monitoring, it is necessary to define the critical processes of the target company that have a key impact on the achievement of the specified quality requirements. Internal audits ensure that the quality management system continuously meets the requirements of the organization and meets the requirements of the standard. (SFS-EN ISO 9001 2015, 12)

Communication and trainings play a key role in managing the quality management system. At worst, employees do not feel that they are part of the process because they know only part of it. When they know the whole process, they are motivated, which increases their positive attitude towards work and organization. (Moreno-Mas et al. 2014, 50) Moreno-Mas et al. (2014, 45) refers to Purvis et al. (2013), noting that process management focuses on the outcomes of processes rather than on the tasks or functions contained in the process. This is how everyone knows how their individual contributions affect the final process and its outcomes. This means that people take responsibility for the end-result.

3.5 QMS Process Measurement and Continuous Improvement

This section describes the principle of Measurement, Analyze and Continuous Improvement of Processes in a Quality Management System. Summers (2005, 211-212) describes process development as follows: 1. Describe and outline the goal of the process from a customer perspective, 2. Describe the main process operations and interactions with other processes, 3. Determine the process owner, 4. Develop the process using its sub-functions, 5. Identify value-generating factors in the process, 6. Identify, analyze and streamline the process, 7. Ensure that all actions in the process will add value and are in the line with best practice, 8. Improve the process, taking into account the issues outlined in paragraphs 1-7.

The optimal measurement frequency for the process is determined so that the benefits and costs of the measurements are in balance. Processes that do not produce the desired results are measured more often than those that work according to purpose. As a result of the measurement, a corrective action must always be taken for a function that does not meet the conversion target. Any increase in measurement costs should lead to immediate corrective

action for the process in question. Managing process measurements should take into account how often we measure process performance and what variations are allowed in process measurement results. (Anupindi et al. 246-247)

Quality management is described by a process model (Figure 10). The organization defines the processes and their interaction. Processes are managed and implemented on the principle of continuous improvement. The goal is to achieve greater value for the customer's supply through improved quality. (Lecklin & Laine 2009, 246)

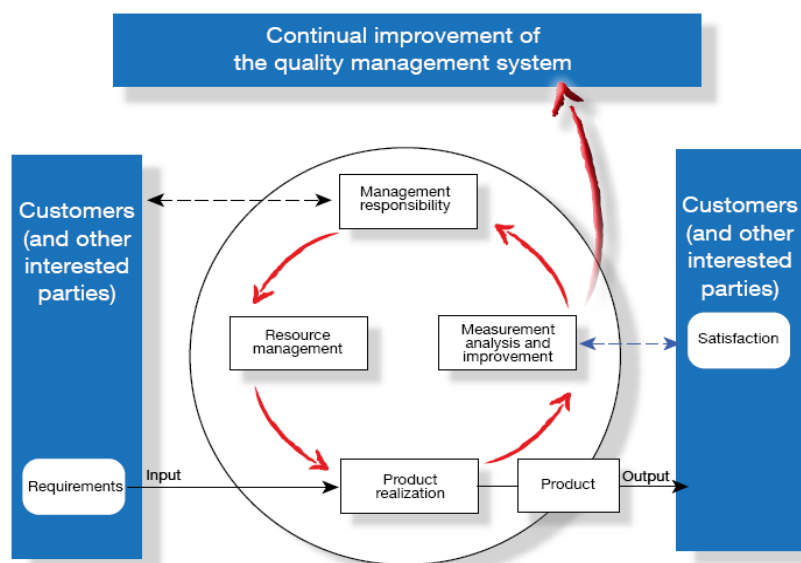


Figure 10. Continuous Improvement of The Quality Management System. (Marletta 2012; Lecklin & Laine 2009, 246)

Figure 10 shows that efficiency and improvement can be understood as a cyclical process. This process utilizes the components of a quality management system when analyzing data and thereby enables the process to guide changes and initiatives and thereby ensure continuous improvement of the system. This creates a forward-looking approach to meeting the goals and customer needs. (Marletta 2012)

Figure 11 shows a seven-step problem-solving procedure and model for continuous improvement based on Deming's management model. The first step of the model is to define the problem and start solving the problem. The second step is mapping the problem situation and collecting information. This is followed by an analysis phase and a design phase and implementation. Towards the end, the testing and analysis of the measures and the

consolidation of the mode of operation will come. Finally, the model is evaluated and learned, resulting in continuous improvement. (Pape, J. 2014)

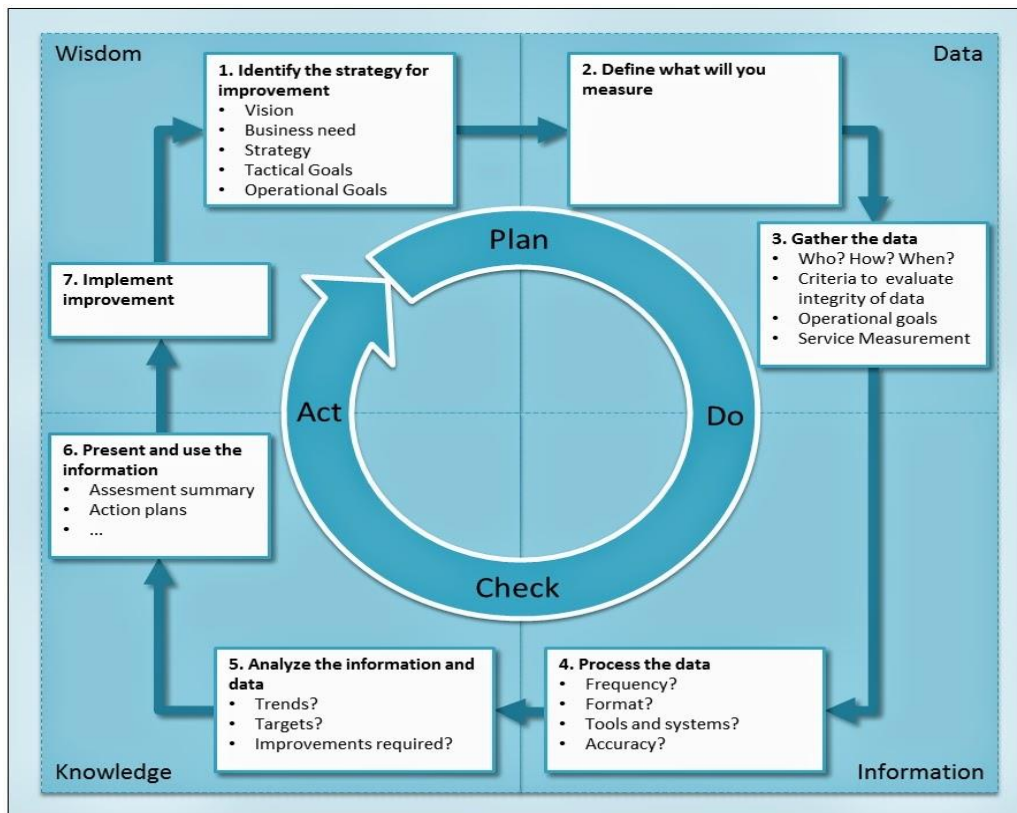


Figure 11. CSI 7 Steps (Pape, J. 2014)

PDCA-circle (Plan-Do-Check-Act) (Figure 11) is the most common process improvement method. Its use is based on the principle of continuous improvement and leads to the sharing of best practices from one activity to another. The process should be measured already during it and react to the process as soon as possible with corrective measures. (Laamanen 2005, 210)

Feedback information is collected from processes, products and services, customers and staff. Analyzing collected data includes the cause-and-effect relationships and benchmarking objectives. Decision-making is based on the analysis. The service or product can be remedied immediately or monitored and repaired later. Finally, the decision is made and the loop starts from the beginning. In the process, continuous improvement of the quality of operations is being created. (Figure 12) (Pesonen 2007, 52)

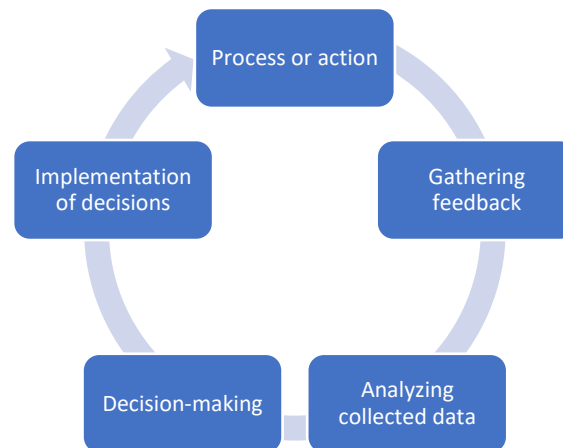


Figure 12. Loop of The Quality Management System. (Pesonen 2007, 52)

3.6 Risk Based Thinking in Quality Management System

This section describes how the term Risk Based Thinking is used in the ISO 9001:2015 Quality Management System to assess risks and opportunities. ISO 9001:2015 is a global standard for quality management systems. Each organization defines the system according to its own needs, suitable for operations, products, services, customers and risks. The organization identifies internal and external risks and opportunities associated with products and activities and is responsible for identifying and addressing them. (Aston 2018, 48-49) "Risk Based Thinking", as referred to in ISO 9001:2015, does not imply more extensive requirements than those required by ISO 31000:2015 Risk Management. However, this standard can be used to assist in the definition of risks in the implementation of a quality management system. (Robitaille 2015, 24) The term "Risk Based Thinking" in ISO 9001:2015 refers to the consideration of risks in system design, implementation, maintenance and continuous improvement. The purpose of this requirement is to ensure that the system is preventive. (Medic' et al. 2016, 188-193) Fonseca (2014, 174-175) states that there must be a Risk Based approach, which means understanding the organization and its connections. Taking this into consideration alongside the needs and expectations of the various parties involved is important in defining the quality management system and its processes.

When recognizing the risks of a quality management system, it must be borne in mind that the different processes have different kinds of risks and different sized risks. Some processes may be subject to regulatory requirements and oversight. The processes may be subject to

internal or external influences as well as requirements of interested parties. (Natarajan 2017, 31) Supply chain risk management can be performed by Krajevski et al. (2019, 604-607) divides into three main groups. The first group is Operational Risks, which focus on material and product flows or services in the supply chain. The second category is Financial risks, which focus is on prices, costs or profitability. The third group is Security risks, which are potential threats to stakeholders, facilities and operations. O'Brien (2014, 192-193) defines transactional risks as risk of failure or delay, risk to brand reputation, risk to competitiveness, price or cost risk and quality risk.

3.7 Document Management in Quality Management System and Quality Manual

ISO 9001:2015 standard defines the basic requirements for documentation. The documentation must describe the company's operations and processes and a description of the quality management system. The ISO 9001 standard requires documentation that the company's quality policy and quality objectives have been defined, as well as a quality manual based on the needs of the company, the organization's own documents (for example, procedural guidelines) or a link to their storage location and records. (SFS-EN ISO 9001 2015, 18-19)

The format of the quality manual is not specified in the standard. The documented description and procedures for the quality system must be defined for the following six items: 1. Document management, 2. Record management, 3. Internal audit, 4. Control of abnormal product (product or service), 5. Corrective action, and 6. Preventive action. Documents are found to be suitable before release. Documents are reviewed, updated and approved, access to documents and authenticity verified, and use of outdated documents prevented. (SFS 2010, 53) [In this section, an older edition of SFS Handbook 2010, with guidance on the Quality Manual, was used as an additional guide. Documentation guidance changed to a more generally in standard ISO 9001:2015 and defines the required documentation for the organization's own needs and systems.]

Documentation of the quality management system is based on the information archive, work instructions and quality manual described in Figure 13, which describes the quality system of the target company and its quality objectives in relation to interrelated processes. In the

picture, detailed working instructions and other information include detailed documentation. The quality management system guidelines describe the interrelated processes and measures needed to implement a quality management system. The Quality Manual describes a quality management system that meets quality objectives. (Lecklin 2006, 30-31)

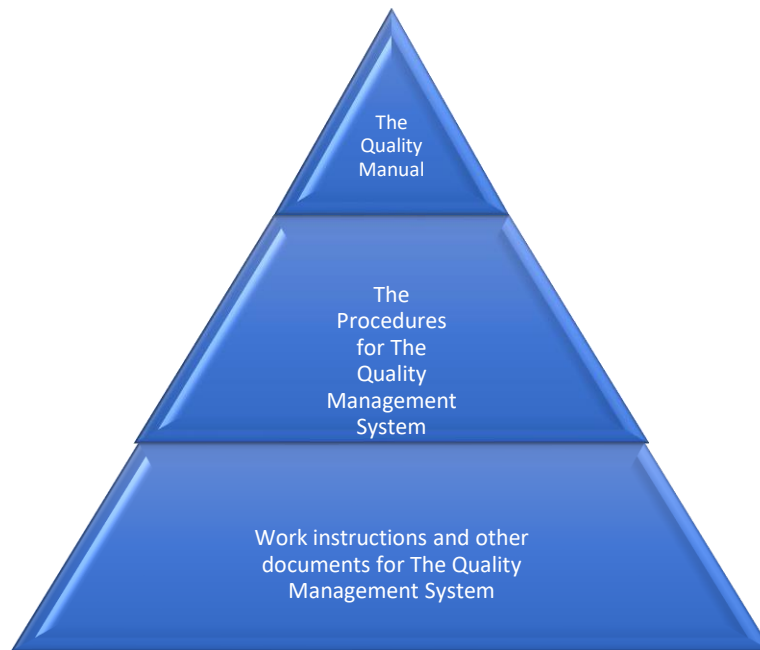


Figure 13. Making a Quality Manual (Lecklin 2006, 31)

The storage and management of documents and records related to the quality management system and the responsibility for maintenance must be determined. Procedures for document management should also be established. The guidelines should define how the recordings are available and the search references if necessary. The guidelines are working instructions, operating instructions, regulatory requirements and industry standards required for practical operations. The recordings may include, for example, customer offers, orders, contracts, notes, minutes, internal audit reports, training registers, deviation information (disruptions, warranty claims, customer declarations), corrective actions taken and preventive changes in processes, purchase documents, receipts for goods and services, and follow-up reports. Records management must be designed to identify, archive, protect, deploy, and store and dispose of. (SFS 2017, 56-58)

Appropriate updated information and documentation shall be maintained for the monitoring, analysis and measures of the quality system. Document management can take the form of

electronic and paper files and their reference information as required by the target company. The information must be documented (title, date, author, reference number). (SFS-EN ISO 9001 2015, 19)

The quality manual includes the scope of the quality management system (including the reasons for its inclusion in the system). The manual should also contain procedural guidelines, process interaction (process map), presentation and descriptions of the organization, presentation of the quality management system, responsibilities and powers, quality policy and objectives, structure of documentation and specific terms used. The quality manual serves as a framework and as a pilot in the use and application of the quality management system in practice. It can be either electronic or part of the paper version. (Pesonen 2007, 87) The purpose of the Quality Manual is to describe the organization and its context. It includes the reports and decisions of process owners, as well as reports of management reviews and decisions made thereunder. The Quality Manual serves as a guide and proof of quality system compliance. (Natarajan 2017, 21)

The quality manual for the implementation of the quality management system and the daily use will be built according to the needs of the target company. The standard does not lay down formal requirements for the quality manual, but it must be supportive of the objectives of the target company and be functional and up-to-date. The main thing is the usability of the quality manual. The responsibility for maintaining the quality manual must be clearly defined. (SFS-EN ISO 9001 2015, 33)

3.8 Audits and Certification of Quality Management System

Certification of a quality management system is always a decision of the organization's management. This section covers certification opportunities and system deployment risks and describes the certification process in general. Larger companies, in particular, began to require ISO certification from their suppliers from the beginning of the 21st century, which increased the focus on systematic quality management. On the other hand, the fact that the will did not come from the organization itself made the implementation of the systems more theoretical and commercial, undermining their credibility. The main areas of concern for ISO 9001:2015 certified organizations are: 1. Leadership issues such as lack of motivation,

lack of recognition and management commitment, organizational learning, deficient strategy plan and long-term focus. 2. Strategy issues, such as KPI configuration errors, due to a lack of mission, vision and value definition. 3. Quality management system issues such as poorly executed plan-do-check-act cycle, generic system (only more meetings, training and paperwork) and internal audit do not work thoroughly and objectively. (Kumar & Balakrishnan 2011, 7-8)

Gillett et al. (2015, 187-190) states that the ISO 9001:2015 quality management system audit process can be described as follows: 1. Defining key processes, 2. Named owners of key processes, 3. Processes described and documented, 4. Process monitoring and metrics defined, 5. Feedback from customers, suppliers and Interactive processes, 6. Improvement mechanism identified, 7. Processes are guided by the principle of continuous improvement and learning, 8. Processes are guided by best practices, 9. Processes are under constant control and responsive to changes whenever needed.

In order to prepare for the internal audit of the organization, the process of auditing the organisation's activities should be described. Key persons in the process should be involved in planning the audit process. The basic structure of audits should follow the following structure: 1. Defining the organisation's strategy and action plan as a basis. 2. Design the audit content, 3. Conduct audits in a systematic and objective manner, 4. Audit logging and reporting, 5. Improvement of operations and any necessary changes to the content of the audit process and reactions to the strategy. (Laamanen 2005, 112-113)

Laamanen (2005, 290-296) describes the assessment of audit success as follows: 1. Policy (compliance, stakeholder needs, performance improvement), 2. Application (understanding, acceptance, utilization skills, systematics and effectiveness, measurement), 3. Results (appropriateness of measurements, results relative to goals and competitors, improvement of results due to action taken on processes). Prior to the certification of the quality system, the system's components should be ready and running for several months, perhaps longer. There must be certainty about the functionality of the system in practice and the possibilities for improving it. Certification is the company's own declaration of conformity. Certification is carried out by an external certified auditor. (SFS 2017, 100; SFS-EN ISO 19011 2018, 5)

According to Bergman & Klefsjö (2010, 98) the quality inspection management terms in QMS are: 1. Continuous improvements before, under and after process 2. Quality assurance before process, 3. Quality control during process, 4. Quality inspection after process. Internal audit ensures that your own organization's experts act as agreed (assurance aspect) on the one hand, and whether the activity is agreed and meets the quality system requirements (development perspective).

The management review aims to gain an overall view of the company's quality situation. For example, the review may be a pre-prepared meeting of the management or a review by process (by function). Information on the quality system and quality issues should be addressed in relation to the implementation of previous decisions, the results of internal and external audits, customer feedback and declarations, compliance of supplies (product and service), quality problems encountered and corrective measures taken and their success and sufficiency of resources. (Pesonen 2007, 173-174)

4 PROCESS PERFORMANCE MEASUREMENT AND ANALYSIS IN QMS

Improving performance is one of the goals of Quality Management System. This section describes the concept of performance measurement and its use as a quality management system dashboard. This section describes the Balanced Scorecard and SAKE performance measurement and analysis system.

Performance means adding resources to processes to achieve the desired results. Performance can be divided into the following themes: time-related, financial and quantitative results, product features, and stakeholder satisfaction and feedback. (Laamanen 2005, 152) Performance is divided for performance, efficiency, quality, profitability, productivity, quality of work and renewal (Sink 1985, 41-46). Järvinen et al. (2014, 67-73) describes performance as consisting of four elements, as dedication, doing, knowledge and development. These do not produce results in isolation but must work together and be in balance.

The performance measurement system should act as a rapid alert system (radar screens) so that the company has the ability to respond daily and weekly. The main focus of the dashboards should be the Key Performance Indicators (KPIs), which are based on critical success factors and are result-driven. These should be distinguished from the Key Result Indicators (KRIs), which are mainly performance indicators. (Hope 2001, 170-171)

In performance measurement measurable things are called success factors. Success factors can be defined directly by strategy or by the needs of customers and stakeholders. Success factors form causal relationships with each other (see Figure 14). Success factors can be divided into cause and effect factors. Cause factors are often intangible factors and effect factors are usually business goals and outcomes. (Lönnqvist et al. 2006, 23)

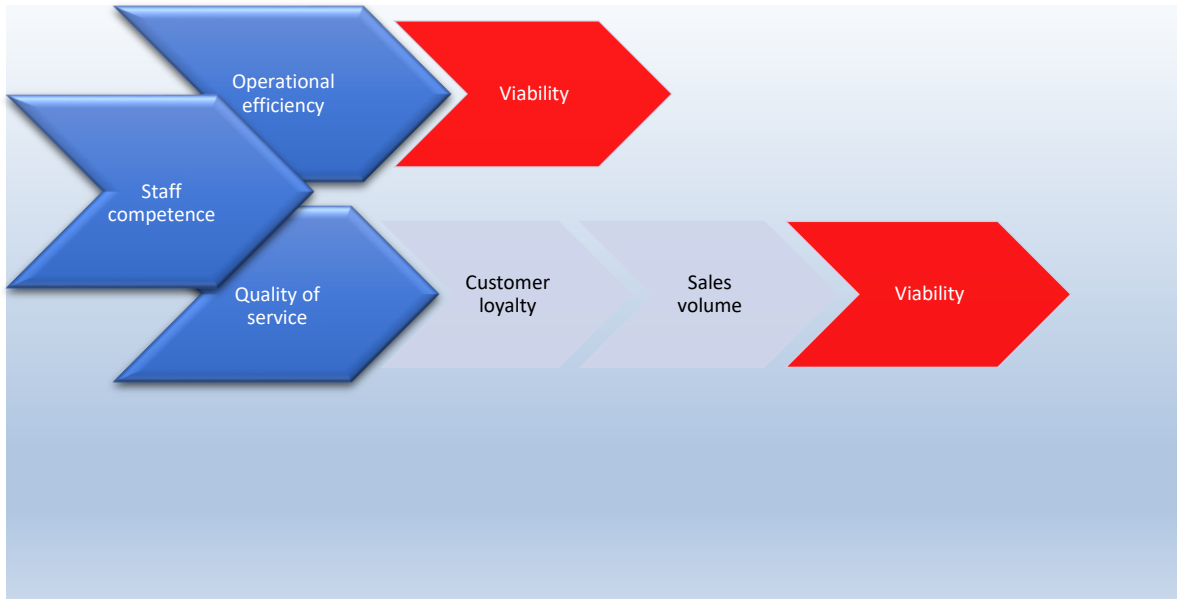


Figure 14. Relationship between success factors (Lönqvist et al. 2006, 23)

To define the Key Performance Indicators (KPIs), Jason Piatt, Director of Praestar Technology, has prepared a guide to the five rules: 1. Measure a few key points. If you choose too many, their importance is blurred in the minds of the staff. 2. The sub-processes to be measured should develop the most important goals of the strategy. 3. The things to be measured should be comprehensible and internalizable for the entire staff. 4. Ensure that the measurement result obtained is up to date and accurate. Decisions must be based on facts. 5. Make sure that you have the resources and authority to do the necessary improvements. It is important to have the necessary training and induction after setting the meters. (Piatt 2012, 30)

Laitinen (2003, 27) divides performance development into seven sub-processes. Initially, the needs of stakeholders and customers will be explored. Next, we will develop the best performing products to meet the needs of stakeholders and customers. The third sub-process explains which are the most important factors in producing these deliverables (critical success factors). Then performance metrics are developed for critical success factors. After that, the performance of critical success factors is measured and developed, and systematically benchmarked. Finally, the process is repeated to continuously improve performance, as the needs of stakeholders change constantly.

Almost all the company's operations should be considered as value-creating processes for customers. The most important value-enhancing process key points for the customer are the company's success factors, which should be measured and improved. The key task is to identify the processes into the core and support processes and to make the process mapping to determine the interaction relationships. It is important to identify critical success factors and think about the appropriate goals, and indicators for each process. It is important to constantly evaluate the process changes and thus the need to update the measurements. (Kankkunen et al. 2005, 210-213) Roshan & Jenson (2014, 2) define the benefits of performance management systems in the following categories: 1. Performance scorecards bring awareness to things that need improvement. 2. Scorecards guide the organization to the necessary improvement efforts. 3. Scorecards provide a basis for decision making and alternative solutions. 4. A loop of continuous improvement is created.

The performance of the company is a multidimensional phenomenon, where balanced scales enable the sharing of performance into smaller and more easily examined areas. The intangible success factors that are crucial for the performance of the processes are selected for the metrics to be measured. The best known of this model is the Balanced Scorecard. For example, things that can be measured in the Balanced Scorecard are determined by the following questions: *How to achieve owner satisfaction? How can customer satisfaction be achieved with the supply provided by the company? How can customer and owner satisfaction be achieved through company processes? How to develop expertise so that processes are continuously improved from a quality and profitability perspective?* (Kujansivu et al. 2007, 152-155)

Four Viewpoints of the Balanced Scorecard are (Kaplan & Norton's model) (Figure 15) The Perspectives of Economy, Customer, Processes and Learning. In the scorecard, the vision is divided into four levels as strategic goals, success factors, key indicators and action plan. The most important thing is that the things to be monitored and measured in the company are internalized and understood. (Kujansivu et al. 2007, 155)

Economy		
<p>Customer</p> <ul style="list-style-type: none"> -Customer satisfaction (survey) -Customer Relationship Research (Interview with Key Customers) - Brand awareness (interview survey) -Positive Publicity (Media Visibility number) -Customer Relationship Development (New Customer Relationships number) 	<p>Process</p> <ul style="list-style-type: none"> - Quality of service (customer feedback) - Working atmosphere (personnel survey) -Project Management (Customer and / or Staff Estimation) -Data flow (number of collaborations made, e.g. number of joint projects) -Novativeity (number of initiatives and patent applications) 	<p>Learning and development</p> <ul style="list-style-type: none"> -Personnel competence (competence survey or assessment) -Training (costs or hours per month) -Welfare of personnel (personnel survey, turnover)

Figure 15. Typical intangible success factors and indicators in the Balanced Score Card (Kujansivu et al. 2007, 155)

O'Brien (2014, 99-100) presents a description of Kaplan & Norton's Balance Scorecard with an addition that combines a supplier with a process perspective. This ensures the supplier's awareness of the organization's vision and goals and aligns common activities. A balanced scorecard serves as a tool for communicating the company's vision and strategy to the staff. The economic aspect of the scorecard measures the achievement of the growth and profitability expectations of the owners. In the customer perspective, customer satisfaction is assessed and how our customers experience us. The process view defines the processes that achieve customer growth and customer loyalty. In the perspective of learning, it is assessed what expertise is required to meet customer needs and how to develop it. (Figure 16) (Selin & Selin 2005, 72)



Figure 16. Impact of Perspectives on Strategy (Selin & Selin 2005, 72)

Using the same processes throughout the organization enables knowledge sharing across processes, while sharing best practices from one process to another. Using the same processes throughout the organization helps to integrate support functions and thus streamline the processes and thus the organization as a whole. (Kaplan & Norton 2007, 115,139)

Balance in the Balanced Score Card metric means that there are factors that ensure continuity and development while balancing economic factors. It focuses its measurement on proactive and performance-driven metrics. There must also be a balance between short-term and long-term goals and external and internal processes. (Malmi et al. 2002, 31-32) The goal of process alignment is to create a total value greater than the sum of the partial functions that affect it (Kaplan & Norton 2007, 41). Zizlavsky (2014, 214) describes the Balanced Score Card system as a balance between operational and strategic (short and long term) goals. It also balances inputs and outputs, internal and external performance factors, and economic and non-economic indicators. These are all set up to give you a clear idea of organization's performance. According to Niven (2006, 165-167, 171-172), the recommended number for all four balanced scorecards is 20-25 meters. Management's strategy meeting on Balanced

Score Card results should be at least quarterly but preferably more frequently, such as monthly.

The SAKE application is an easy-to-use performance measurement and analysis system that is best suited to the needs of small and medium-sized companies. The system is based on the continuous improvement and the measurement of key and critical success factors defined for core processes and based on the organization's vision and strategy. The first step is to determine the main function of the organization and ensure the full commitment of the management. Next step is to determine the three to six key areas of operation and determine their weight percentages. The sum of the weight percentages for the functional areas must be 100%. Critical success factors are defined for the functional areas, with a maximum of six meters per area (up to 6 sub-areas x up to 6 meters per sub-area = up to 36 meters). Finally, the subgroups are scaled on a scale of 1-10 (no scaling is required). (Rantanen et al. 2018) [A person in charge of the management system should be assigned. It is important for the benefits of the system that measurement, analysis and process improvement work on the principle of continuous improvement.]

5 DESCRIPTIONS AND CONFIGURATIONS OF TARGET COMPANY'S ISO 9001:2015 QMS

Descriptions and configurations of the target company's quality management system are presented in this chapter (Chapter 5) as the results of the study.

5.1 Description of Target Company

Target Company is a Finnish family owned company that started its operations in 1993 and imports, sells and manages aftersales services for Washtec German car wash equipment. Target Company is the largest car wash equipment supplier in Finland with 17 employees. The parent company of the target company, Washtec, is the world's largest manufacturer of car wash equipment, listed on the Frankfurt Stock Exchange. In 2017 Target Company was merged with Pamaco Totalservice AB of Sweden. The merger created the largest car washing machine importer in the Nordic countries, employing almost 100 people. The Target Company has a total annual turnover of approximately EUR 30 million. The total size of the Finnish car wash equipment market is 60 washing machines sold per year, and in addition, market for replacement machines emerging from the sale of new equipment. The equipment market for new car wash machines ranges from 6.000.000 to 10.000.000 € per year. The sector has a high annual business cycle. (The Target Company's Strategy 2017)

At present, the role of the Target Company could be called a technical service provider, which, in addition to equipment project deliveries, is responsible for good car washing and drying results and the availability of equipment as a supplier of chemical and maintenance services. The company's goal is to be the best partner for its customers. The cornerstones of the partnership are five areas where the target company wants to be the best in its field. The first area is the high uptime of the equipment, because the machines work when there are customers in car wash. Second area is the quality of the car wash (quickly but without compromising on the washing performance). The third area is the safety of car washing. Poor reputation spreads and the treatment of problems is unfortunate. The fourth area is car wash products (factors) that increase the average price of washing. The customers are ready to pay for quality. The fifth area are car wash products (factors) that increase the amount of the washes. Customers are ready to wash more often if availability and ease are improved

and they are committed to washing. The Target Company is medium-sized operator and supplier of car washing machines and related technology and services to individual and chain car wash operators. The target company's objective is to further expand its business towards overall customers. Such models include consultancy and advice on equipment and carwash solutions, provision of finished facilities and technical and commercial operation of washing operations and marketing services. (Interviewee 1; The Target Company's Strategy 2017)

As mentioned above, the Target Company operates in many different sectors at the same time in different roles: equipment vendor, developer, user training, hardware vendor and device developer. This diversity of activities combined with a relatively small organization, the recruitment challenges of professional staff and the fierce competition situation makes the research case particularly special. The construction and operation of the quality management system to be built on the base are the operating and marketing plans of the target company. Situation for competition has been getting harder and brought challenges for profitability and by target company has been added as a part of a bigger Nordic company presenting the same trademark. At the moment the Target Company doesn't have any operating quality system even though the Target Company sees quality as their most important competitive weapon. The Target Company knows the world around is changing and is thinking what should be made otherwise. (Interviewee 1)

5.2 Quality Policy and Goals of The Target Company

The quality management system is based on the quality policy, strategy and values defined for the organization and by the management. (See Chapter 3.1.) Business idea defines the products and services (the supply) offered to customers as well as a description of the strengths over competitors. The business idea answers the questions: what, to whom, how and why the organization's supply is produced and offered. A business idea is a combination of a business idea and a vision. The vision gives direction to the operation of the organization over a longer period, for example 5 years. (Lecklin & Laine 2009, 128-129)

The quality policy of the target company is a combination of business idea and vision. (SFS-EN 9001 2015, 13) (See Chapter 3.1.) The Target Company's business idea is to create

successful car wash operations for its customers with advanced service solutions and the best customer service (The Target Company's. Strategy 2017).

The vision of The Target Company: The goal of the target company is to be leading supplier in the car washing machine market in Finland. The target company offers the best products, the best range of services and the best customer service. The target company provides the best overall solution for the customer on the market. The target company has satisfied customers who at the end of the current device life cycle they want to acquire a new device from the target company. The business processes of the target company are efficient and are reflected in the quality of the service. The target company staff is satisfied with the workplace and the target company is the desired employer. The profitability and liquidity of the target company are good and the target company is solid. (The Target Company's Strategy 2017)

The strategies of The Target Company: The strategy is the course chosen by the company towards the goals. It helps the company to create the conditions for future success.-The growth strategy of the target company is that the company aims at generic growth by keeping a high market share and growing in the market. In accordance with its customer strategy, the target company is involved in the product and service supplier of the entire car washing machine market. The target company segmented its offering to different customer groups, matching it to the customer's wishes and needs. According to its competition strategy, the target company competes with a more comprehensive range of services, better quality and better customer service. According to the product and service strategy, the products are built to meet customer needs with options and modules. Services differentiate the company from its competitors. The partnership strategy is to keep all the core know-how in target company's own hands. Some of the service portfolio can be produced with the help of partners. (The Target Company's Strategy 2017)

Values of The Target Company: The cooperation value of the target company is that "we are more together". The target company works openly and reliably within the company, as well as with the customer and partners. The effectiveness value is that the target company strives to make the right things at the right time, efficiently, safely and systematically. In accordance with sustainability values, the company is committed to its operations and to the continuous development of its products and services, as well as the deepening of its customer

relationships. The target company wants to be a reliable partner, and in the future it will ensure the long-term viability of business and business continuity. (The Target Company's Strategy 2017)

5.3 Purpose and Responsibilities in The Target Company's Organization

The description of the target company's team organization and its responsibilities is made on the basis of an interviews with the target company contact person using Corporate Governance of the Target Company 2017 as support material. The Management team reports on the different areas covered by the scorecard. The focus is on identifying deviations from planned and reflective remedies. In addition to the scorecard, the project portfolio is reviewed and decisions are made on what it requires. The target company has both, line and matrix organization. The members of the Management Team represent the agreed line organization, but they also have process and project responsibilities. An employee may belong to a particular process or project that is the responsibility of a person other than their own line manager. The Sales team is responsible for hardware and system sales and customer relationship management (handling complaints, ensuring customer satisfaction, and service contract sales). In addition, it is responsible for the sharing of technical information and technical contact. The Project team is responsible for tender calculation, management and development of installation projects, design and consultancy services for car wash facilities, service development and maintenance. The Maintenance and Sales Support team is responsible for resource maintenance, repair, maintenance and repair coordination, subcontracting network operations, contracts, damage cases and car wash operations. The Administration team is responsible for supplier, customer and contract registers, invoicing, purchase and sales accounts, internal reporting, fixed asset accounting, regulatory contacts, Human Resource team tasks and customer service functions at the head office. Material Management is responsible for procurement contracts, purchasing, product management, order processing, warranty handling, inventory tracking and project support, and the web shop of spare parts sales. The Management and Marketing team is responsible for personnel management, recruitment and competence development, business planning and development, organizational development, product range and customer segment decisions, and risk management. In addition, management's responsibilities include analyzing market information and making marketing plans and monitoring implementation. (See Figure 17.)

The organization's practices include weekly meetings that deal with current issues such as project situations and maintenance schedules, as well as setting up team-specific goals. (Interviewee 1; Corporate governance of the Target Company 2017)

	Chain customers	Merchants owning the property	Car dealerships	Investors
Sales (3 people)	Sales	Sales	Sales	Material operations and economy (3 people)
Projection (3 people)	Projection	Projection	Projection	Material operations and economy
Maintenance (11 people)	Maintenance	Maintenance	Maintenance	Material operations and economy

Figure 17. Target Company's Team Organization (Corporate governance of the Target Company 2017)

5.4 Supply of The Target Company

Based on interviews and discussions with the contact person of the target company, a description of the Target Company's Supply in the context of the quality management system is defined in relation to this study. The target company's service consists of the following parts or a combination of these at the customer's choice: 1. Car washing machine (and other car washing technology), 2. Customer relationships, Consultancy, 3. Service contract (maintenance, chemicals, supervision, maintenance), according to the customer's choice and need, 4. Product warranty (factory warranty, vendor warranty), 5. Training, orientation, counseling, guidance. 6. Communications and follow-up (discussions, reports, two-way partnership). (Interviewee 1) (See Chapter 3.2.)

5.5 Target Company's Processes Descriptions and Meters in the QMS

The main processes of the target company (Figure 18) are the customer acquisition process, the material process, the maintenance process and the management process. The subprocesses of the customer acquisition process are the marketing process, the sales process and the installation process. The subprocesses of the material process are the Purchase Process and the Stock Process. Partial processes in the maintenance process are the periodic maintenance process, the fault repair process and the daily maintenance processes. The subprocesses of the administration process are the strategic process and the processes of general and personal administration. (The Target Company's Process Description 2017)

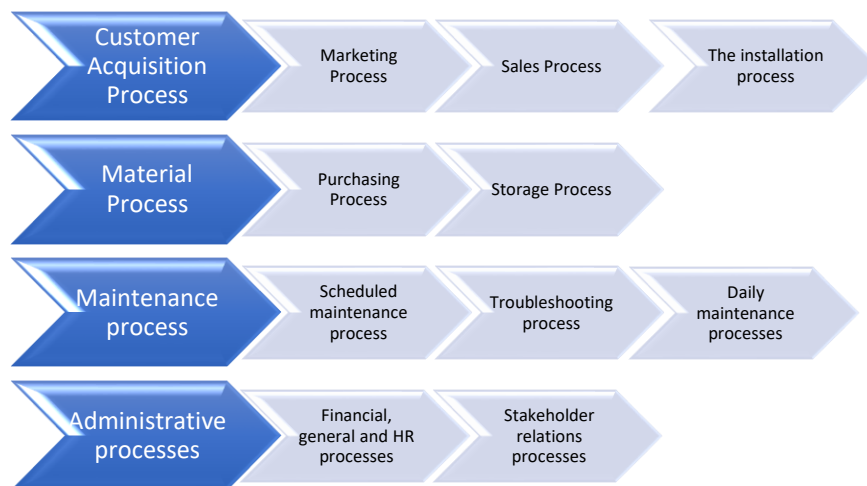


Figure 18. Process Map of The Target Company (The Target Company's Process Description 2017)

The quality management system is built to manage the main processes of the target company and to improve the quality and profitability of operations. The four main deliveries of the target company are defined as the main processes: marketing, sales, installation and maintenance. Management and administration work as their support processes. (The Target Company's Process Description 2017)

Based on the process description of the ERP system of the target company and the interviews and discussions with the contact person of the target company, the processes are selected and described in this study for the quality management system to be built. The quality

management system to be built utilized the processes used in the ERP-CRM (Figure 18), which are specified to be compatible with the Quality Management System. According to study constraints, installation and maintenance processes that have the greatest impact on customer satisfaction (customer companies and car wash end-users) and on operational performance. are in more detail described. In connection with this study, Key Performance Indicators (KPIs) and meters and measurement frequencies are determined for the processes. Ishikawa's "fishbone" (cause and effect) method (Figure 9 and Chapter 3.4) is used to determine the success factors of the processes. In Chapters 5.5.1 - 5.5.6 There are cause-and-effect relationships marked with process KPI definitions in relation to this study. From the Process Descriptions of the target company are selected based on the success factors of the QMS processes, the indicators that indirectly influence the target. A total of 22 KPIs are selected for the quality management system for nine processes. The study utilized the previous company experience and ERP-CRM processes, which does not require major additional investments and utilizes already existing systems and practices (SFS 2017, 8).

In this section, background information on the car wash business, process backgrounds, and Key Performance Indicator (KPI) selections are based on interviews and discussions with the target company's contact person, supported by The Target Company's Process Description. In addition, interviews and discussions with the car wash sales manager of the customer company are used to gather information from the customer company's and end-customers' point of view. Use of Strategy Materials of the Target Company the source of this study is marked according to the reference used.

5.5.1. The Installation Process description and meters in the QMS

The goal of the installation process is to install the hardware as a functional entity at the same time, keeping it on schedule. It is important to have a co-operative rules with the customer company. At the same time as the installation process is carried out, the car wash hall technology coupled to the washing apparatus (for example doors and lighting) can be renewed or refurbished. The installation of the car washing equipment may take place simultaneously with the installation of hall technology (work arrangements, agreement, co-operation, communication and scheduling). The installation of new equipment will be

accompanied by a specialized team, which will always be allocated for installation, apart from the daily activities of the target company.

The use of subcontractor companies as a resource enhancer is often the most cost-effective way of balancing momentary capacity peaks. The profitability of the process for the supplier consists of the sales revenue of the hardware, which is reduced by the installation and start-up costs. In the future, the revenue will come from the service revenue related to the service contract and the sales of chemicals. The key to the efficiency and cost of the process is the use of personnel and the management and organization of operations. (Interviewee 1)

The cooperation period between the target company and the customer company in connection with the purchased car wash device is 5-10 years, depending on the life cycle length of the device. If the customer company decides to acquire also the next washing equipment from the target company, it will continue to cooperate with a lifetime of at least one equipment. The length of the life cycle of the equipment is affected by the number of washes performed on the machine during its lifetime and the need for renewal as the competition or other external factors change. During the lifecycle, hardware can also be upgraded (make technical changes and upgrades) and make basic repairs. After the turnover, the washing machine can also be reconstructed and transferred to a smaller capacity car washing station. Provision of reconstructed hardware as an alternative (equipment recycling) utilizing recycled equipment and parts to replace new car washing machines can be an economic solution in some cases. The customer company can be provided with the basic design of the existing car washing equipment as an alternative to new purchases. As a sales argument, a supplier warranty can be provided for the equipment that is well-repaired by agreement. There are plenty of reasons to provide reconstructed hardware. The number of cars for a commercial location does not carry the capital cost of a new machine. There is also always uncertainty about the future and continuity of a business site. The financial situation of a business-place entrepreneur requires less time to extend the capital cost. The capacity of a business site does not, for example, cover capital costs for a new car washing line such as the current one, but the slower option can be seen to decrease revenue further and permanently. There are changes in the environment that have a negative effect on washing activity. In-house equipment recycling in the car washing station chain, taking into account the above-mentioned considerations (make the necessary car wash equipment

replacement at the washing station) and the old transfer as standard for car washing station with a lower capacity. (Interviewee 2) [Basic equipment refurbishment can be done as filling the capacity of the supplier during quieter periods, which improves labor costs.]

As the Key Performance Indicators (KPIs) of the installation process are chosen and defined as part of the study: 1. the cost of the project versus the budget ja 2. Project Schedule versus Project Plan for which the metrics are obtained from the financial management of the target company once a month. Selected KPIs direct operations to improve the profitability of the Installation process. Better process-specific efficiency and profitability (secondary cause) increases the competitiveness (primary cause) and thus profitability of the target company (effect). (Interviewee 1; The Target Company's Process Description 2017)

5.5.2. The Process of Projection description and meters in the QMS

The target company has signed a cooperation agreement with the manufacturer of modular car wash halls. The target company co-acts as a supplier for new car wash equipment. The target company can operate as a technical expert in car wash hall reconditioning and building (The Target Company's Strategy 2017). In practice, this job often meant that the target company would take a look at the car wash hall and give to customer company idea of what is to be renovated in the washroom, after which the customer decides what the hall is to be refurbished. The target company can also advise special planners and manage builders' bidding on behalf of a customer company, but mainly the target company provides guidelines for the renovation of the customer company's existing car wash hall and supervises work performance. (Interviewee 1)

As the Key Performance Indicators (KPIs) for the process of projection are chosen and defined as part of the study: 1. Profitability of projects, for which measurement and comparison figures are obtained once a month from the management of the target company. In addition, the following is selected as the meter. 2. Project schedule versus Plan. As a result of the improved efficiency and profitability of the projects (cause), the result of the target company (effect) is improving. (Interviewee 1; The Target Company's Process Description 2017)

5.5.3. The Maintenance Process description and meters in the QMS

Munchiri et al. (2010, 3) defines accessibility, reliability, performance, and product quality as success factors for maintenance. The most important leading indicators in the article are repetitive work and late work. In addition, the share of invoiced work in total work and downtime play an important role. The direct cost of maintenance and the costs of using subcontractors are defined as ladding.

The management should provide guidance, support, communication, tools to employees. Work and work orders are organized in such a way as to minimize the downtime of customer companies' operations. It is necessary to ensure and manage the flow of information towards the customer company. Accurate treatment of spare parts logistics minimizes waiting times and downtime. The efficiency and timing of work is improved by a fast and easy-to-manage reporting system. Mobile support by the installer will be available as needed. The aim is to work without accidents, and costs and absences caused by them. Methods for good occupational safety are proper working methods and instructions, safety equipment and accessories. (Interviewee 1)

As The Key Performance Indicators (KPIs) for the maintenance process are chosen and defined as part of the study (illustrated in the Figure 19): 1. Efficiency of work control, including billed hours versus total hours (ratio of driving hours, waiting hours, spare parts retrieval hours, hours worked and overtime work hours), which are measured once a month by the management of the target company and counterparts from targets. More efficient project (cause) and work management (cause) increases the target company's profitability (effect). 2. Response Time Tracking, for which metrics are obtained once a month from the target company administration. Improved response time (secondary cause) increases customer satisfaction (primary cause) and thus the competitiveness and profitability of the target company (effect). (Interviewee 1; The Target Company's Process Description 2017)

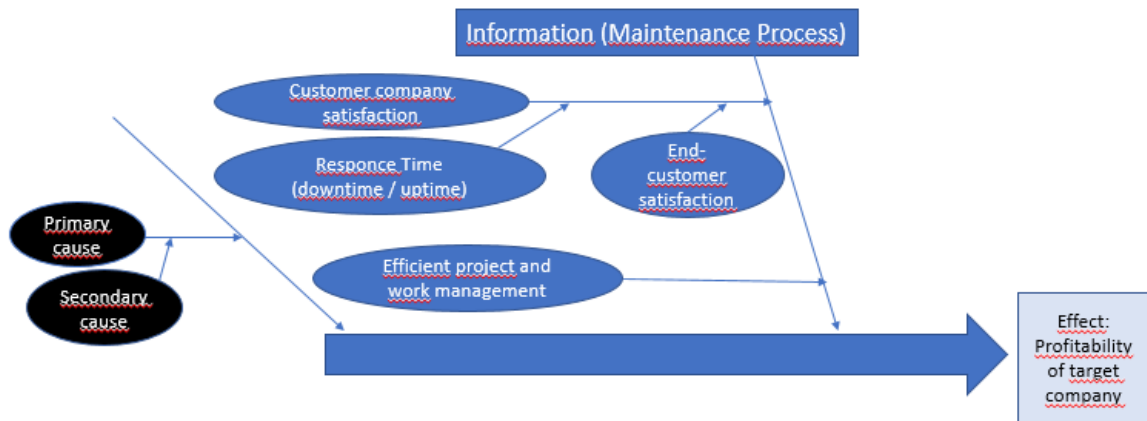


Figure 19. Cause and effect diagram usage in the target company's maintenance process KPI definition

5.5.4. The Material Process description and meters in the QMS

The material process consists of purchasing spare parts and supplies from brand contract suppliers, accessory suppliers, washing chemical purchases and related logistics, as well as warehousing and logistics for service personnel and sales directly to customer companies. Storage optimization ensures cost-effective operation. Subcontractor co-operation for maintenance supplies and additional services required complements maintenance and installation operations. Material management includes storage, inventory tracking, needs definition, logistics, and ordering. (Interviewee 1)

The areas of logistics monitoring include security of supply (sales, purchases), incorrect deliveries (sales, purchases), loss, inventory rotation, billing speed and number of quick orders (purchase) (The Target Company's Process Description 2017). As the Key Performance Indicators (KPIs) of the material process are chosen and defined as part of the study (illustrated in the Figure 20): 1. Delivery reliability in sales and purchasing, for which the metrics of the target company's material management are obtained once a month, and the set target is used as a benchmark. As a result, improved of supply (secondary cause) and project profitability and efficiency (secondary cause) increases customer satisfaction (primary cause) and thus the profitability of the target company (effect). 2. Losses (secondary cause) for which measurement values are obtained once a month from the financial management of the target company, and the set target is used as the benchmark. As

a result, the reduced loss (primary cause) will improve the result of the target company (effect). 3. Wrong deliveries in sales and purchasing (secondary cause), for which metrics from material management are obtained once a month, and the set target is used as a reference. The result (primary cause) is improved target company profitability (effect). 4. Inventory rotation, for which metrics from financial administration are obtained once a month, and the set target is used as a reference. Improved inventory rotation (cause) improves the profitability of the target company (effect). 5. Billing rate for which metrics and comparison figures are obtained from the financial administration. Improved billing speed (cause) increases the target company's profitability (effect). (Interviewee 1; The Target Company's Process Description 2017)

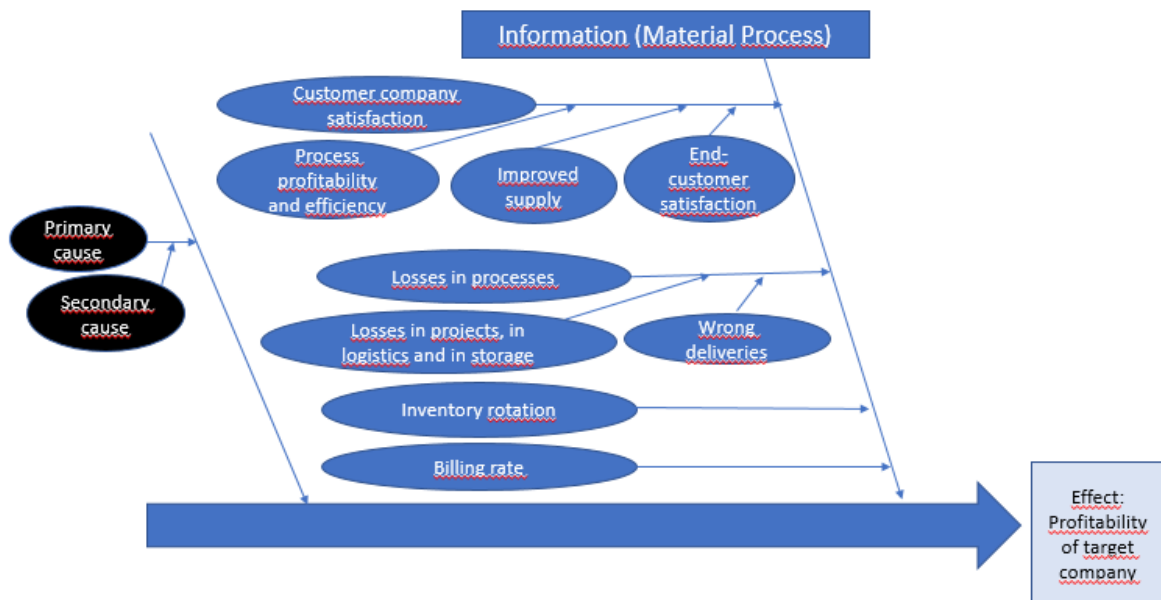


Figure 20. Cause and effect diagram usage in target company's material process KPI definition

5.5.5. The Sales Process description and meters in the QMS

Key sales processes are sales by phone to chain customers, sales to private customers, detergent sales and sales tracking. The product portfolio of the target company consists of automatic car wash equipment, self-service car washing machines, car vacuum cleaners, water-air devices, car cleaning and other car care equipment and air compressors related to car wash. In addition, business support services are provided, such as remote technical

monitoring, 24/7 maintenance and operation, and car wash mobile applications for customer companies. The target company provides immediate support for the car wash business of the customer company, the equipment maintenance contract, the chemical contract, and the construction and renovation of the car wash halls, as well as ready-made solutions.

An essential part of the sales process is the acquisition of equipment, based on long-term framework agreements with contracted principals. The customers of the target company are the service station chains, service station dealers (who carry out independent procurements), individual car wash companies, car dealerships, transport companies and car wash chains that are not affiliated with oil companies. It is important to maintain the agreed delivery schedules, which is important and confidence-building minimization of defects and errors and, if necessary, patching should be done without delay. Errors increase costs and undermine a reliable supplier image. Also, the errors of subcontractors and third-party suppliers accumulate as errors in the service provider's final service. (Interviewee 1; The Target Company's Strategy 2017)

Subscription description in equipment sales:

1. Bidding round (invitations to tender, offers and presentations per item)
2. Scheduling whenever possible
3. Delivery contract (framework contract)
4. Schedules must be constantly updated and maintained. Pay attention to changes due to subscriber schedules or processes. Also, holiday periods may lead to longer delivery times. These should be anticipated at the ordering stage.
5. Targeted Orders and Order Confirmations
6. The specific requirements of the subscriber's target and equipment complicate the process. It would be most advantageous for the supplier if the orders were as standardized as possible (hardware uniform).
7. Changes in schedules and delivery content will always increase costs and binding resources. (Interviewee 2)

As the Key Performance Indicators (KPIs) of the sales process are chosen and defined as part of the study (illustrated in the Figure 21): 1. The number of bids made and the actual percentage for which the measurements are obtained from the administration of the target

company and the reference figures for the targets set once a month. The number of offers (secondary cause) increases success and thus the competitiveness (primary cause) and profitability of the target company (effect). 2. Project coverage versus budget, for which metrics are obtained from the financial management of the target company once a month. Improved project profitability and efficiency (cause) increases the profitability of the target company (effect). 3. Amount of the customer contacts versus Plan. Active customer contacting (secondary cause) improves the chances for good sales (primary cause) and hence the profitability of the target company (effect). 4. New customers versus lost customers, which is reflecting on sales activity (secondary cause) and hence the result of the sales process (primary cause) and thus profitability on target company (effect). (Interviewee 1; The Target Company's Process Description 2017)

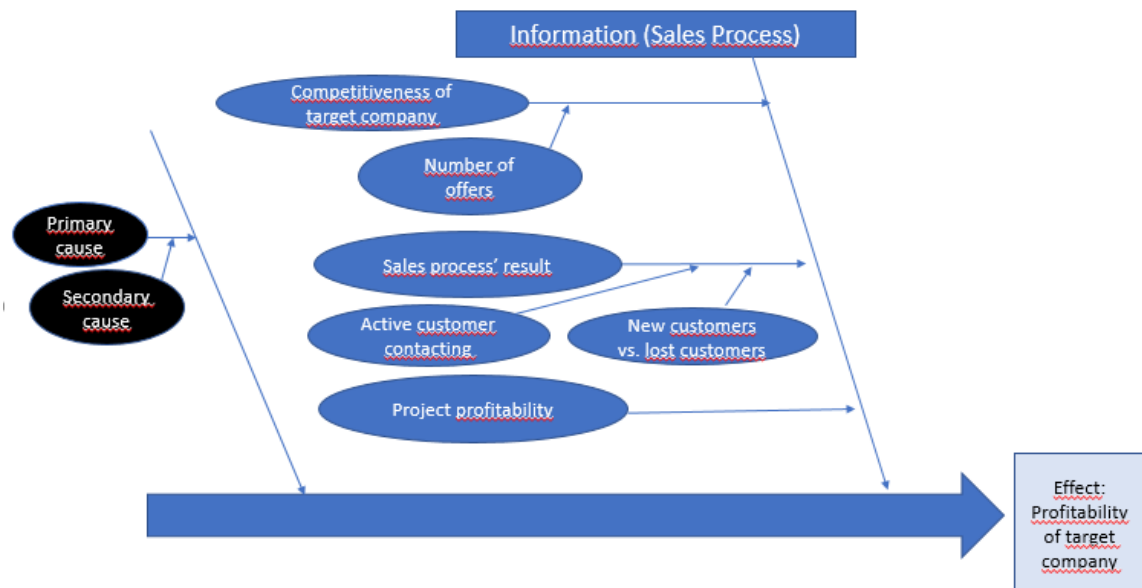


Figure 21. Cause and effect diagram usage in target company's sales process KPI definition

5.5.6. The Administration Process description and meters in the QMS

The Administration Process consisting of financial and human resource management, customer relationship management, corporate governance, and development (The Target Company's Process Description 2017). (See Figure 22.)



Figure 22. The Target Company’s Administration Process (The Target Company’s Process Description 2017)

An important part of the installation and maintenance is ensuring know-how through systematic recruitment, orientation and training. The task of the management team is to ensure the right, necessary skills at all times in a timely manner. In addition to know-how, key employees are the right attitude, ability to cooperate, self-management and flexibility. Within the organization of the target company, this is the responsibility of the Human Resource administration in the Administration process. (Interviewee 1)

In relation to this study, questionnaire templates are built for customer and personnel satisfaction surveys. The quality in the installation and maintenance processes is monitored during the bidding phase with feedback from the customer companies and during the installation phase with feedback from customer companies and service installers. Customer company feedback is collected and recorded during the bidding (Attachment 1; Attachment 4), delivery, and installation phases, and regularly in the after-sales phase as a basis for operational improvement. Feedback from the service technicians during installation, maintenance and repair visits is recorded (Attachment 2). (Interviewee 2)

As the Key Performance Indicators (KPIs) of the administration process are chosen and defined as part of the study (illustrated in the Figure 23): 1. Profitability of projects, for which measurement and comparison figures are obtained once a month from the management of the target company. As a result of the improved profitability of the projects (cause), the result of the target company (effect) is improving. 2. Profitability of service contracts, for which measurement and comparison figures are obtained once a month from the management of the target company. As a result of the improved profitability of the contracts (cause), the result of the target company (effect) is improved. 3. Profitability of car

wash chemical contracts, for which measurement and comparison figures are obtained once a month from the management of the target company. As a result of the improved profitability of the contracts (cause), the result of the target company (effect) is improved. 4. Personnel for whom measurement and benchmarking results are obtained once a year from the employee satisfaction surveys conducted by the target company (scale 1-5; normal level 3) (Attachment 3). Improved job satisfaction (cause) improves the profitability of the target company (effect). 5. Service level measured results twice a year from Target Company's customer-specific Uptime (Response time) (secondary cause) and First Fix measurements (secondary cause). Improving service levels increases customer satisfaction (primary cause) and thus the profitability of the target company (effect). 6. Customers whose measurement results are continuously measured from customer companies via mobile or PC application and after installation and maintenance visits or projects, and separately once a year (scale 1-5; normal level 3) (Attachment 1; Attachment 4). Customer satisfaction (cause) improves competitiveness and hence profitability of target company (effect). (Interviewee 1; The Target Company's Process Description 2017)

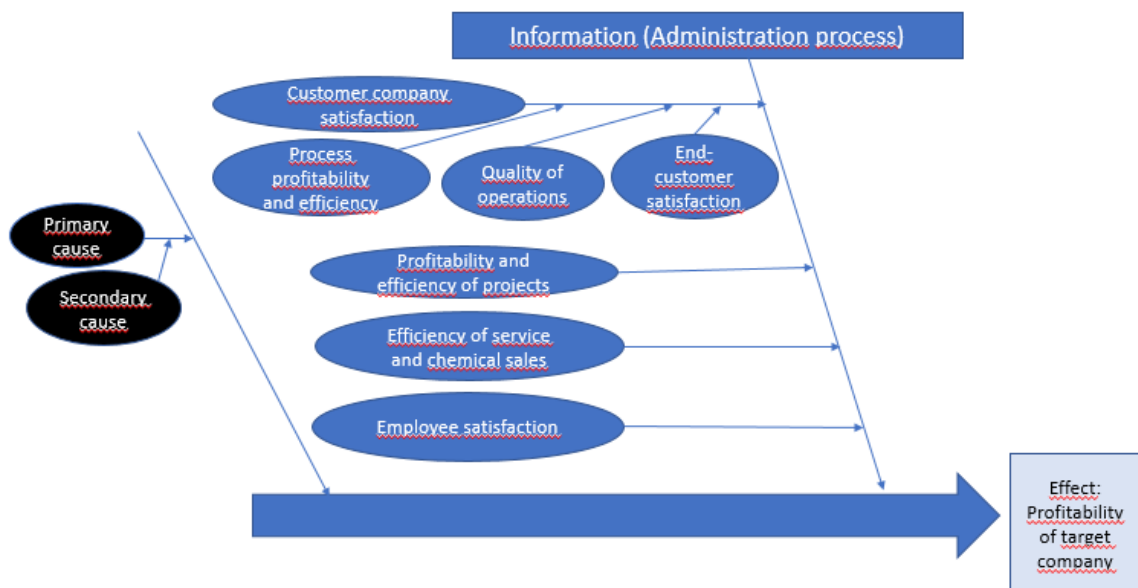


Figure 23. Cause and effect diagram usage in target company's administration process KPI definition

5.5.7. The Stakeholder Process description in the QMS

The Stakeholder Process, on the other hand, includes a supplier process, a customer complaint process (customer companies, end-user customers in the car wash station), risk

management and the social process, including legal monitoring, government announcements, and data retention (The Target Company's Process Description). The sub-processes of the stakeholder processes are: 1. The risk management process, which includes risk mapping and the risk management plan based on it, 2. The social process that follows the legislation and notifications according to its requirements, which includes employment contracts, training plans, development discussions, safety committee matters, commission and incentive issues, and vacation arrangements. Stakeholder process issues are discussed in management reviews. (The Target Company's Process Description 2017)

5.5.8. The Strategy Process description in the QMS

The operations of the strategy process include market analyzes, the supplier process and the personnel process, in addition to communication management. The management reviews the strategy in relation to the annual plan, organizational chart, process descriptions and work descriptions. The management also makes strategic review based on market analysis. (The Target Company's Process Description 2017) (See Figure 24.)



Figure 24. The Target Company's Strategy Process (The Target Company's Process Description 2017)

5.5.9. The Marketing Process description and meters in the QMS

The marketing process includes communication and customer satisfaction with continuous monitoring measurements. (See Figure 25.)

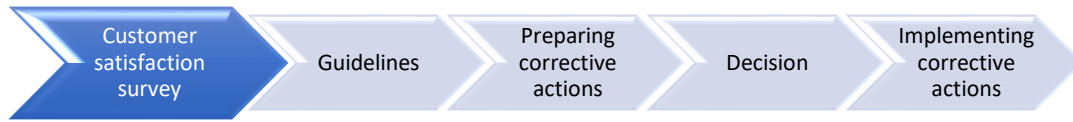


Figure 25. The Target Company’s Marketing Process (The Target Company’s Process Description 2017)

As the Key Performance Indicators (KPIs) in the marketing process are chosen and defined as part of the study: a customer satisfaction survey (Attachment 4) that is performed once a year on a scale of 1-5 (normal level 3). A customer feedback survey is conducted after each installation, projection and maintenance visit (Attachment 1). Similarly, the service technician gives his or her own feedback after completing the work (Attachment 2). Improved customer satisfaction (cause) increases the target company's profitability (effect). (Interviewee 1; Interviewee 2; The Target Company’s Process Description 2017)

5.6 The Interaction Between Target Company’s Processes

For the QMS, the interactions between processes based on interviews and discussions with the target company’s contact person and the process descriptions of the target company as background information are defined and described in relation to the QMS. When describing the interaction between quality management system’s processes, the previous waterfall model is applied, according to which the output of the second process may be the input of the next process. In this case, a poor result in the preceding process or an error in the process will adversely affect the result of the subsequent process. (See Chapter 3.3.)

The Installation Process for New Hardware interactions with other processes by function are: Interaction processes at the stage of a customer request from a customer company are stakeholder, marketing and sales processes. In addition to the sales process, the offer to the customer company is also linked to the management process. The order and order confirmation phase goes through the sales process and the sales transaction and the delivery

contract in addition to the sales process are linked to the management process. The hardware delivery, installation, and operation training are done by the installation process, supported by the management process. Maintenance, sales and stakeholder processes are linked to service contract and aftersales issues.

The Process' of Reconstructed Used Equipment interactions with other processes by function are: During the selection and design phase of the equipment to be repaired, and in the organization of work, the maintenance and installation process, and material, maintenance and installation processes in the procurement phase of the necessary spare parts and supplies. During the equipment renovation and testing phase, the installation and material process are interactive. In the sales phase, the sales and marketing processes involved in making the offer to the customer company and the sales work, if necessary, rely on the help of the installation process. Sales and maintenance processes are linked to the order confirmation, sales contract, maintenance and chemical contract phase. In aftersales interactions, there are maintenance, sales and stakeholder processes.

The Process of Projection includes construction, renovation and consulting of car washing hall renovations and interactions with other processes. The installation process gets input from the sales process and works in close connection with the installation, maintenance and marketing process. The Maintenance Process includes maintenance and repair. The interaction processes of the maintenance process with other processes are subdivided to ensure competence (administration, installation and stakeholder process), occupational safety (administration and installation process), material management (material and installation process) and maintenance management (administration and installation process). In the Material Process, administration and sales determine the product range for which the material process acquires and supplies spare parts and accessories. Installation and maintenance are directly related to the material process.

The processes affecting the Sales Process are the administration and marketing processes. The outputs of the sales process are inputs to the installation, maintenance and material processes. The Administration Process plays a key role in the strategy process, the stakeholder process, marketing and sales, and guides the material process and installation and maintenance processes. Related to The Stakeholders Process, stakeholder relationship is

a management tool that guides sales and marketing. Installation and maintenance are also linked to the stakeholder process.

The Strategy Process is under the guidance of the administration process and directly affects sales, marketing, installation, maintenance and material processes. The marketing process is under the control of the administration and strategy process and directly affects sales, installation and maintenance processes. It has an indirect effect on other processes, such as the material process. The sales process is influenced by administration and marketing processes. The outputs of the sales process are inputs from installation, maintenance and material processes. The Marketing Process is guided by the management and strategy process and directly influences the sales, installation and maintenance processes. It also has an indirect effect on other processes, such as the material process. (Interviewee 1; The Target Company's Process Description 2017)

5.7 Risk Based Thinking in Target Company's Processes

This section discusses the risks associated with the target company's processes and their use. Proper and controlled risk management can also provide opportunities for the organization. The risk management of the target company processes is based on interviews with the target company contact person and target company's strategy materials. The SWOT analysis model was used to determine the risks and opportunities (Strengths, Weaknesses, Opportunities, Threats).

The key risks in process management can be linked to the target company's management process. Human resource management includes ensuring the availability of skilled and competent personnel (recruitment and training) and the retention of key personnel have a direct relationship with the installation, maintenance and material processes. Managing and succeeding in installation operations models (target company's own installers, contractors, subcontractors) influences installation and maintenance processes. Ensuring the quality and competitiveness of the supply includes car wash equipment, delivery with installation and aftersales support to the customer company. It has a direct interaction with the material process as well as the installation and maintenance processes. The risk can also arise from the loss of a large chain customer relationship, where the quality and reliability of the target

company's supply is crucial. Sales activity, collaboration and communication also play a major role in maintaining and acquiring customer relationships. (Interviewee 1)

Laamanen (2005, 297) identifies as process management risk for not being able to identify and separate the core and support processes of an organization. Too many processes make them difficult to manage. Laamanen (2005, 210) emphasizes the importance of reacting during the process. The response model is the Plan-Do-Check-Act (PDCA) Circle. Applying the waterfall process model to continuous improvement. (See Chapter 3.5.) Kruchten (2003, 54-55) states that measurement frequency and response over a long period of time yields undesirable results. Functions need to be measured and the necessary remedial action taken during the process. Also, false initial assumptions that guide you to solve things in the wrong context are also a risk. This may be due to lack of experience in the area to be solved or lack of thorough research.

5.8 Using Target Company's existing systems in Quality Management System

When implementing a quality management system, the organisation's operating methods should be changed only if development is achieved (SFS 2017, 8). [This also means that the existing systems of the target company should be utilized.] The existing systems of the target company can be utilized in the construction of the quality system. The Enterprise Resource Planning (ERP) system of the target company, the Balanced Scorecard, SAKE- performance analysis system and the Customer Relationship Management (CRM) system are used as tools.

5.8.1 Using ERP and CRM in Quality Management System

Kumar & Reinhartz (2006, 21; Figure 26) illustrate how the integration of Enterprise Resource Planning (ERP) and Customer Relationship Management systems provides the target company's ERP system with up-to-date information on the customer interface.

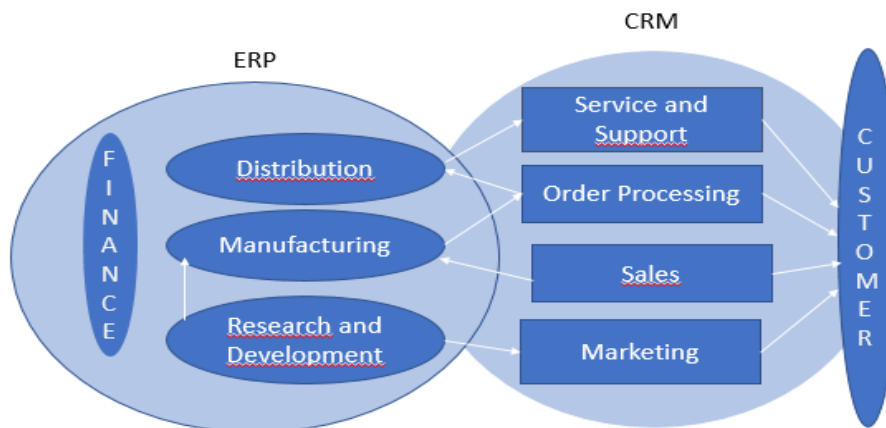


Figure 26. Customer information from customer interface to company's ERP system (Kumar & Reinhartz 2006, 21)

Integration of the quality management system with the target company's ERP system is possible and compatible, because ERP systems are based on a process-like operating model. The system has in place and capabilities in the form of documentation, processes and instructions management for ISO 9000 quality management systems. (Hamilton 2003, 326) The people involved in the use of the ERP system must be actively involved in the planning and implementation of additions and changes to the system. This provides better functionality and user awareness from the start. At the same time, users' commitment to potential additional tasks is enhanced. In particular, the compatibility of process functionalities with the needs of the organization must be better taken into account when the people who are familiar with the process are involved. (Matende & Ogao 2013, 522-524) [This also applies to incorporating the Quality Management System, that is the subject of this study, into the processes of the Enterprise Resource Planning system.]

Field service technicians are in daily personal contact with the customer, but far from their own supervisors. In this case, the ERP and its associated CRM function as a tool for work order, spare part orders and customer information reporting and is in control of the field service technician. Customer satisfaction surveys and service technician feedback can be integrated into the system right after the end of the project. In this case, the technician acts independently as a representative of the company towards the customer. (Ptak & Schragenheim 2000, 374-379)

For a field service technician, an ERP system is a tool for management communication, technical information, performance monitoring and reporting. The flow of information and thus the process and responsiveness are accelerated thanks to the online connection. The use of ERP enables information flow and communication in managerial matters without personal contact, transferring information from company databases and contacting overseas principals directly from the field when needed. (Ptak & Schragenheim 2000, 374-379) [The operation and utilization of the systems requires self-control by service technicians, but at the same time it supports self-directed field work.]

Enterprise Resource Planning system (ERP) of the target company: The target company's management team assesses the management and operational activities based on the NAV-ERP system and decides on the necessary measures, resources and implementation (Figure 27). Measurements include personnel surveys, scorecard monitoring and reporting.



Figure 27. Description of the Executive Team's mission statement in The Target Company (The Target Company's Strategy 2017)

Financial Scorecard: In terms of operational activity, sales and gross margin are monitored by customers as well as by vendor as compared to the budget. The amount of warranty costs per project is monitored. Profitability is monitored on a project-by-project basis and for maintenance and detergent contracts. In terms of administration, the balance sheet and cash flow are monitored compared to the budget as well as liquidity and credit loss. In Customer

Scorecard customer satisfaction is measured in terms of operational activity. Reports are also available on new and lost customers and payment times. The share of administration in monitoring is the market share of machine sales and of the supply of maintenance and car washing chemicals. In Employee Scorecard measurements include work satisfaction, accident and near miss situations, working time, overtime and sick leave. Performance is monitored for efficiency, project lead time, maintenance workload per visit, and service level (uptime, operating rate, First Fix rate). Development Scorecard monitoring development is based on the strategic goals of the target company. Related to sales tracking, sales monitoring measures include customer contacts, the number of customer visits compared to the plan, the number of bids made and the actual percentage, project coverage compared to the budget, market share-%, and potential sales. (The Target Company's Strategy 2017)

Customer Relationship Management system (CRM) of the target company: The control of the customer management system consists of a steering group and a project group. The monitoring of the results will be reported to the project team at the meetings and to the management team of the target company during the meetings. The customer segment process is accompanied by current and potential customers and marketing plans developed for them. The market information process includes information about rivals, trades performed by competitors, bids, prices and products. Competitors' customer relationships with major customers are included in the monitoring. (Target company's Process Description 2017) (See Figure 28.)



Figure 28. Customer relationship management (CRM) system in the target company (The Target Company's Process Description 2017)

[The objective of the Customer Relationship Management System is to guarantee a continuous quality and customer satisfaction. The system works process-based on the principle of continuous improvement and development. The customer relationship management system acts as a guidance tool and as a basis for management decisions.]

5.8.2 Balanced Scorecard of The Target Company

The scorecard of the target company is a meter built using the balanced scorecard principle. Target scorecards for the target company include performance metrics defined by topic: economy, customers, processes and projects, and personnel. (See Figure 29.) The things to be measured are derived from the critical success factors of the target company. The scorecard works as a measure connected to the Enterprise Resource Planning system and Quality Management System.



Figure 29. The Balanced Scorecard of The Target Company (The Target Company's Strategy 2017)

5.8.3 SAKE Performance Analysis System built to Target Company's needs

As LUT system was built 2018 for the target company SAKE-based application performance analysis and measurement system. It is now plugged as measure of the target company quality management system. The starting point for building a performance measurement

system was the company's vision and strategy. The strategy is driven by critical success factors and objectives. Based on the goals, the objects of measurement and the instrument clusters are defined. (Ruoho 2018)

The choice of instrument cluster guides activity through causes (sub-areas) to performance. The frequency of measurement with customer satisfaction is one time per year. However, due to continuous monitoring, the report is prepared and monitored four times a year. In this case, the latest measurement result is used as the value of customer satisfaction and market share. The basic starting point for scaling of instrument clusters is standard grade 8 for good standard performance. (Attachment 5; Ruoho 2018)

The results of the performance measurement are used as a management tool for operational guidance and staff meetings, training and self-management. During the time periods of the year, the accuracy, functionality and weightings of the meters are assessed. The aim is to make changes so that they are adjusting the measurement system to guide the action to implement the strategy and goals. (Ruoho 2018) The KPI criteria and their weights for the SAKE performance measurement system, built for the target company, are in the Attachment 5.

5.8.4 Questionnaires as Indicators of Quality Management System

In connection with the quality management system, templates of questionnaires, which are described as KPIs in the description of the target company Administration process (Chapter 5.5.6), are constructed in connection with this study and will be deployed when implementing the quality management system. The questionnaire design is based on discussions with the target company contact person and the sales manager of the customer company.

1. Customer survey after a maintenance visit or project ends (the model in Attachment 1)
2. Inquiry from service technicians after maintenance or project completion (the model in Attachment 2)
3. Question radios by function in The Target Company (the model in Attachment 3)

4. Customer Satisfaction Survey once a year (Car Wash Entrepreneurs and Chains) (the model in Attachment 4). (Interviewee 1; Interviewee 2)

5.9 Document management and The Quality Manual

The Quality manual version 1, built on the target company in relation to this study, is in electronic form and can therefore be easily updated and accessed wherever necessary. The Quality Manual works as a description, frame and determinant of the quality management system of the target company. The quality manual is linked or directed to electronic files and archiving as well as to another database of the target company.

The Quality Management System of the target company is part of the enterprise resource planning system (NAV-ERP), which has a customer relationship management (NAV-CRM) section. Reporting, archiving, and recordings are described in the process description of the target company. The system includes a Share Point document archive in the target company's extranet. The system's Share Point repository contains documents, forms, instructions, and web-based remote access to work in the field. (See Chapter 5.8.1.)

The documentation is accompanied by protocols and notes of internal meetings related to the quality management system and notes of remedial measures (continuous improvement). In addition, records and documents about internal audits, management quality management reviews, and audits by an external auditor are recorded. The person in charge of the Quality Management System of the target company is responsible for the up-to-date (additions, deletions and updates) of records, links and documentation, as well as for guidance and communication to the organization. Simultaneously, updates to the Quality Manual must also be made. (See Chapter 3.7.)

6 CONCLUSIONS

6.1 Conclusions on the study and the results

When doing the study, the structure and related issues of the quality system are clarified and the application of the target company's goals and uses is structured. Quality is the result of the work and thus indirectly measurable and analyzable as a basis for continuous improvement. The company's quality is technical, functional and internally and externally defined by the smoothness and reliability of the co-operation.

The ISO 9001 standard and its criteria and definitions are the basis for the construction of the quality management system itself. In keeping with the criteria mentioned above, a good quality management system must be built and adapted to the activities and objectives of the target company. The existing system of the target company must be parallel to the quality management system and, if necessary, updated.

Thematic interviews and discussions are conducted with the contact person of the target company and the sales manager of the customer company as a data collection method. The thesis investigated what qualitative factors may improve it's business. The researcher has some practical work experience and a deeper insight into the car wash business through project work, which helped in the analysis and application of strategy and interview materials. This view also helped in defining the quality management system as the work progressed. The most work and time required to determine the cause and effect of processes. In practice, the author of the study compiled the work completely independently.

The Target Company's Quality Management System Model and Principle for this study is constructed based on the requirements and principles of the ISO 9001:2015 standard, utilizing the Enterprise Resource Planning (NAV-ERP and NAV-CRM) processes used in the Target Company. (See Chapter 5.8.1.) The Quality Management System's measurable processes and their performance indicators (KPIs) are selected according to the criteria set for those that, through improved quality and efficiency of their operations, are most effective in producing better results. As a complementary measure and tool, a Balanced Scorecard, a SAKE built-in performance analysis system and questionnaires (Attachments 1-4) are added

to the target company's quality management system. (See Chapter 5.8.2, Chapter 5.8.3 and Chapter 5.8.4.)

The target company's ERP system, NAV-ERP, is a significant part of quality management, process-oriented and provides the necessary information for management and process management for the quality management system. (See Chapter 5.8.1.) As part of this system, the customer relationship management system NAV-CRM, as well as the balanced scorecard, the SAKE performance measurement system, questionnaires and the quality audits and surveys in pen and paper or mobile applications, are included as part of the system. The SAKE performance measurement system was built for the target company as a project work in connection with studies of the author of the study (Ruoho 2018).

The choice of measures with all the tools mentioned is based on a process-based principle and is based on the Critical Success Factors of the target company. (See Figure 14 and Chapter 5.5.) The process feature defined by the ISO 9001 standard is realized in practice by describing the processes of the target company and their metrics. The interaction between the target company's processes is described in Chapter 5.6 and the description of the principle in Figure 6. The output of the previous process can be the input of another process. A total of 22 KPIs are selected for nine processes of the quality management system, so the number of processes and meters is effectively manageable in practical operation. Laamanen (2005, 297) identifies the risks of process management as the inability to identify and distinguish between core and support processes, too many processes (over 20).

The Supply, which is a product and service package, consists of hardware, systems, and service segments and contracts at the Target Company. In the case of the target company, The Supply is in the lifetime (5-10 years) of the entire delivery and installation cycle and aftersales. The model of The Quality Manual structure and the starting point is taken from the SFS ISO 9001:2015 standard. The Quality Manual for the Quality Management System of the target company (Attachment 8) is attached to this study. The Target Company's Quality Manual consists of electronic recordings and related sections and links through the links and operating instructions to the target company's ERP system for monitoring and reporting as well as their use. Some of the recordings are in other systems and records of the management of the target company.

The first step in implementing the system is to ensure the commitment of the company's management. The role of the person responsible for maintaining the system is very important, both in the design, implementation, and later stages of use. Training, orientation, guidance and information on the implementation phase for those using the system must be thoroughly managed and a good foundation created. There is a risk of system downtime after start-up, so system updates and running are the key priorities of the responsible person. Reporting monitoring, communication and up-to-date record keeping as well as updates to the Quality Manual are the things that are constantly being managed. In addition to use and availability, the responsible person is responsible for coordinating system audits.

Ensuring validity in the use of Quality Management System, customer satisfaction of Customer Companies and Target Company Personnel Satisfaction are selected as measurable issues to ensure validity. A customer feedback questionnaire (mobile or form) is made after each maintenance and repair visit. The actual customer satisfaction survey is conducted once a year, as well as a personnel satisfaction survey. Conducting studies must be well prepared and communicated, and an open atmosphere must be ensured in order to obtain honest assessments. Ensuring Reliability means that improving qualitative results should be reflected in the improvement of quantitative results.

6.2 Answers to The Research Questions

How to improve the target company's enterprise resource planning from quality aspect (by using quality management system) and converting quality to better profit?

Enhanced measurement of effectiveness and performance increases awareness, which is the first condition for improvement. Process-based operations, the identification of critical success factors and continuous improvement are the basic elements of quality management. Through systematic activity, good quality and customer satisfaction are achieved, thus ensuring continuity and better results. (See Chapter 3.3, Chapter 3.5, Figure 6 and Figure 10.)

The focus of this study is on installation and projection processes, which have a major impact on the quality and profitability of the target company. (See Chapter 5.5.1 and Chapter 5.5.2.) The Real Cost of the Project vs. The Budget and The Real Project time versus The Plan are chosen as the quality management system metrics for installation and projection processes to improve project profitability and customer reliability. They also should contribute to better resource planning and predictability.

Measures of work efficiency are selected as indicators of the maintenance process as ratio of driving hours, waiting hours and overtime work versus the plan should improve resource utilization and planning, and profitability. (See Chapter 5.5.3.) Response time monitoring will probably improve customer reliability, as well as the smooth running of the customer's business and thus profitability. Customer company confidence is directly reflected in better opportunities for continuity in the customer relationship. The delivery assurance, chosen to measure the material process in the system for the delivery of car wash equipment and spare parts, should improve customer satisfaction and customer company's performance. It's supposed reduce the loss of revenue to the customer company caused by downtime and potential compensation costs from the target company to the customer company. Optimal inventory rotation should improve the profitability of the target company and reliability towards the customer company. Minimizing losses as well as contractual billing speeds is supposed to improve the profitability of the target company.

The profitability of projecting process, as a part of the sales process, directly impacts the target company's performance. (See Chapter 5.5.5.) The number of offers and customer contacts versus the plan reflects the activity of sales and the increase in sales opportunities. The profitability of the maintenance and car wash chemical sales are chosen as a measure of the administrative process may affect the target company's earnings. (See Chapter 5.5.6.) The Uptime and First fix (maintenance level meters) and customer satisfaction measurements should improve reliability, performance and profitability. Measuring employee satisfaction should improve resource efficiency and performance.

How to engage the staff for creating better quality?

Awareness of the results of the action and the work itself and the factors that affect the results should improve motivation and direct the action towards the target. Remuneration (tangible

and intangible) and development opportunities in the target company may increase motivation.

The key principles of ISO 9001:2015 include management's commitment to quality improvement through a quality management system and ensuring staff competence and commitment at all levels (SFS-EN ISO 9000 2015, 8-14; Wilson & Campbell 2016, 829-844). The quality management system raises awareness of the goals set and the results achieved already during the processes. It participates and enables participation throughout the organization. In addition, communication within the organization improves, which improves collaboration and efficiency between different processes. (Nanda 2005, 20-21)

It seems, that understanding the cause-and-effect relationships of an organization's processes and the interaction between processes should help staff become aware of their work as part of the overall process. An understanding of the whole guides operations towards self-direction as desired by the company. (See Chapter 3.3 and Chapter 5.6.) Evaluations and comments from service technicians and customer companies on installation and maintenance processes should improve process quality and performance. (See Chapter 5.5.1 and Chapter 5.5.3.) Self-evaluation is supposed to enhance self-steering. Discussing evaluations with staff at weekly meetings is a great way to communicate, guide and engage.

Rewarding employees based on personal performance and the success of the company is a commonly used management and motivation tool. The reward criteria must include concrete, measurable personal goals and goals common to the entire organization in terms of the overall goal. (Liinalaakso et al. 2016, 15; Kaplan & Norton 2007, 190. 301) The Key Indicators of reward are the same as those chosen for the quality management system, that they direct the action towards achieving the goals.

As part of the administration process, employee satisfaction surveys in the target company are conducted once a year. It provides up-to-date information on staff motivation for work and proactive information on sustainability. In addition, motivational leadership, proper and planned training and communication are key factors in guiding staff towards better quality. Properly implemented, rewarding will probably increase employee motivation and self-direction as well as the profitability of the target company. (See Chapter 5.5.6.)

How to increase the performance of the company and improve the profitability of processes?

An established saying is what is being measured is interested in it. Initially defining the processes and then their internal Key Performance Indicators (KPIs), are reached the development of performance already in the early stages of the processes. This ensures the best possible direction. Through common awareness and development, cooperation is improved inside teams and interacts with other teams, while improving continuity. Operational efficiency means at least better quality and productivity with the same cost structure. (See Chapter 3.4 and Chapter 5.5.) Subchapters Chapter 5.5.1, Chapter 5.5.2 and Chapter 5.5.3, where are selected Key Performance Indicators guide the field of installation and maintenance service technicians in a more productive way.

In order to determine the critical success factors and Key Performance Indicators of the processes, the factors leading to the desired end result must be identified. The Key Performance Indicators should be deliberately distinguished from the Key Result Indicators. The next step is to determine the correct measurement criteria and measurement frequencies for the success factors. Meters must be easy to understand and the means of influencing results must be in place to direct them to self-steering. (Parmanter 2015, 1-5)

In this study, the ratio of driving hours, waiting hours, spare parts retrieval hours, and overtime work hours versus plan are chosen as the measure of work efficiency in the maintenance and installation processes. These are the factors that should drive better performance. Improved Response Time Tracking will increase the reliability of the target company in the eyes of the customer companies, should improve the profitability of the customer company and the quality of customer service for the end-user who is washing his car. In the longer term, improving the reliability of operations is likely to affect the target company's profitability through the continuity of customer relationships. (See Chapter 5.5.1 and Chapter 5.5.3.)

How to pay attention to changing operational environment?

Keeping the focus all the time in producing good functional quality and hence in productivity, anticipates future changes and is ready for them without major separate change processes. Commitment and self-directed are key factors in responding to the increasing competition and the changes it has brought. The changing operating environment is taken into account through continuous improvement of the quality management system processes. The basic principle of defining processes is customer orientation. Interaction relationships and value-generating success factors are defined for processes. Measuring, developing sub-functions and streamlining processes will improve processes. In accordance with the principle of continuous improvement (see waterfall model), changes in customer requirements and other circumstances, or foreseeable, are already measured, analyzed and responded to during the process (Summers 2005, 211-212; Kruchten 2003, 60-61, 76). (See Chapter 3.3 and Chapter 3.5.) Quick responsiveness already in the process is something that the target company should be aware of. It requires sufficiently frequent measurement frequencies, continuous analysis as well as operational powers and expertise.

Customer satisfaction survey once a year for car wash entrepreneurs and chains (Attachment 4), which is under the responsibility of the Administration process, provides information on how customers and customer companies react to the activities of the target company. (See Chapter 5.8.4 and Chapter 5.5.6.) Feedback after installation, projection and maintenance projects (Attachment 1), as well as daily interactions provide information on changes in the market and customer intent. (See Chapter 5.8.4.) Analyzing and quickly reacting to a measurement of a quality management system is paramount. Market analyses performed by strategy processing indicate changes in the competition situation. The Stakeholder Process maintains a risk management report that the management is able to react to changes. (See Chapter 5.5.7.)

6.3 Follow-up measures and remarks regarding the introduction of QMS

When the system's pilot phase of about six months is over, it is recommended for the organization to execute a survey for users (Attachment 6), as well as for the target company's management. Over again after year of operating period, for the same target group. After

about a two-year start-up period and management audits, the target company will make decisions about applying for a possible ISO 9001 certification. One of the most important factors is the commitment of the management of the target company to the implementation of a quality management system and its demanding temporal and financial resources. In order to ensure the successful implementation of the Quality Management System of the target company, templates are created for user queries for the pilot phase (pre-pilot and after 6 months and 12 months of use). These surveys will examine the current situation in terms of resources used and benefits achieved. (Attachment 6)

As an alternative to certification, the organization may declare itself that the Quality Management System conforms to standard 9001:2015 (SFS 2017, 99). Regardless of whether the organization is applying for certification, implementing a quality management system will benefit the organization in terms of improved processes and improved quality (SFS 2017, 15). The development idea for the target company is to exploit the quality management system as a tool for performance-based recruitment (professionalism, attitude, social characteristics) built with performance evaluation and measurements help to improve the success of personnel choices and at the same time increase the level of systematic planning of service-specific training and development. If the employee feels right and the company takes employee's development into account, the commitment should be improving and the staff turnover should decrease. At the same time, the corporate image should improve as quality improves and positive messages increase.

The risks and opportunities are defined for the implementation of a quality management system. An article by Ingason (2014, 199) on a survey conducted by ISO 9001 certified organizations in various fields in Iceland shows that implementing a quality management system from deployment to certification took more time than expected. The average time for organizations that had implemented a deployment plan, including internal costs, was 13 months. For those implementations without a precise and budgeted plan, the average time was 24 months. In summary, good preparation for implementation, including budgeting, organization and responsibilities, and direct employee involvement are key to success. [Although the study described in Ingason's (2014) article has been conducted for different organizations, it can be concluded that, in general, the same things to consider, such as human engagement, available time, and cost, are repeated in deployment.]

Fonseca et al. (2017, 1-6, 14) presents a research article based on globally compiled scientific publications on quality management system certification. The study collected overall marks for published estimates of the benefits of quality management system certification. In the ISO 9001:2015 Certification Scoreboard, 10% of the evaluations showed no evidence of a positive impact, 59% of the evaluations showed 25% of the benefits achieved, 20% of the evaluations 50% success, 10% of the evaluations 75% success and 1% of the evaluations 100% success. [The benefit of actual certification is clearly achieved if its existence is required by the target company itself. However, under no circumstances will genuine results be achieved without a well-functioning quality management system actively used for continuous improvement.]

Quality Management system certification is always a case-by-case solution. Reasons for Certification in Multimäki's Dissertation Research (2009, 28), with reference to (Carlsson & Carlsson 1996, 39; Lipovatz et al. 1999, 533; Yahya & Goh 2001, 942-943), split into external (customer requirements and marketing factors) and internal reasons (performance improvement through quality system). In summary, Multimäki (2009, 31) states that internal reasons for a quality management system are a much better starting point than a process initiated for external reasons. [Multimäki's (2009) study confirms the importance of management commitment. It is emphasized as a genuine goal of quality improvement, securing resources and leading the process. It seems that a quality management system based on marketing alone, without the internal will of the organization and the resources to improve quality, will not produce good results in the long run.]

Too short a preparation period for a quality management system and a lack of resources before certification is considered to entail the risk of seeking only a minimum system (Lipovatz et al. 1999, 540). In addition, focusing on work processes rather than business processes is the reason for the failure of quality management development in companies (Hoyle 2001, 122). Juuti (2015, 39) criticizes, that the use of a quality management system, especially in the implementation phase, can take too much time and focus from customer service and development. [Well executed advance planning and clear responsibilities as well as management involvement help keep the focus on the day-to-day operations and system operation accordingly. The initial phase is the most critical here.]

Corporate management commitment is a prerequisite for employee engagement and thus a prerequisite for successful system implementation (SFS-EN ISO 9001 2015, 13). In the worst-case scenario, employees do not recognize that they are part of the process or know the whole (Moreno-Mas et al. 2014, 50). Rewarding personnel in the right direction acts as a motivator and a commitment. (See Chapter 3.1 and Chapter 3.4.)

6.4 End Conclusion of The Study

In conclusion, the objective set out in Chapter 1.2 of this study, the ISO 9001:2015 Quality Management System Plan, tailored to the needs of the Target Company, has been achieved. “The purpose of the work was to design a quality management system in accordance with the ISO 9001:2015 standard, which will enable the target company to deploy and implement the system.”

7 SUMMARY

As a result of this study, an ISO 9001:2015 Quality Management System for the target company providing car wash equipment, car wash chemicals and maintenance services was prepared for the pilot and implementation phase. The Quality Management System is built within the framework set by the standard, tailored to the needs of the Target Company and suitable to operate in conjunction with an existing management system with The Enterprise Resource Planning and The Customer Relationship Management. The implementation of the Quality Management System will be carried out by the Target Company as the next step.

The management of the target company will decide on any certification after the testing phase and the internal audits. In order to understand and define the operation and impact of business processes and the process metrics, practical work and the market situation were studied quite extensively. The supply of the target company (product and services) consists of a complex entity. Car wash equipment and car wash chemicals as products contain functional as well as marketing elements. The target company's service consists of installation, maintenance, training and consulting under various contracts. The study was curbed so that greater emphasis was placed on the installation and maintenance processes, which have the most significant impact on the target company's performance. Due to the distance of the field work, the circumstances and the diversity of operations require service technicians to be multi-skilled and have operating management systems at their disposal. Developing the work guidance and self-direction of field service technicians were key elements in this study.

In connection with the study, the processes of the target company were described and the critical success factors that most influenced their quality and performance were identified, as well as the key indicators and measuring frequencies. Organizational processes interact with each other. In supply chains, the result of one process may be the input of another. In integrated supply chains, where an organization's inputs can come from another organization's processes, addressing them successfully improves entity management. A process model produces an output that consists of the input of a process and the sum of the resources added to the process. The efficiency and effectiveness of the processes is achieved by the principle of continuous improvement, represented by the Plan-Do-Check-Act

(PDCA) model. One of the key concepts of ISO 9001:2015 Quality Management System is Risk Based Thinking. It involves identifying and understanding the risks associated with an organization and its operations. Identified risks can be anticipated and, in some cases, used as an opportunity.

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Interviews:

Interviewee 1. Lasonen, Jyrki, Project Director. Prowash Oy (Target Company of the Study), Vantaa. Three interviews in Vantaa and complementary discussions, June 2017 – October 2018, interviewer Joonas Ruoho.

Interviewee 2. Ruoho, Tauno, Car Wash Sales Manager. Kesko Oyj (Customer company of the Target Company) Helsinki. Two interviews in Espoo and complementary discussions, June 2017 – October 2018, interviewer Joonas Ruoho.

ATTACHMENTS

Attachment 1. Customer survey after a maintenance visit or project ends (model)

Customer survey immediately after service visit or after completion of project (for example device installation) on PC or mobile

- The arrival of the service installer or the start of the project was duly pre-agreed and reached on schedule to initiate.
- The work proceeded on schedule and not, for example, delays in the intake of spare parts.
- The work came into shape at once.
- The service mechanic kept the customer informed of the situation and adequately informed (start, interim, end).

Scale 1-5 (normal level 3)

Free comments:

Attachment 2. Inquiry from service technicians after maintenance or project completion (model)

Query service installers immediately after completing a work (PC or mobile)

1. The arrival of the service installer or the start of the project was duly pre-agreed and reached on schedule to initiate.
2. The work proceeded on schedule and not, for example, delays in the intake of spare parts.
3. The work came into shape at once.
4. The service installer thinks that the customer was kept informed of the workflow with the timetable (start, interim, end)
5. The customer was receptive to the information and the co-operation

Scale 1-5 (normal level 3)

Free comments:

The result is better customer satisfaction (car wash entrepreneur, consumer customer). The customer company's trust in the target company increases and the profitability of washing operations improves.

Attachment 3. Question radios by function in The Target Company (model)

Question radios by function (once a year):

The task of better quality is to achieve better productivity for both the target company and the customer company. Ensuring continuity and a better service for consumer customers.

Administration Process / Economy, sales, marketing, human resources management, financial management

Effectiveness of meeting practices

- How do I experience our meeting practice in terms of time and other efficiency?

Clarity of reporting and documentations

- Are our reporting and internal documentation clear in terms of operational guidance?

Clarity and functionality of organisation

- Is the task division clear and the work descriptions clear and meet the objective?

Communication and information flow

- Does communication between departments and parties work smoothly?
- Is adequate and correct information at my disposal?

Distractions

- Are there any distractions that hinder the achievement of the objectives?

Attitude

- What factors could increase the productivity of our operations in terms of the team's potential for greater unity and attitude?

Good and functional practices in our Organization

- What would I not change in our practices?

Suggestions for improvement and ideas

- Which would directly or indirectly improve the quality and results of our operations?

Free comments:

Sales Process

The functionality of the sales and ordering process

- Comment on the functionality of the sales and ordering process

Scheduling and anticipating

- How would you improve predictability and therefore scheduling?

Clarity of reporting and messaging

- Are we reporting and communicating clearly in terms of operational guidance?

Clarity and functionality of organisation

- Is the division of the task clear and the work descriptions clear and meet the objectives?

Communication and information flow

- Does communication between departments and parties work smoothly?
- Is adequate and correct information at my disposal?

Distractions

- Are there any distractions that hinder the achievement of the objectives?

Attitude

- What factors could increase the productivity of our operations in terms of the team's potential for greater unity and attitude?

Good and functional practices in our Organization

- What would I not change in our practices?

Suggestions for improvement and ideas

- Which would directly or indirectly improve the quality and results of our operations?

Free comments:

Material Process (Warehousing and Logistics)

Inventory Tracking Policy Fluency

- Are there any tools, guidance and competence in order for inventory monitoring?

The success of anticipation (not for long-term stock-standing stuff or, on the other hand, not too many emergency delivery situations)

- How do you experience our success in optimizing inventory for business and on the other costs?

Clarity of reporting and messaging

- Are we reporting and communicating clearly in terms of operational guidance?

Clarity and functionality of organisation

- Is the division of the task clear and the work descriptions clear and meet the objectives?

Communication and information flow

- Does communication between departments and parties work smoothly?
- Is adequate and correct information at my disposal?

Distractions

- Are there any distractions that hinder the achievement of the objectives?

Attitude

- What factors could increase the productivity of our operations in terms of the team's potential for greater unity and attitude?

Good and functional practices in our Organization

- What would I not change in our practices?

Suggestions for improvement and ideas

- Which would directly or indirectly improve the quality and results of our operations?

Free comments:

Aftersales (maintenance and installation activities)

Fluency in the reception of tasks

- Is there an easy-to-use and smooth system of work reception?

Fluency and efficiency of the organisation of tasks

- Does work control and task sharing work for the smoothness and efficiency of the work?

Predictive action

- Where possible, do we perform maintenance and repair work in anticipation and future downtime?

The fluency of spare parts logistics

- Are the spare parts right at the right place? Are there any downtime or waiting situations?

Communication and information flow

- Does communication between departments and parties work smoothly?
- Is adequate and correct information at my disposal?

Disactions

- Are there any distractions that hinder the achievement of the objectives?

Attitude

- What factors could increase the productivity of our operations in terms of the team's potential for greater unity and attitude?
- What is the importance of experiencing customer encounters and communication with the washing station representatives?

Good and functional practices in our Organization

- What would I not change in our practices?

Suggestions for improvement and ideas

- Which would directly or indirectly improve the quality and results of our operations?

Free comments:

Projecting (Construction, consulting, implementation of solutions)

Clarity of orders

- Are assignments clear and objective-understandable?

Clarity and functionality of organisation

- Is the division of the task clear and the job descriptions clear and meet the objectives?

Communication and information flow

- Does communication between departments and parties work smoothly?
- Is adequate and correct information at my disposal?
- Is the division of the task clear and the work descriptions clear and meet the objectives?

Distractions

- Are there any distractions that hinder the achievement of the objectives?

Attitude

- What factors could increase the productivity of our operations in terms of the team's potential for greater unity and attitude?

Good and functional practices in our Organization

- What would I not change in our practices?

Suggestions for improvement and ideas

- Which would directly or indirectly improve the quality and results of our operations?

Free comments:

Projecting (installations)

Planning, guidance, organisation (work, different activities)

- Do I have sufficient target-specific information and guidance in the installation projects?
- How is the organisation and arrangements of the workplace successful in our projects?

Keeping and Realising Schedules

- Are schedules installed in such a way that the desired end result is achieved?
- How do I experience the required flexibility and rhythms in the workflow?

Communication, information flow

- Does communication between departments and parties work smoothly?
- Is adequate and correct information at my disposal?
- Will the project feedback be carried out together (projects ' successes and improved issues)?

Distractions

- Are there any distractions that hinder the achievement of the objectives?

Attitude

- What factors could increase the productivity of our operations in terms of the team's potential for greater unity and attitude?

Good and functional practices in our Organization

- What would I not change in our practices?

Suggestions for improvement and ideas

- Which would directly or indirectly improve the quality and results of our operations?

Free comments:

Attachment 4. Customer Satisfaction Survey for car washing entrepreneurs and chains
once a year

(Grade 1-5) and on all points the possibility of giving free comments

The aim is to enhance and improve the service offered by the target company

Company Image:

Reliability as a device supplier:

Service level estimation:

Device Delivery level estimation:

Device Sales Level estimation:

Washing chemicals Level estimation:

Other services Level rating:

Cooperation and communication:

Further questions:

What is your customer relationship with the target company at the moment?

Which products or services do you purchase from the target company or its competitors?

On what basis do you choose Product supplier?

What do you think the strengths of the target company?

What are the main weaknesses of the target company?

How does the Advanced Service car wash partner work (what kind of services and products)?

Under what conditions would you choose the target company for your supplier/partner?

What else would you like to raise about the target company and its activities or car wash activities in general?

Rating (1-5) for the services of the target company's competitors (+ opportunity to provide free comments):

Car wash equipment

Maintenance and repair activities

Car Wash chemicals

Other services

Attachment 5. SAKE KPIs and criteria

INSTRUMENT CLUSTER FOR THE SAKE APPLICATION		
Allocation of criteria to sub-regions and their respective weightings (total 100%) and scaling (1-10 for scales)		
The norm targets are marked in yellow (Grade 8)/The aim is to limit the norm (Grade 10)		
1.	Customer satisfaction (car wash entrepreneurs) / weight value 40%	
1.a.	Customer Survey once a year / weight value 30%	
	Rating	Input value
	10	5,0
	9	4,2
	8	3,8
	7	2,8
	6	2,5
	5	2,0
	4	1,7
	3	1,0
	2	0,7
	1	0,3
	0	0,0
		Value on scale 1-5 (average of survey replies)
		Average value of 3.8 gives a rating of 8
		Measurement and upgrade System once a year (measurement by the target company)
1.b.	Significant customer complaints per unit delivery (pcs) / weight value 10%	
	Rating	Input value
	10	0/15
	9	0,1/15
	8	0,3/15
	7	0,5/15
	6	1/15
	5	1,6/15
	4	2/15
	3	2,3/15
	2	2,6/15
	1	2,8/15
	0	3/15
		Claim amount (value) per 15 device installation
		0.3 pcs claim value per 15 installs give a rating of 8
		Measurement and upgrade System 2 times a year (own assessment of the management of the target company)
2.	Personnel (service installers and subcontracting companies), operational reliability / weight value 30%	
2.a.	Sickness absence% (own service installers for the target company) / weight value 15%	
	Rating	Input value
	10	0
	9	1
	8	2
	7	2,6
	6	3
	5	3,4
	4	3,7
	3	4
	2	4,3
	1	4,8
	0	5
		Sickness absence hours per all working hours (%)
		2% value give a rating of 8
		Measurement and upgrade System 4 times a year (target company administration reporting)
2.b.	Situation resulting from the transfer or the special arrangements causing the installation time per all installations / weight value 15%	
	Rating	Input value
	10	0/15
	9	0,2/15
	8	0,5/15
	7	0,65/15
	6	0,8/15
	5	0,92/15
	4	2/15
	3	2,3/15
	2	2,6/15
	1	2,85/15
	0	3/15
		Costs-causing cases per 15 device installations (percentage effect)
		0.5 delay in installation or transfer from 15 to 8
		Measurement and upgrade System 2 times a year (own assessment of the management of the target company)
3.	Efficiency and effectiveness / weight value 30%	
3.a.	Cost of installations per installation operations' net sales (%) / weight value 8%	
	Rating	Input value
	10	5
	9	5,3
	8	5,5
	7	6
	6	6,4
	5	6,9
	4	7,4
	3	8
	2	8,7
	1	9,5
	0	10,5
		Criterion:
		2 installtors x 10 day x 8 h/day x 40 €/h (incl. sos. cost) = 6.400 € (100% in action)
		Hardware price installed €120.000 (= Net sales per installation)
		The above-mentioned norm value gives a rating of 8
		Measurement and upgrade System 4 times a year (from financial reporting of the target company)
3.b.	Maintenance costs per service charge (%) / weight value 8%	
	Rating	Input value
	10	50
	9	55
	8	60
	7	65
	6	70
	5	73
	4	77
	3	80
	2	86
	1	90
	0	100
		Criterion:
		Maintenance work costs per service charge (taking into account the level of activity)
		Estimates used 40 €/h work costs and 65 €/h charges
		The above-mentioned norm value gives a rating of 8
		Measurement and upgrade System 4 times a year (from financial reporting of the target company)
3.c.	Market share% / weight value 14%	
	Rating	Input value
	10	55
	9	52
	8	50
	7	45
	6	40
	5	35
	4	30
	3	20
	2	15
	1	10
	0	0
		Target company's target limit of 50% gives a rating of 8
		Measurement and upgrade System once a year (from industry statistics)

Attachment 6. Query templates for users in the implementation phase of the quality management system

Prowash Oy's representatives (estimates) regarding the implementation of a quality management system

The quality management system is a system that improves the company's function processes through measurements. Measurements and the resulting process healing reactions are guided by continuous improvement. The impact of the measures will be measured again after the next function period (frequency determined by the monitoring target). The basic principle is that the benefits provided by the system must be greater than the time spent and other committed resources. The results (benefits) are the improvement in the profitability of the processes (e.g. profitability of the installation projects) and improved customer satisfaction (customer companies and end-user customers).

The quality management system is designed to work as a tool for continuous improvement of the processes of the operational control system used by Prowash Oy, such as installation and maintenance processes.

Questions:

1. What are the challenges and threats in the introduction of a quality management system (start-up phase) and the use can arise (communication, information flow, trainings, orientation, resources, attitude, etc)?
2. What opportunities and benefits does the system bring in place? What advance wishes and conditions are set for the introduction and use of the system?
3. How should the deployment and implementation of the system be carried out in practice and what matters should be strictly taken into account (induction, training, meetings, information, etc)?

4. The goal of using the quality management system is defined as the improvement in the profitability of the installation projects, customer satisfaction and the self-directed field work. What practical aspects can or will be hindered or promoted in the future?
5. How do you define your own engagement rate (scale 1-5; 5 highest degree) for the introduction of a quality management system?
6. Give still free comments and ideas.

Answer directly to this bottom and return via email xx.xx@xx no later than xx.xx.

Prowash Oy's representatives in relation to the quality management system in the pilot phase (this questionnaire is made to users 6 months and 12 months after commissioning)

The quality management system is a system that improves the company's function processes through measurements. Measurements and the resulting process healing reactions are guided by continuous improvement. The impact of the measures will be measured again after the next function period (frequency determined by the monitoring target).

The basic principle is that the benefits provided by the system must be greater than the time spent and other committed resources. The results (benefits) are the improvement in the profitability of the processes (e.g. profitability of the installation projects) and improved customer satisfaction (customer companies and end-user customers).

The quality management system is designed to work as a tool for continuous improvement of the processes of the operational control system used by Prowash Oy, such as installation and maintenance processes.

Questions:

1. What are the challenges and threats in the introduction of a quality management system (start-up phase) and the use can arise (communication, information flow, trainings, orientation, resources, attitude...)?
2. What opportunities and benefits does the system bring in place? What advance wishes and conditions do you set for the use and exploitation of the system as an operational development tool?
3. How to implement the system and implementation to date (induction, training, meetings, information, user experiences...) and what should be strictly considered and what remedial measures could be taken Postpaid (onboarding, training, meetings, information...)?
4. The goal of using the quality management system is defined as the improvement in the profitability of the installation projects, customer satisfaction and the self-directed field work. What practical aspects can or will be detrimental to the achievement of these objectives at present or in the future?
5. How do you define your own engagement rate (scale 1-5; 5 highest degree) for the introduction of a quality management system?
6. Give still free comments and ideas.

Answer directly to this bottom and return via email xx.xx@xx no later than xx.xx.

Attachment 7. Interviews' theme frame (replies recorded as freeform text and then assembled to work)

- Characteristics of the target company
- Characteristics of the car wash sector
- Customer company's expectations and comments
- Process definition and descriptions
- Success factors for processes (performance enhancing factors)
- Meters for processes (KPIs) and measurement frequencies
- Response to performance measurement results
- Interaction relationships between processes
- Process-specific risks and opportunities
- Additional comments and remarks

Interview schema is used to determine QMS process descriptions and configurations for the target company.

This frame was used both in interviews and discussions with the contact person of the target company (Interviewee 1) and the customer company's sales manager (Interviewee 2). With the target company's representative, strategic plans for the target company and the description of the governance model and processes were used as support material.

Attachment 8. Quality Manual for The Target Company, version 1.



QUALITY MANUAL for Prowash Ltd (version 1)

Joonas Ruoho

CONTENTS

1. Introduction
2. Scope of the Quality Manual (activities and limitations)
3. Management Responsibilities
 - 3.1 Responsibilities of the Target Company's organization
 - 3.2 Vision, Business Idea and Quality Policy
4. ISO 9001:2015 Quality Management System
 - 4.1 Description of Target Company's main processes and the measurements chosen for them
 - 4.2 The interaction between Target Company's processes
 - 4.3 Defining Critical Success Factors and Key Performance Indicators
5. Resources
 - 5.1 Training Data
 - 5.2 Information and description of the quality management system's work instruments of the target company
6. Corrective and Preventive Measures
7. Document Management
 - 7.1 System Guidance
 - 7.2 Work Instructions
 - 7.3 Memos of Audits and Meetings
8. List of Abbreviations used

1. Introduction

This Quality Manual serves as a guide and framework for the Quality Management System of the target company. The responsible person designated by the target company is responsible for updating the quality manual. This Quality Manual, with the changes made after piloting and deployment, is stored electronically in a file defined by the target company, from which it is also available remotely.

2. Scope of the Quality Manual (activities and limitations)

The quality management system is built to control the main processes of the target company and to improve the quality and profitability of operations. The main processes are defined as the four main supplies of the target company: marketing, sales, installation and maintenance. Management and administration act as their support processes.

3. Management Responsibility

3.1 Responsibilities of The Target Company's organization

	Chain customers	Merchants owning the property	Car dealerships	Investors
Sales (3 people)	Sales	Sales	Sales	Material operations and economy (3 people)
Projection (3 people)	Projection	Projection	Projection	Material operations and economy
Maintenance (11 people)	Maintenance	Maintenance	Maintenance	Material operations and economy

3.2 Vision, Business Idea and Quality Policy

Quality Policy

- The quality policy of the target company is a combination of business idea and vision.

The Business Idea of The Company

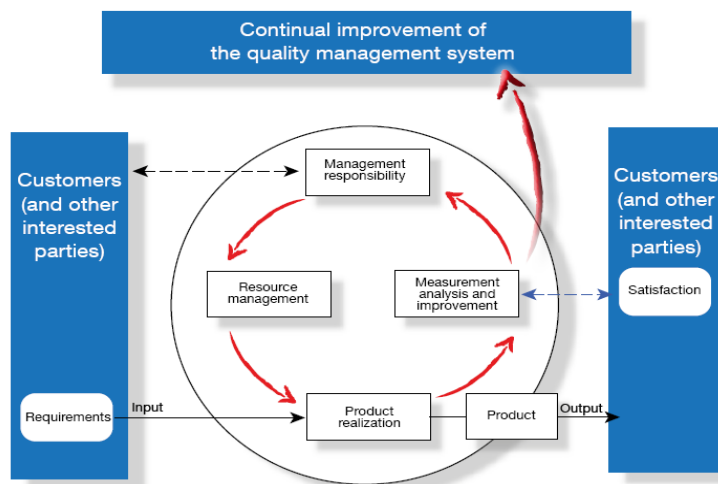
- The company's business idea is to create successful car wash operations for its customers with advanced service solutions and the best customer service.

The Vision of The Target Company

- The goal of the target company is to be leading supplier in the car washing machine market in Finland.
- The target company offers the best products, the best range of services and the best customer service.
- The target company provides the best overall solution for the customer on the market.
- The target company has satisfied customers who at the end of the current device life cycle they want to acquire a new device from the target company.
- The business processes of the target company are efficient and are reflected in the quality of the service.
- The target company staff is satisfied with the workplace and the target company is the desired employer.
- The profitability and liquidity of the target company are good and the target company is solid.

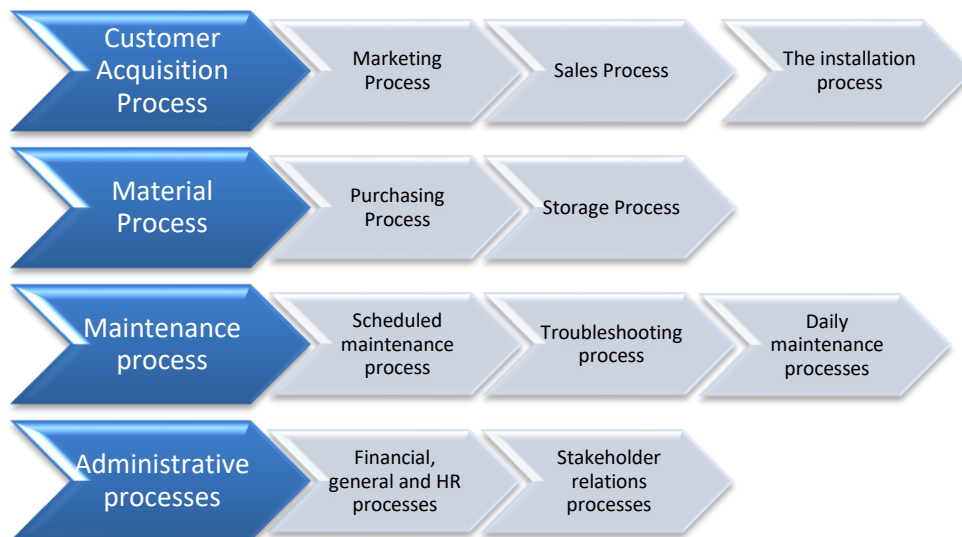
4. ISO 9001:2015 Quality Management System

Efficiency and improvement can be understood as a cyclical process. This process utilizes the components of a quality management system when analyzing data and thereby enables the process to guide changes and initiatives and thereby ensure continuous improvement of the system. This creates a forward-looking approach to meeting the goals and customer needs.



4.1 Descripton of the Target Company’s main processes and the measurements chosen for them

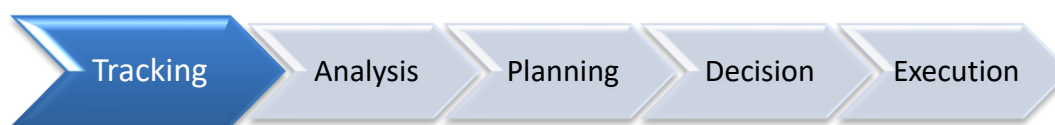
This section is associated with process diagrams as an overview. More specifically, the processes with measurements, corrective reactions and data storage descriptions are in the Process Description of the target company.



The Material Process

The Key Performance Indicators (KPIs) of the material process are:

1. Delivery reliability in sales and purchasing, for which the metrics of the target company's material management are obtained once a month, and the set target is used as a benchmark. As a result, improved security of supply increases customer satisfaction.
2. Losses for which measurement values are obtained once a month from the financial management of the target company and the target is used as the benchmark. As a result, the reduced loss will improve the result of the target company.
3. Wrong deliveries in sales and purchasing, for which metrics from material management are obtained once a month, and the set target is used as a reference. The result is improved target company profitability.
4. Inventory rotation, for which metrics from financial administration are obtained once a month, and the set target is used as a reference. Improved inventory rotation improves the profitability of the target company.
5. Billing rate for which metrics and comparison figures are obtained from the financial administration. Improved billing speed increases the target company's profitability.



The Administration Process

The Key Performance Indicators (KPIs) of the administration process are:

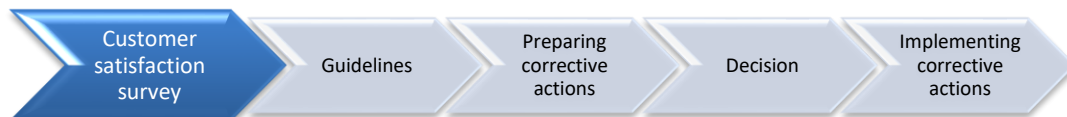
1. Profitability of projects, for which measurement and comparison figures are obtained once a month from the management of the target company. As a result of the improved profitability of the projects, the result of the target company is improving.
2. Profitability of service and chemical contracts, for which measurement and comparison figures are obtained once a month from the management of the target company. As a result of the improved profitability of the contracts, the result of the target company is improved.
3. Profitability of car wash chemical contracts, for which measurement and comparison figures are obtained once a month from the management of the target company. As a result of the improved profitability of the contracts, the result of the target company is improved.

4. Personnel for whom measurement and benchmarking results are obtained once a year from the employee satisfaction surveys conducted by the target company (scale 1-5; normal level 3). Improved job satisfaction improves the profitability of the target company.
5. Service level measured results twice a year from Target Company's customer-specific Uptime (Response time) and First Fix measurements. improving service levels increases customer satisfaction and thus the profitability of the target company.
6. Customers whose measurement results are continuously measured from customer companies via mobile or PC application and after installation and maintenance visits or projects, and separately once a year (scale 1-5; normal level 3). Customer satisfaction improves competitiveness and hence profitability



The Marketing Process

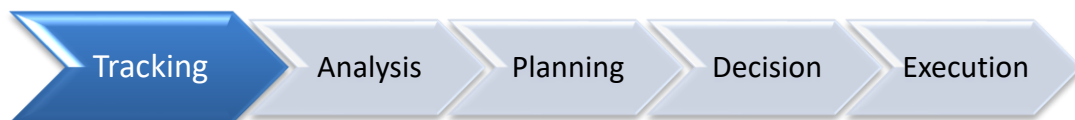
The Key Performance Indicator (KPI) in the marketing process is a customer satisfaction survey that is performed once a year on a scale of 1-5 (normal level 3). The customer feedback questionnaire is performed after each installation, projection, and maintenance visit. Similarly, the service mechanic gives own feedback after completing the work. Improved customer satisfaction increases the profitability of the target company.



The Sales Process

The Key Performance Indicators of the sales process (KPIs) are:

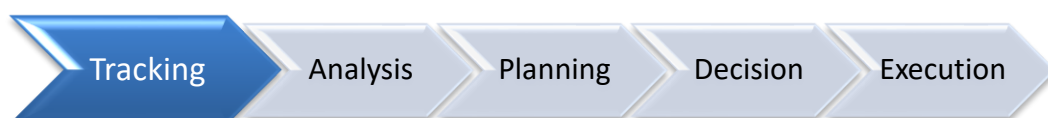
1. The number of bids made and the actual percentage for which the measurements are obtained from the administration of the target company and the reference figures for the targets set once a month. The number of offers increases success and thus the competitiveness and profitability of the target company.
2. Project Coverage versus Budget, for which metrics are obtained from the financial management of the target company once a month. Improved project profitability increases the profitability of the target company.
3. Number of customer contacts versus plan. Active customer contact improves the chances of a good sales result.
4. New customers versus lost customers describes sales performance.



The Installation Process

The Key Performance Indicators (KPIs) of the installation process are:

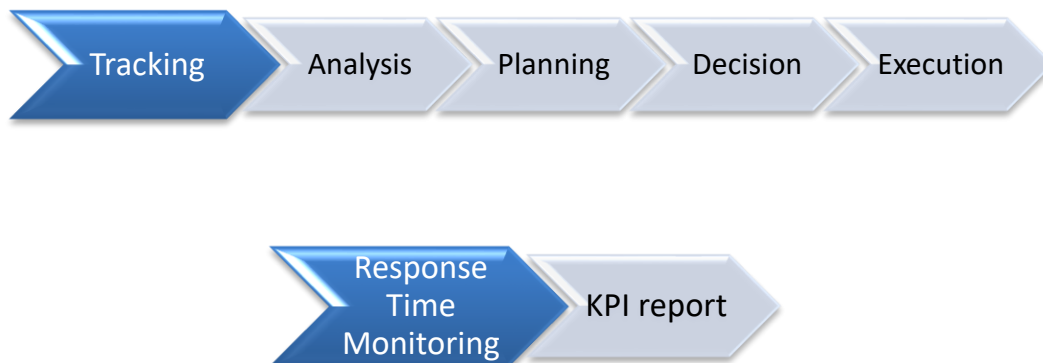
1. the cost of the project vs. the budget
2. Project schedule (project time) versus plan, for which the metrics are obtained from the financial management of the target company once a month. The selected KPIs will result in a better profitability of the installation process. Better process-specific profitability increases the profitability and competitiveness of the target company.



The Maintenance Process (equipment service) (The metrics include customer base, project tracking, quotation base and open washing machine sales deals)

The Key Performance Indicators (KPIs) for the maintenance process are:

1. Efficiency of work control, including billed hours versus total hours (ratio of driving hours, waiting hours, spare parts retrieval hours, hours worked and overtime work hours), which are measured once a month by the management of the target company and counterparts from targets. More efficient project and job management increases the target company's profitability.
2. Response Time Tracking, for which metrics are obtained once a month from the target company administration. Improved response time increases customer satisfaction and thus the competitiveness of the target company.



Quality of Operations

The quality of the operation at the washing station includes a quick audit during the maintenance visits and reporting to the customer company (critical attention to the operation in particular). The Criteria for Quality of The Operations are that general look and feel is good, washing machine is clean, washing hall is clean, there is no extra stuff in the washing hall, waiting line and run-in is clean, technical condition of washing is neat, washing signs and marketing material are in a good condition and emergency telephone numbers displayed in the washing hall.

Technical Quality

Initially, the factors relating to the technical condition monitoring of a car washing plant are discussed. These include: 1. The total number of washes of this device, the time of purchase and any renovation work carried out. 2. Outdoors and the need to upgrade. 3. Faults and estimate the duration and cost of repairs. and 4. Repair critical assessment.

Maintaining and improving technical and operational quality enhances the productivity, reliability, and thus customer satisfaction of the washing business (car wash entrepreneur and consumer customer of the target company)

Determination of Washing Machine and Technology

Subsequently, the factors related to the inventory of the washing halls and washing technology are discussed. These include the condition of wall and ceiling materials, condition of the floor material, ventilation and heating (technical condition, capacity adequacy), condition of the doors and functioning, condition of the luminaires, separation alarm function, performance of the sloping heater, visual inspection of separators and in particular sand separator, the protection pool for chemicals, signs for car wash and the lamps must be intact.

The Strategy Process

The management reviews the strategy in relation to the annual plan, organizational chart, process descriptions and job descriptions. The management also makes strategic review based on market analysis.



The Stakeholder Process

The sub-processes of the stakeholder processes are:

1. The risk management process, which includes risk mapping and the risk management plan based on it.
2. The social process that follows the legislation and notifications according to its requirements, which includes employment contracts, training plans, development discussions, safety committee matters, commission and incentive issues, and vacation arrangements.

Stakeholder process issues are discussed in management reviews.

4.2 The interaction between Target Company's processes

The output of the second process may be the input of the next process.

The Material Process Interactions

In the material process, administration and sales determine the product range for which the material process acquires and supplies spare parts and accessories. Installation and maintenance are directly related to the material process.

The Administration Process Interactions

The administration plays a key role in the strategy process, the stakeholder process, marketing and sales, and guides the material process and installation and maintenance processes.

The Stakeholder Process Interactions

Stakeholder Relationship is a management tool that guides sales and marketing. Installation and maintenance are also linked to the stakeholder process.

The Strategy Process Interactions

The strategy process is under the guidance of the administration process and directly affects sales, marketing, installation, maintenance and material processes. The marketing process is under the control of the administration and strategy process and directly affects sales,

installation and maintenance processes. It has an indirect effect on other processes, such as the material process. The sales process is influenced by administration and marketing processes. The outputs of the sales process are inputs from installation, maintenance and material processes.

The Marketing Process Interactions

The marketing process is under the control of the administration and strategy process, and directly affects the sales, installation and maintenance processes. The indirect effect it has on other processes, such as the material process.

The Sales Process Interactions

The sales process is influenced by administration and marketing. The sales process outputs are inputs for installation, maintenance, and material processes.

The Maintenance Process' interactions between other processes are:

The Maintenance Process (Maintenance and Repair) - The interaction processes of the maintenance process with other processes are subdivided to ensure competence (administration, installation and stakeholder process), occupational safety (administration and installation process), material management (material and installation process) and maintenance management (administration and installation process).

The Installation Process Interactions

The Installation process' of New Hardware interactions between other processes are:

Interaction processes at the stage of a customer request from a customer company are stakeholder, marketing and sales processes. In addition to the sales process, the offer to the customer company is also linked to the management process. The order and order confirmation phase goes through the sales process and the sales transaction and the delivery contract in addition to the sales process are linked to the management process. The hardware delivery, installation, and operation training were done by the installation process, supported by the management process. Maintenance, sales and stakeholder processes are linked to service contract and aftersales issues.

The Process' of Reconstructed Used Equipment interactions between other processes:

Interactive processes by function are: During the selection and design phase of the equipment to be repaired, and in the organization of work, the maintenance and installation process, and material, maintenance and installation processes in the procurement phase of the necessary spare parts and supplies. During the equipment renovation and testing phase, the installation and material process are interactive. In the sales phase, the sales and marketing processes involved in making the offer to the customer company and the sales work, if necessary, rely on the help of the installation process. Sales and maintenance processes are linked to the order confirmation, sales contract, maintenance and chemical contract phase. In aftersales interactions, there are maintenance, sales and stakeholder processes.

The Process of Projection Interactions (Building, renovation and consulting of car wash halls)

The Process of Projection (construction, renovation and consulting of car washing hall renovations - interactions with other processes: The installation process gets input from the sales process and works in close connection with the installation, maintenance and marketing process.

4.3 Defining Critical success factors and Key Performance Indicators

The starting point of the measurement are the company's vision and strategy. The strategy is derived from critical success factors and Key Performance Indicators (KPIs) and targets. Based on strategy and objectives, measurement targets and meters are defined.

For the selection of critical success factors, a good tool is a SWOT analysis of the target company.

	<p>Opportunities: Automation of activity processes Improving subcontracting Maintenance activities increase and contaminating costs Self Service Car Wash business operations Consumer environmental awareness is growing</p>	<p>Threats: Continuation of the downturn Large chain contract lost Non-contamination surface material for cars Dependency on the main vendor</p>
<p>Strengths: Production skills (Installation and maintenance) Good main product: strong, large supplier Understanding Car Wash (technical, business) Chain Collaboration Templates Good economy and liquidity Versatile input generation</p>	<p><u>Leverage</u></p>	<p><u>Prepare yourself</u></p>
<p>Weaknesses: Grommet through development Key Personnel irreversibility Too many manuals and memory function processes (lack of automation) Human resources management Variation in work quality</p>	<p><u>Develop</u></p>	<p>Avoid, prevent, monitor</p>

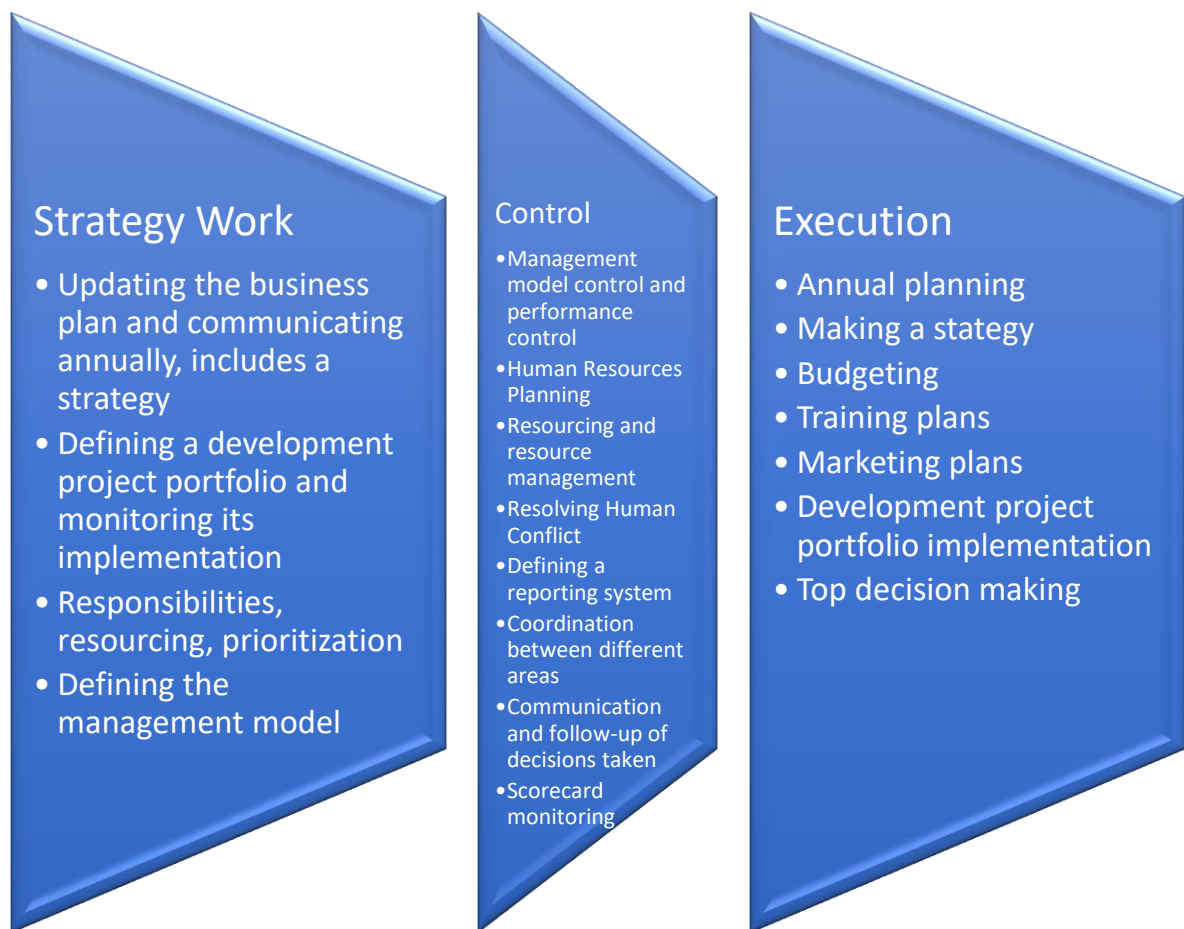
5. Resources

5.1 Training Data

(Link to NAV-ERP Training files for the target company)

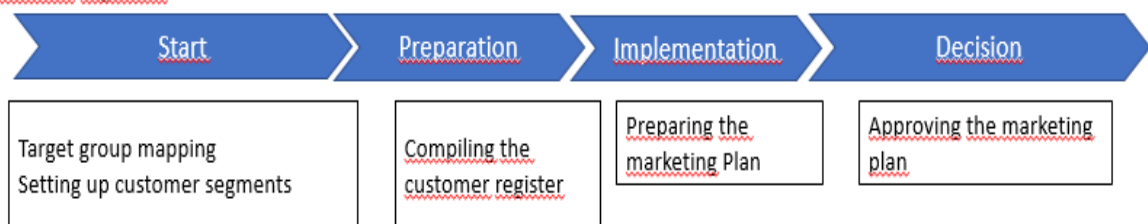
5.2 Information and description of the quality management system’s work instruments of the target company

Enterprise Resource Planning System NAV-ERP (processes described in the target company’s process description):

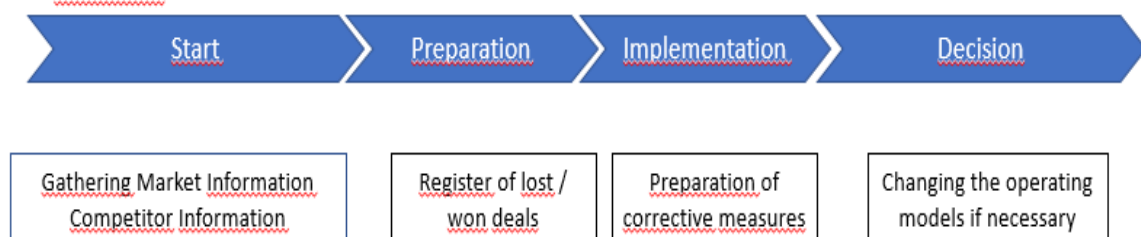


Customer Relationship System NAV-CRM (processes described in the target company's process description):

Customer segments:



Market Information:



Balanced Scorecard:



The scorecard for the target company is subject to the relevant performance metrics: economy, customers, processes and projects, and personnel.

SAKE Performance Analysis System:

For the success of the company, customer satisfaction, installation personnel and operational efficiency and productivity were determined as the most important areas to be measured. Quality, reliability and security of supply were chosen as criteria for customer satisfaction. Customers of the target company are car wash entrepreneurs using machines. Customer satisfaction weight was set to 40%. The installation staff also includes subcontracting companies in the maintenance and installation operations. The criterion here is the success of the maintenance installers ' persistence and recruitment. In particular, the recruitment of a challenge is a factor in the fact that maintenance installers should be the multi-skilled entity required by the company. The weight of the installation staff became 30%. Operational efficiency and productivity was set at 30%.

INSTRUMENT CLUSTER FOR THE SAKE APPLICATION		
Allocation of criteria to sub-regions and their respective weightings (total 100%) and scaling (1-10 for scales)		
The norm targets are marked in yellow (Grade 8)/The aim is to limit the norm (Grade 10)		
1. Customer satisfaction (car wash entrepreneurs) / weight value 40%		
1.a. Customer Survey once a year / weight value 30%		
Rating	Input value	
10	5,0	Value on scale 1-5 (average of survey replies)
9	4,2	Average value of 3.8 gives a rating of 8
8	3,8	
7	2,8	Measurement and upgrade System once a year (measurement by the target company)
6	2,5	
5	2,0	
4	1,7	
3	1,0	
2	0,7	
1	0,3	
0	0,0	
1.b. Significant customer complaints per unit delivery (pcs) / weight value 10%		
Rating	Input value	
10	0/15	Claim amount (value) per 15 device installation
9	0,1/15	0.3 pcs claim value per 15 installs give a rating of 8
8	0,3/15	
7	0,5/15	Measurement and upgrade System 2 times a year (own assessment of the management of the target company)
6	1/15	
5	1,6/15	
4	2/15	
3	2,3/15	
2	2,6/15	
1	2,8/15	
0	3/15	
2. Personnel (service installers and subcontracting companies), operational reliability / weight value 30%		
2.a. Sickness absence% (own service installers for the target company) / weight value 15%		
Rating	Input value	
10	0	Sickness absence hours per all working hours (%)
9	1	2% value give a rating of 8
8	2	
7	2,6	Measurement and upgrade System 4 times a year (target company administration reporting)
6	3	
5	3,4	
4	3,7	
3	4	
2	4,3	
1	4,8	
0	5	
2.b. Situation resulting from the transfer or the special arrangements causing the installation time per all installations / weight value 15%		
Rating	Input value	
10	0/15	Costs-causing cases per 15 device installations (percentage effect)
9	0,2/15	0.5 delay in installation or transfer from 15 to 8
8	0,5/15	
7	0,65/15	Measurement and upgrade System 2 times a year (own assessment of the management of the target company)
6	0,8/15	
5	0,92/15	
4	2/15	
3	2,3/15	
2	2,6/15	
1	2,85/15	
0	3/15	
3. Efficiency and effectiveness / weight value 30%		
3.a. Cost of installations per installation operations' net sales (%) / weight value 8%		
Rating	Input value	
10	5	Criterion:
9	5,3	2 installtors x 10 day x 8 h/day x 40 €/h (incl. sos. cost) = 6.400 € (100% in action)
8	5,5	Hardware price installed €120.000 (= Net sales per installation)
7	6	The above-mentioned norm value gives a rating of 8
6	6,4	
5	6,9	Measurement and upgrade System 4 times a year (from financial reporting of the target company)
4	7,4	
3	8	
2	8,7	
1	9,5	
0	10,5	
3.b. Maintenance costs per service charge (%) / weight value 8%		
Rating	Input value	
10	50	Criterion:
9	55	Maintenance work costs per service charge (taking into account the level of activity)
8	60	Estimates used 40 €/h work costs and 65 €/h charges
7	65	The above-mentioned norm value gives a rating of 8
6	70	
5	73	Measurement and upgrade System 4 times a year (from financial reporting of the target company)
4	77	
3	80	
2	86	
1	90	
0	100	
3.c. Market share% / weight value 14%		
Rating	Input value	
10	55	
9	52	Target company's target limit of 50% gives a rating of 8
8	50	
7	45	Measurement and upgrade System once a year (from industry statistics)
6	40	
5	35	
4	30	
3	20	
2	15	
1	10	
0	0	

6. Corrective and Preventive Measures

(Link to the target company's file folders)

7. Document Management

The structure of documentation (electronic and paper versions, storage and storage systems) is clarified in the system implementation.

The target company's quality management system operates as part of a NAV-ERP system that has a NAV-CRM Customer Relationship Management Section. Reporting, archiving, and recordings are described in the process description of the target company. As part of the system, there is a Share Point document archive in extranet. The system's Sharepoint repository includes documents, forms, guidelines, and the Remote Web Connection for fieldwork use.

The documentation will include the protocols and memos of internal pieces of the quality system and the memoranda of corrective action (continuous improvement). In addition, memos and documents are stored for internal audits, audits related to management quality management system, and audits performed by an external auditor

The manager of the target company's quality management system is responsible for the timeliness (additions, deletions and updates) of recordings, connection links, and documentation, as well as for guidance and communication to the organization. Updates should also be made to the quality manual at the same time.

(Links to the target company's instructions)

(Link to the target company's Process Description)

7.1 System Guidance

(Links and addresses to the target company's guidelines)

7.2 Work Instructions

(Links and addresses to the target company's guidelines)

7.3 Memos of Audits and Meetings

(Links to the target company's ERP)

8. List of abbreviations used

QMS = Quality Management System

ERP = Enterprise Resource Planning System

CRM = Customer Relationship Management System

CSF = Critical Success Factor

EFQM = European Foundation for Quality management

KPI = Key Performance Indicator

KRI = Key Result Indicator

NAV = Management system (NAV-ERP, NAV-CRM) Provider for the target company

PDCA cycle (Plan, Do, Check, Act) is a development method and solution model. Other designations include Deming quality circle and PDCA development cycle

Quality Policy = The overall purpose and direction of the organization as expressed by the management.

SFS = The Finnish Association for Standardization (SFS) is a Finnish central organization for standardization. SFS is a member of the European Organization for Standardization (CEN) and the International Organization for Standardization (ISO)

ISO = International Organization for Standardization (ISO)

SWOT = Strengths, Weaknesses, Opportunities, Threats; applied in SWOT analysis