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Quality of work and performance in a production organisation

The impact of QMS and organisational structure

Name: Niels van Someren
Student number: s1048186

E-mail: niels.vansomeren@student.ru.nl

Name of assigned supervisor: Dr. Lander Vermeerbergen
Name of assigned 2nd examiner: Dr. Stefan Schembera

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* Permission has been given by the director of STAS to use the name of the organisation in this thesis

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Abstract

The use of technology and the organisational structure must be linked together. When technology and the organisational structure fit well together, the quality of work and performance will increase. However, the embedding of technology in the organisational structure is often forgotten in organisational studies. Besides, it can be assumed that using technology requires a different approach to the work that has to be performed, which changes the organisational structure. However, relatively little scientific research has been conducted into what exactly changes the content of the work. The quality management system (QMS) is used as a technological system in this research, whereby the introduction of self-managing teams (squads) includes the organisational structure. This research focuses on bottlenecks and strengths that QMS and self-managing teams (squads) create. Thereby, it is investigated how the use of QMS and the new organisational structure affects the quality of work and performance. This research question was answered by a case study about the Belgian organisation STAS. This organisation uses QMS and works with self-managing teams, where the term ‘squads’ (or self-managing teams) refer to the new organisational structure. Experiences and feelings of the employees were examined to determine the impact on the quality of work and performance. Sixteen employees from different organisational layers were interviewed to get insight into this. A white paper and excel files that were available within STAS were also consulted to validate the results of the interviews. This study found that both QMS and squads ensured that the quality of work and performance at the case organisation increased. Furthermore, QMS and squads were not separate but complemented each other. In other words, only their joint use can ensure that the quality of work and performance remains high.

Table of contents

Chapter 1: Introduction

A technological system that can be used in organisations to increase the quality of work and performance is a quality management system (QMS) (Luthans, 1995; Liu & Liu, 2014; Yadav, Shankar & Singh, 2020). QMS is a quality system that can ensure that the quality of work can be improved (Fink & Ludíková, 2013), because QMS reduces work stress (Liu & Liu, 2014). The quality of work means the characteristics of the work itself and the consequences it entails for the employee (de Sitter, 1994; Achterbergh & Vriens, 2009). In addition, QMS can distinguish an organisation from its biggest competitors as the use of QMS can deliver desired performances for the organisation (Africano, Rodrigues & Santos, 2019). QMS can ensure that responsiveness is increased, errors occur less quickly, and improvements can be implemented faster, leading to a higher performance (Yadav et al., 2020; Jong, Sim & Lew, 2019). Performance refers to the extent to which an organisation can ensure that its goals are achieved effectively and efficiently (de Sitter, 1994; Achterbergh & Vriens, 2009). However, the effectiveness of QMS is determined by the factors within the internal organisational environment (Psomas & Antony, 2015). The commitment and motivation of the employees for using QMS will ultimately determine whether the goal of QMS can be achieved.

In addition to having a technological system running, a well-designed organisational structure is also essential to increase the quality of work and performance (Dhondt & Benders, 1998). An organisational structure can be seen as a formal composition of individuals and groups regarding allocating tasks, responsibilities, and authority in an organisation (Baron & Greenberg, 1999). To be able to meet the changing requirements of the environment, organisational structures must be adapted to it (Bolwijn & Kumpe, 1998). A structure should not be set up too complex because this can lead to negative consequences regarding the quality of work and performance (Christis & Soepenberg, 2015). It is crucial to have a clear organisational structure that consistently classifies operational and regulatory activities (de Sitter, 1994; Achterbergh & Vriens, 2010). If there is no clear structure in the organisation, it is almost impossible to exist as an organisation (Maduenyi, Oke, Fadeyi & Ajagbe, 2015).

An organisation can make different choices about how the organisational structure is designed regarding introducing new technological systems because technology has many variations (Davis, 1971). As a result, the wishes of the organisational members can be met, which

improves the quality of work (Levine, Taylor & Davis, 1984). Furthermore, work is more challenging and motivating when individual work positions are more complex (Benders, Hoeken, Batenburg & Schouteten, 2006). In this way, employee's work can become more meaningful, and their performances can be increased. At the same time, it leads to better performances for the organisation (Maduenyi et al., 2015; Benders, Dhondt & Van Hootegem, 2015).

Technological systems and the organisational structure must be linked together (Trist & Bamforth, 1951). Otherwise, it is not possible to stay competitive as an organisation in the current market. If technology and the organisational structure are linked, this can encourage the recruitment of new employees and increase an organisation's performance. The organisational structure and the way work is performed are influenced by technology (Cascio & Montealegre, 2016). Professions are sensitive to technological innovations, which can be introduced by automatisation and digitalisation within organisations. If technology and a well-designed structure fit each other, both the quality of work and performances will be improved (Shrivastava, Mohanty & Lakhe, 2006). Improved quality of work and performance will lead to higher involvement and better financial returns.

However, the embeddedness of technology in the organisational structure is often forgotten in other organisational studies (Bal, Benders, Dhondt & Vermeerbergen, 2021). It is essential that the use of technology is in line with the design of the organisational structure and that the organisational structure fits the technology (Trist & Bamforth, 1951; Huys, Sels, Van Hootegem, Bundervoet & Henderickx, 1999; Batenburg, Benders & Steijn, 2002). Only when a proper connection is visible between these two, the intended results regarding the quality of work and performance can be achieved (Shrivastava et al., 2006). In other words, without a suitable and appropriate organisational structure, QMS will not achieve the intended results. Further, without a properly functioning QMS, the organisational structure will not work effectively. This research aims to examine the impact of the use of QMS, the new organisational structure, and the relationship between the two on the quality of work and performance. In this research, the following research questions will be answered: "*How does the use of QMS and the new organisational structure affect the quality of work and performance at STAS?*".

The impact of QMS and the new organisational structure on the quality of work and the performance will be examined by a case study about the Belgian organisation STAS which produces trailers. STAS uses QMS, which is operated on a tablet. Furthermore, this organisation started working according to a new organisational structure. There is a new organisational structure evident in this case because they have undergone an organisational change. They started to work in self-managing teams (also called 'squads' in the organisation). Earlier, only one person was responsible for each project, and the tasks were quite limited and fixed. Nevertheless, a change is now made to a work structure where self-managing teams represent a complete task and are given the fullest responsibility and regulatory potential.

Conducting this research has scientific relevance because the number of new research publications on how technologies are used in organisational structures is growing (Kadir, Broberg & da Conceição, 2019; Longo, Nicoletti & Padovano, 2017; Sony & Naik, 2020). However, most researchers look at this topic from a technical viewpoint. This leaves out job-related aspects such as workload, decision latitude, work autonomy, and involvement. Second, the use of technology will give a different approach to employees' work, changing the organisational structure (Batenburg et al., 2002). In this area, too little research has been conducted into the changes in the work content (Cascio & Montealegre, 2016; Orlikowski, 2010). It can be expected that work content significantly influences the quality of work and performance (Hirsch-Kreinsen, 2016; Maduenyi et al., 2015).

Furthermore, previous studies that investigated the impact of QMS and the organisational structure on the concepts of quality of work and performance have only looked at the effect on one of the two (Groebner & Merz, 1994; Liu & Liu, 2014; Yadav et al., 2020; Tjepkema, 2003; Dhondt & Benders, 1998; Maduenyi et al., 2015). However, this research contributes to the effect on both the quality of work and performance. It also applies to the relation between the organisational structure and QMS since studies that include this relationship only talk about technological systems without explicitly focusing on QMS (Benders et al., 2006; Benders et al., 2015; Johnson et al., 2020). Besides, it provides additional insight to some other studies that investigated the impact of QMS on the quality of work and performance (Fink & Ludíková, 2013; Liu & Liu, 2014; Stefanovic & Djordjevic, 2016; James, 1992; Jong et al., 2019; Yadav et al., 2020). Simultaneously, with a look at how QMS is changing the work that the employees perform (Escriba-Moreno & Canet-Giner, 2006). Ultimately, this

research complements other studies investigating self-managing teams' introduction (squads) (Tjepkema, 2003; Doorewaard, Van Hootegem & Huys, 2002).

The practical relevance regarding QMS is to test whether QMS is used frequently and if the intended results are achieved. Furthermore, it is looked at whether everyone is sufficiently aware of QMS, and it provides insight into where critical pitfalls lie. Regarding the new organisational structure, the relevance can be seen in how the employees experience working in squads and how they feel about this. Besides, it shows which matters regarding the new organisational structure can be optimised and whether the employees are well informed about the new organisational structure. Additionally, it clarifies which factors determine the success; the new organisational structure, QMS, or both. This allows tangible proof of whether it has resulted in a win for the organisation and a win for the employees themselves. Finally, this research clarifies the relationship between QMS and working according to a specific organisational structure. External parties such as the government can use the insights in policy reports to help and support other organisations adopting new technology (like QMS).

This research is structured as follows. Chapter 2 will elaborate on the main concepts: the quality of work, performance, QMS, the organisational structure, and the relation between technology (specified to the technological system about QMS) and the organisational structure. A conceptual model can be seen at the end of this chapter, visually representing the main concepts' relationships (and impacts). Subsequently, in chapter 3, it is discussed which research method was applied, it specifies the sample, the data sources, and how it was measured. After that, the analysis method, limitations, and research ethics are further described. Subsequently, chapter 4 describes the results of the research. Furthermore, chapter 5 shows the discussion of this research. This chapter presents the relation between the empirical findings and scientific literature, the scientific contribution, and the practical implications. Finally, in chapter 6, the conclusions of this research are described, together with the limitations of this research and recommendations for future research.

Chapter 2: Theoretical background

In this chapter, the theoretical background will be discussed in which a broad explanation is given of the key concepts. First, in section 2.1, quality of work is described, after which performance is described in section 2.2. Subsequently, QMS is introduced in section 2.3. Section 2.4 sets out the organisational structure, including its design parameters. In section 2.5, the relation between the organisational structure and technology (QMS) is discussed, and the conceptual model can be seen in section 2.6.

2.1 Quality of work

This section discusses the first concept of this research, namely the quality of work. First, a brief definition of quality of work is given, including the indicators to measure this concept. The Job Demand Control model is then shown, which can be linked to the indicators to ultimately provide insight into the quality of work. Based on this model, six subdimensions are identified that are linked to job demands and job control. Finally, the Job Demand Control model is applied in an environment where new technology has been used.

Quality of work can be defined as "the meaningfulness of jobs and (the possibility to deal with) work related stress" (Achterbergh & Vriens, 2009, p. 224). This concept is related to the employee's outcomes, making it an instrument that focuses on individual efforts and actions. According to de Sitter (1994), two indicators encompass quality of work. These are the level of **absenteeism** and **personnel turnover** (Achterbergh & Vriens, 2009). Beneath, a model is explained that can identify these indicators.

2.1.1 Job Demand Control model of Karasek

De Sitter has used the Job Demand Control model of Robert Karasek to assess and get insights into the subdimensions surrounding absenteeism and personnel turnover (de Sitter, 1994; Karasek, 1979). This model assumes that psychological strain does not only originate from the work environment itself but that it is determined by the job demands set and the job control given to the employee facing those job demands (Karasek, 1979).

According to Bakker and Demerouti (2017), job demands can be defined as the "aspect of work that require effort and therefore are associated with physical and psychological costs" (p. 277). Thereby, Karasek (1979) defines job demands as "psychological stressors involved

in accomplishing the workload" (p. 291). Thus, job demands are about the aspects of a job that are needed to fulfil work-related tasks. Another factor that influences the quality of work is job control. Job control can be defined as "the working individual's potential control over his tasks and his conduct during the working day" (Karasek, 1979, p. 289-290). Job control refers to the work characteristics in which employees can make decisions for themselves and have the opportunity to use their skills and knowledge (Karasek & Theorell, 1990). Both job demands and job control can be high or low. It concerns the combination of the workload and individual control options that the work offers (Karasek, 1979). The Job Demand Control model, which combines the parts about job demands and job control, can be seen in figure 1.

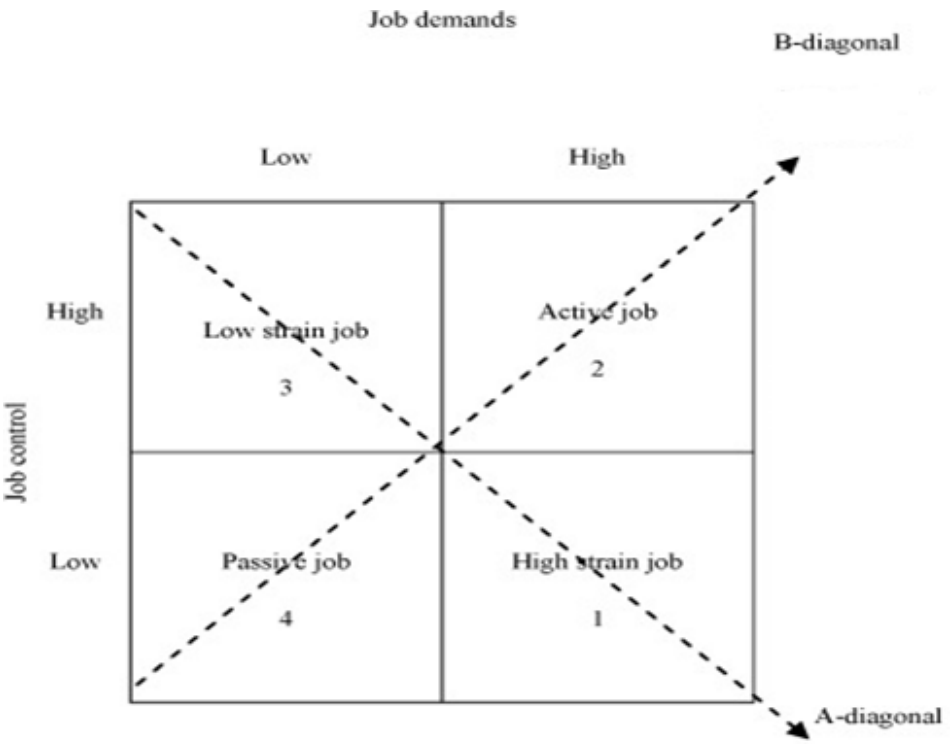


Figure 1: Job Demand Control model (Karasek, 1979)

In order to understand what the model in figure 1 entails, it will be explained in more detail. In this model, two lines can be seen which are indicated with 'A-diagonal' and 'B-diagonal'. The combination of these two lines determines the job type where someone is confronted with. Four different job types are present, which are shown with the numbers 1 to 4. If high job demands are set, but no possibility is offered to control these demands, it could lead to stress complaints (Karasek, 1979; Karasek & Theorell, 1990). According to Christis (1998, p. 21), the feeling of stress has to do with "the situation in which you face problems but are unable to solve them". A high degree of stress will result in a job where the job strain is high (see 1). If higher levels of stress are experienced, this will positively influence burnout

complaints (Schaufeli, Bakker & Van Rhenen, 2009). This can lead to longer absenteeism and more employees that leave the organisation, eventually resulting in a lower quality of work.

However, another effect will occur when high job demands are set accompanied by high job control (see 2). Here, the job type makes a leap from high strain to active, enabling someone to cope with the high job demands set (Karasek, 1979). In this situation, opportunities are offered to the employees because they can work more autonomously and feel more attracted to the organisation, resulting in a lower level of absenteeism and lower level of personnel turnover (Karasek, 1979; Karasek & Theorell, 1990). This will have favourable outcomes for the quality of work. Likewise, low job demands ensure that the work is not challenging enough, which can lead to a lack of motivation resulting in a low strain (see 3) or passive job (see 4). If high job control is added to this, the job remains a low strain job (3).

According to Baillien, De Cuyper & De Witte (2011), jobs that have a high workload (high job demands) and a low work autonomy (low job control) will result in high strain jobs. In contrast, jobs with a low workload (low job demands) and a high work autonomy (high job control) will lead to a low strain job. Therefore, a healthy balance between job demands and job control is essential. This will result in higher involvement and lower stress in the workplace (Karasek, 1979). In this way, lower absenteeism and personnel turnover are expected, leading to a positive result on the quality of work (de Sitter, 1994). To better understand which subdimensions can be assigned to both job demands and job control, they will be explained separately in more detail.

2.1.2 Job demands

The job demands have to do with the aspects of work placed on a person necessary to fulfil the job (Karasek, 1979). The workload is a crucial subdimension related to job demands (Bakker, Demerouti & Euwerna, 2005). Therefore, it will be formed as the first subdimension in this research. If a job is characterized by high job demands (a high workload), job stress and absenteeism increase regardless of the type of job that someone is performing (Demerouti, Bakker, Nachreiner & Schufeli, 2001). The behaviour of employees to report themselves absent in this kind of situation is a response to the stress caused by the job demands, leading to an increase in absenteeism (Kristensen, 1991). Here, reporting absent makes it possible to deal with the degree of stress experienced at work. In addition, a higher workload is related to an increase in personnel turnover (Janssen, De Jonge & Bakker, 1999;

Houkes, Janssen, De Jonge & Bakker, 2003), whereas the experience of stress also correlated with the level of personnel turnover (Moore, 2000).

Job demands do not always have to be negative. However, when high demands are placed on the efforts to meet those job demands, they can turn into job stressors (Bakker, Demerouti & Schaufeli, 2003). Karasek's model focuses mainly on job stressors related to time pressure and work pace (Karasek, 1979). The feeling of stress and burnout (due to emotional exhaustion) can lead to severe consequences for the quality of work, with increased absenteeism and personnel turnover (Hoonakker, Carayon & Korunka, 2013). They argue that high job demands can lead to an increase in absenteeism and personnel turnover, as it is likely that this kind of job will lead to strain reactions.

In addition, previous studies have also linked Karasek's model of job demands to the subdimension of work-family conflict (Duxbury, Higgins & Lee, 1994; Butler, Grzywacz, Bass & Linney, 2005). Although Karasek's model is limited to the level of stress experienced in the workplace, the results can also be used for work-family conflicts as it is shown that stress and conflicts are related (Googins, 1991). In this, the complexity of the work partly determines the number of psychological stressors present in the work environment (Karasek & Theorell, 1990). As a result, the degree of conflicts can be seen as established job demands, as it is related to the degree of stress experienced determined by the degree of complexity (Duxbury et al., 1994). It was suggested that higher job demands were associated with an increase in work conflicts if no supportive job resources are offered (Grywacz & Butler, 2005). This is because higher job demands can result in extra pressure and more efforts that need to be put in to perform the work (Voydanoff, 2004). In this research, the subdimension of conflicts will only be focused internally in the organisation between employees. Thereby, it is mainly related to the complexity of the work. To sum up, the subdimensions included in this research regarding job demands are workload and conflicts (including the complexity of work).

2.1.3 Job control

The other part of the Job Demand Control Model is job control, elaborated in more detail in this section (Karasek, 1979; Karasek & Theorell, 1990). Job control is about the amount of control that an employee has in his/her job to deal with the job demands set (Karasek, 1979). In other words, this is the amount of leeway (control) that an employee has to manoeuvre in

his/her job. The decision authority assigned combined with the skill level is often correlated and forms the decision latitude (Karasek & Theorell, 1990). The decision latitude often works to buffer the effects of job demands. A job with high job demands creates a strain when the decision latitude is low, but when a high decision latitude is set, this strain will not occur. If sufficient decision latitude is ensured in the workplace, employees are more likely to achieve their goals, reducing absenteeism and personnel turnover (Hoonakker, Carayon & Korunka, 2013). De Sitter (1994) confirms this by emphasizes the urgency to provide the opportunity to the employees to solve the problems that persist in the work themselves. If employees can solve problems themselves, it will cause the stress conditions that the employees' experience to be as low as possible.

According to Bakker et al. (2005), the next subdimension that can be linked to job control and can reduce the experience of work stress is work autonomy. The Job Demand Control model of Karasek and Theorell (1990) already identified this important subdimension that could positively influence employees' outcomes. Work autonomy refers to the degree of freedom an employee have to make independent decisions about their work situation (De Jonge & Kompier, 1997; Witte, Verhofstadt, & Omey, 2007). It is considered necessary regarding work stress, as having more autonomy is associated with more possibilities at work to deal with stressful situations (Jenkins, 1991; Karasek, 1998).

In research by De Spiegelaere, Van Gyes and Van Hootegem (2016), different characteristics of work autonomy were linked to work engagement, which means "a positive employee state of mind in which the employee feels that the work runs smoothly" (p. 516). If someone cannot see the point of his task or does not have a good idea of what he or she is doing, it can lead to alienation from the task (Achterbergh & Vriens, 2009). Alienation entails "an unenthusiastic outlook toward the world of work that indicates a low level of engagement in the work role which is associated with diminished levels of positive psychological activation pertaining to work endeavours and settings" (Hirschfeld & Feild, 2000, p. 790). According to Shepard (1971), a person alienated from the job is not involved in the work but is used to pursue an unworkable goal rather than rewarding the intrinsic efforts. It is necessary to have an overview of the work that someone is performing, to know whom to consult and where when problems arise to ensure that alienation remains low (Achterbergh & Vriens, 2009). That is why Achterbergh & Vriens (2009) emphasise that for proper involvement, active participation in a social network is needed. Besides, having a clear overview of which

activities are carried out is also essential. This part about involvement will therefore form an extra subdimension linked to job control.

Lastly, in the research conducted by Karasek and Theorell (1990), the existing Job Demand Control model has been broadened even further by adding the subdimension of social support. Social support is seen as job control because it can be used to exert control within the work environment and thus provide the means to change the number of stressors (Daniels & Guppy, 1994). Social support consists of the support experienced by the employees in the same environment, such as colleagues (Karasek & Theorell, 1990). Thereby, it can be considered a communication flow between employees who have concerns, who need extra information and care at work (Cooper & Smith, 1985). It turned out that if there was a low degree of social support, along with high job demands and low job control, the effect of burnout-related complaints was significantly increased (Johnson & Hall, 1988; Karasek & Theorell, 1990). However, if a high degree of social support was offered to the employees along with high job demands and high job control, the impact of work stress was further reduced, and the employee's well-being was improved (Johnson & Hall, 1988). Finally, it was found that in an organisation where social support is offered by both team leaders and colleagues (Jawahar & Hemmasi, 2006; Lee, 2004), the level of involvement in the work was increased (Blau & Boal, 1987). As a result, employees are less likely to leave the organisation and are less likely to be absent from work. That is why social support will be regarded as the last subdimension of job control. To sum up, the subdimensions included in this research regarding job control are decision latitude, work autonomy, involvement, and social support.

2.1.4 Applying Job Demand Control model to technology

Scientific insights about using the Job Demand Control model in an environment in which new technology is used are discussed in this section. Recent research by Bal et al. (2021) reveals new technology's impact on job content, looking at head-worn displays (HWDs). The findings show a significant impact on job demands and job control, which are dimensions of Karasek's Job Demand Control model (1979). Regarding job demands, the physical workload was reduced, whereas the cognitive workload was increased (Bal et al., 2021). Besides, a variation was shown in work autonomy, social support, task complexity, and skill discretion regarding job control. This variation had to do with the organisational context that could steer the use of HWDs in two directions; it was set up as a supportive tool for autonomy and social

support, or it was deliberately designed to increase controllability and manageability (Bal et al., 2021).

Further, the paper of Carlson, Carlson, Zivnuska, Harris and Harris (2017) investigated the extent to which technology can be seen as a predictor of personnel turnover intentions by using the Job Demand Control model. They found that involvement had a significant impact. Other issues that impact personnel turnover were the possibilities of control options given to the employees (Korunka, Hoonakker & Carayon, 2008). In addition, Korunka et al. (2008) also pointed out that supervisory support was an important aspect that could affect employee retention. Besides, new technological systems ensure qualitative enrichment of the work, which results in greater autonomy and more involvement (MacDougall, 2014). This allows the level of absenteeism and personnel turnover to be reduced, resulting in a positive effect on the quality of work (de Sitter, 1994).

Lastly, it is known that in an environment where new technology is applied, both job demands and job control must be sufficiently provided (Kopp, Dhondt, Hirsch-Kreinsen, Kohlgrüber & Preenen, 2019). Workplaces initiated by new technological systems where high job demands are imposed, and high job control (autonomy) is offered to the employees appear to be better workplaces. If there are high job demands, there is enough challenge for the employee, and he or she can grow in his work (Amabile & Kramer, 2011), while in high levels of job control (autonomy), the employee is enabled to deal with changes that occur during work.

2.2 Performance

The previous section mainly retrieved the subdimensions of the first concept that have to do with the quality of work. This section discusses the second concept related to performance. Again, a brief description of its meaning will be given, including the indicator to measure this concept. Subsequently, by linking different studies, several subdimensions are identified that can be linked to the indicator. In this way, the performance can be made measurable and insightful.

The concept about the quality of organisation mentioned in de Sitter's theoretical framework will be used to define and elaborate on the performance (de Sitter, 1994). The quality of organisation has to do with "an organization's potential to effectively and efficiently realize and adapt its goals" (Achterbergh & Vriens, 2009, p. 224). An indicator related to this concept

is production-cycle time (de Sitter, 1994; Achterbergh & Vriens, 2009). The production-cycle time is the total time to complete one unit (Koo, 2020). The production-cycle time starts when employees start producing and end when the product is ready for delivery. This is a well-managed indicator of performance, and it is also used by other researchers (Mason-Jones & Towill, 1999; Sharland, Eltantawy & Giunipero, 2003).

To remain competitive as an organisation in dynamic and unpredictable global markets and thus achieve the desired performances, factors such as time and responsiveness are strategic elements that play a significant role (Stalk, 1988). These factors emphasise the urgency of the production-cycle time that can help determine the organisation's viability. A commonly used concept that has to do with shortening production-cycle times is lead times (Goldratt & Cox, 2014). Lead times are about shortening the time in the entire production process. It starts when the customer has made a request for a product and ends when the product is delivered to the customer (Rother & Shook, 1999). The concept about lead times will be stated central to finding out the subdimensions related to performance, as **lead times** can be used as a comprehensive concept to shorten production-cycle times. To better understand the differences between lead time and production-cycle time, figure 2 shows a visualised difference.

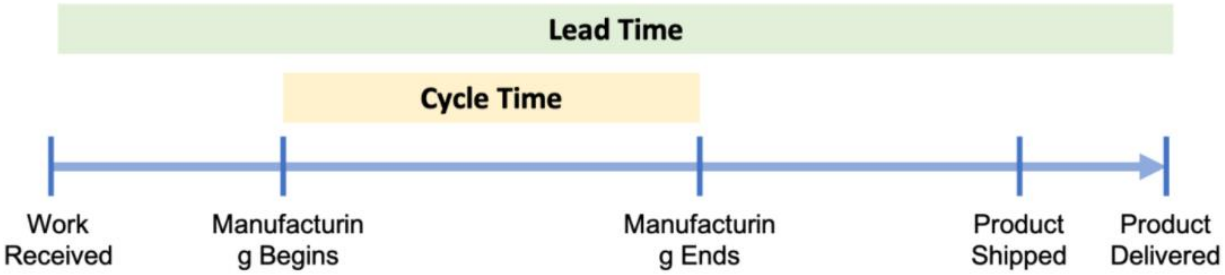


Figure 2: Difference between lead time and cycle time (Koo, 2020)

According to Goldratt and Cox (2014), lead times can be reduced by identifying bottlenecks and drawing attention to the total quantity of an item that has to be made for delivery at a specific moment. The reduction of lead times was previously recognized in the Toyota Production System (TPS), also known as lean manufacturing (Godinho Filho, Marchesini, Riezebos, Vandaele & Ganga, 2017). However, the primary goal of lean manufacturing was not focused on reducing lead times but on reducing the well-known seven wastes (Godinho Filho et al., 2017). A subdimension that is entirely focused on reducing lead times is Quick

Response Manufacturing. According to Godinho Filho et al. (2017), the concept of Quick Response Manufacturing (QRM) is entirely aimed at all efforts to improve the lead times reduction. They said that QRM "focuses on time as the key factor in competitive manufacturing, particularly in customer-oriented Engineer and Make to Order (ETO/MTO) production environments" (p. 437).

This section will be further applied to the use of QMS to find out other essential subdimensions of lead times used in this research. QMS is a system that can ensure that production errors are minimised and that the production process is continuously improved (Africano et al., 2019). In this way, the lead times to deliver products and services can be shortened (Goldratt & Cox, 2014). As a result, the number of errors and continuous improvements will form the last two subdimensions of lead times. QMS also directs a feedback process to promote continuous improvements (Barros, Sampaio & Saraiva, 2014). This allows employees to do their job better and improve communication between team leaders and employees, resulting in fewer problems and better performances (Bakker et al., 2005).

In a production environment where technological systems like QMS are used, it is much easier for employees to provide real-time feedback about the conditions that occur in the production (Sanders, Elangeswaran & Wulfsberg, 2016). This provides a comfortable working environment where concerns can be expressed immediately, and feedback can be provided when problems arise (Schuh, Gartzen, Rodenhauser & Marks, 2015). To sum up, the subdimensions used in this research regarding lead times are the number of errors, QRM, and continuous improvements (including providing feedback).

2.3 QMS

The two concepts about the quality of work and performance, including the subdimensions, have become apparent in the previous two sections. Now, the other concepts central to the research question will be explained. This section describes QMS in more detail. First, it is explained what QMS entails and what its purpose is. Next, the impact of QMS on the subdimensions related to the quality of work indicators are described. Then the impact of QMS on the subdimensions related to the performance indicator will follow.

In the management literature on quality management, all kinds of core practices are mentioned where QMS can be associated with, such as continuous improvements, process management, and quality assurance (Jong et al., 2019; Ahire, Golhar & Waller, 1996). QMS seems to be a systematic approach (also called a 'technological system'). High-quality output can be achieved and maintained using different tools, techniques, and practices (Flynn, Schroeder & Sakakibara, 1994). This quality system ensures that the overall production process can be improved by making complex data more manageable. According to Rehmani, Ahmad, Naseem and Syed (2020), QMS is one of the key concepts that helps to improve the effectiveness of the organisation. Thereby, ISO 9000 certification is used to indicate the effectiveness and quality of an organisation (Aggelogiannopoulos, Drosinos & Athanasopoulos, 2007). ISO 9000 certification is applied to QMS and requires an organisation to focus on the performance measures of a valuable system (Bell & Omachonu, 2011). It is crucial to use suitable performance measures to assess whether organisations meet the expected results of the ISO 9000 certification standards. In this way, an organisation can adhere to having a sound quality system running (Bell & Omachonu, 2011). The ISO 9000 certification includes generic quality assurance and quality management standards, which can be applied to any organisation (Aggelogiannopoulos et al., 2007).

However, it will also provide outcomes related to the employees themselves, as they eventually have to control the system (Hunt, 1987). A glance is taken at the wireless communication characteristic of QMS to explain this a bit more broadly. Hall and Khan (2003) mentioned that flow benefits could be created in the production process by having wireless communication systems. For example, QMS is consulted via a tablet and/or telephone. The cooperation between these wireless communication systems and employees can ensure that decision-making can be optimised by transferring extra responsibilities that come with the system (Tjahjono, Esplugues, Ares & Pelaez, 2017). However, an essential factor needed to ensure that quality systems run smoothly is the ease of use and the knowledge required to work with them optimally (Hall & Khan, 2003).

Altogether, QMS is a way to run the organisational process based on quality (Midor, 2013). Quality includes all organisational resources and processes to meet the customer's demands and achieve quality goals. It is essential to know that QMS must be based on the needs that arise within the organisation as this always include organisational issues (Anttila & Jussila, 2017). Only then the success of QMS can be achieved. That is why managers must adopt

QMS according to their understanding of the informational needs and documentation system (Bell & Omachonu, 2011). If this is done correctly, it does not matter what an organisation produces because it will benefit from it (Aggelogiannopoulos et al., 2007). In that way, a technological system such as QMS can improve an organisation's overall performance and work performance (Africano et al., 2019).

The following subsections show a closer look at the impact of QMS related to the subdimensions of the quality of work and performance. As was mentioned by Luthans (1995), QMS holds all employees responsible for improving the quality of work in an organisation. QMS occurs within the organisational boundaries, affecting employee-related issues such as autonomy (Hunt, 1987). It does not mean that employees automatically get more autonomy through QMS because it also has to be appropriated. Furthermore, QMS is positively related to the well-being of employees, as it reduces workload and work stress (Liu & Liu, 2014). They also mentioned that it empowers employees to take more responsibility, giving them a sense of importance to achieve organisational goals. In this way, it allows employees for a higher degree of autonomy and more decision-making room in performing their work (Liu & Liu, 2014). Besides, QMS creates a kind of climate in the organisation that promotes communication. Because of this, employees can more quickly feel that they are listened to and are respected, thereby reducing potential conflicts. In addition, by using QMS as an organisation in the context of ‘business as usual’, employees can more easily adapt to the working conditions that this system creates (Groebner & Merz, 1994). Thereby, it provides the employees with the means to meet the job demands, reducing absenteeism and personnel turnover (Hoonakker et al., 2013; Kristensen, 1991; Karasek, 1979). QMS creates greater work autonomy, allowing the employees to be more involved and connected to their work (Hodson, 1996).

In addition to the fact that QMS impacts the quality of work, it was also previously known that it benefits performance. According to James (1992), QMS can achieve the right impact on performance when employees are fully developed and committed to the organisation at all levels. In research by Yadav et al. (2020), it was found that when QMS is used in an organisation, the performance indicators such as responsiveness and quality performance changed positively. Thereby, a collaboration between the sub-activities is necessary because then the communication and exchange of feedback between employees will increase (Molleman & Slomp, 2006; Yukongdi, 2001). In this way, the production process can be

improved, as QMS allows better and faster improvements. In addition, QMS is also associated with process management (Jong et al., 2019). It ensures that as few production errors as possible repeat in the process and that continuous improvements can be made, shortening lead times. This ultimately ensures an increased performance of the organisation. Finally, QMS enables an organisation to improve the quality of its output and ensures a smoother flow of activities (Anderson, Rungtusanatham, Schroeder & Devaraj, 1995; Ahire & Dreyfus 2000). As a result, waste and costs can be reduced. However, it remains crucial to continuously improve, identify, and evaluate the main processes, to maintain and achieve the desired performance (Ebrahimi & Sadeghi, 2000).

2.4 Organisational structure

This section describes the last concept about the organisational structure. First, it is extensively described with which approach the organisational structure is set out and what this entails. After this, design parameters will be described to map out the organisational structure further. Subsequently, the impact of the design parameters values with a closer focus on the quality of work and performance is described. In the last subsections, the impact of the organisational structure on the subdimensions related to the quality of work indicators is described. Then the impact of the organisational structure on the subdimensions related to the performance indicator follows.

To map out the organisational structure, the principles of the modern sociotechnical approach will be used. The modern sociotechnical approach is a Dutch approach towards the sociotechnical redesign, which "explicitly and systematically uses cybernetics to formulate rules and principles for designing 'viable' distributions of work" (Achterbergh & Vriens, 2009, p. 210). Organisations must be designed to adapt to the changing requirements of the environment (Bolwijn & Kumpe, 1998). Generally, when the overall work structure is too complex, this can lead to internal disruptions (Christis & Soepenberg, 2015). Besides, if the control capacity is not sufficient, one cannot act when disruptions occur. This results in negative consequences regarding the quality of work and performance. The theory about the modern sociotechnical approach tries to arrive at a mechanism that clearly shows the relationship with the quality of work, performance, disturbances, and regulatory actions (Achterbergh & Vriens, 2009).

As it became clear, having a well-designed organisational structure is vital for the organisation's viability (de Sitter, 1994). By following several rules, organisational demands can be met and positively affect the quality of work (Dhondt & Benders, 1998). In order to understand what an organisational structure means, it will be defined. Besides, a short example will be given. An organisational structure is “a network of related tasks” (Achterbergh & Vriens, 2010, p. 231). In a task, several sub-activities are connected. In Ashby’s (1958) thoughts, three parts are cited that make up an activity. These are the beginning state, the process, and the end state. Through the process, the beginning state is transformed into the end state. The beginning state forms, for example, raw materials such as steel. The process involves cutting steel to realize the product eventually. Ultimately, delivering the product to the customer forms the last activity, namely the end state.

Achterbergh and Vriens (2019) mention two activities that deserve special attention to further distinguish between sub-activities. This is the difference between the operational activities and the regulatory activities. The operational activities ensure that the end state can be achieved (de Sitter, 1994; Achterbergh & Vriens, 2019). In the previous example, one could think of bending and welding the steel plates. On the other hand, the regulatory aspect ensures that the operational activity can be carried out smoothly (de Sitter, 1994; Achterbergh & Vriens, 2019). This concerns whether all parts are available, that disruptions can be dealt with by the employees themselves, and that the goals to make the product are understandable (Achterbergh & Vriens, 2019).

Finally, a distinction is made between two substructures (de Sitter, 1994, p. 91): “the production structure – the grouping and coupling of operational tasks” and “the control structure – the grouping and coupling of regulatory tasks”. In a production environment, the production structure is reflected in the layout of workplaces on the shop floor (Dhondt & Benders, 1998). How the production structure is built partly determines the possibilities for job enlargement (setting job demands), whereas the control structure determines the possibilities for job enrichment (setting job control) (Huys et al., 1999; Bakker, Schaufeli & Demerouti, 1999). The production structure originates in the primary process, while the control structure is related to several forms of regulation (Achterbergh & Vriens, 2019).

2.4.1 Seven design parameters

As the previous section clarified, an organisational structure can be mapped based on activities (Ashby, 1958; de Sitter, 1994; Achterbergh & Vriens, 2019). However, a much more detailed view of organisational structures can be created (Achterbergh & Vriens, 2009). De Sitter (1994) proposes seven design parameters to describe an organisational structure based on high and low values. Other researchers have developed and discussed more design parameters (Thompson, 2003; Kleinke, Christensen, Grossman & Hwang, 2009; Mintzberg, 1980). However, the ones of de Sitter will be stated central in this research because other researchers most frequently suggest them, and it concerns a set in which all elements are involved (Achterbergh & Vriens, 2019).

Although the design parameters act as a means of description, they can also be used normatively. Achterbergh and Vriens (2019) state that an organisational structure can be designed or redesigned to achieve specific values. They mean that an organisation with high parameter values can be transformed into an organisation with low parameter values by adjusting the organisational structure. The seven design parameters of de Sitter can be subdivided into three different structures (de Sitter, 1994). Three design parameters can be assigned to the production structure, three design parameters can be assigned to the control structure, and one design parameter can be assigned to the production structure and control structure (Achterbergh & Vriens, 2019). Below it is described per structure which design parameters can be linked to them. Furthermore, an explanation is given about the meaning of these design parameters, including the high and low values.

The first structure to which design parameters will be linked is the production structure. The production structure is about the network of related activities to deliver a product or service (de Sitter, 1994). The design parameter that can be coupled to this structure is the degree of functional concentration. According to de Sitter (1994), the degree of functional concentration means the extent to which operational tasks are related to all order types. In other words, this is about the way the tasks are divided in the workplace. When this parameter had a high value, the potential exists that all operational activities of the same type are related to all order types (Achterbergh & Vriens, 2009; de Sitter, 1994). In this structure, machines or workplaces are grouped based on a single type of operation (Dhondt & Benders, 1998). An organisational structure with a high level of functional concentration can be seen in figure 3. This structure is derived from an organisation in the production industry focused on making clothes. Each

order type (A and B) goes through all departments, and therefore all departments deal shortly with different order types.

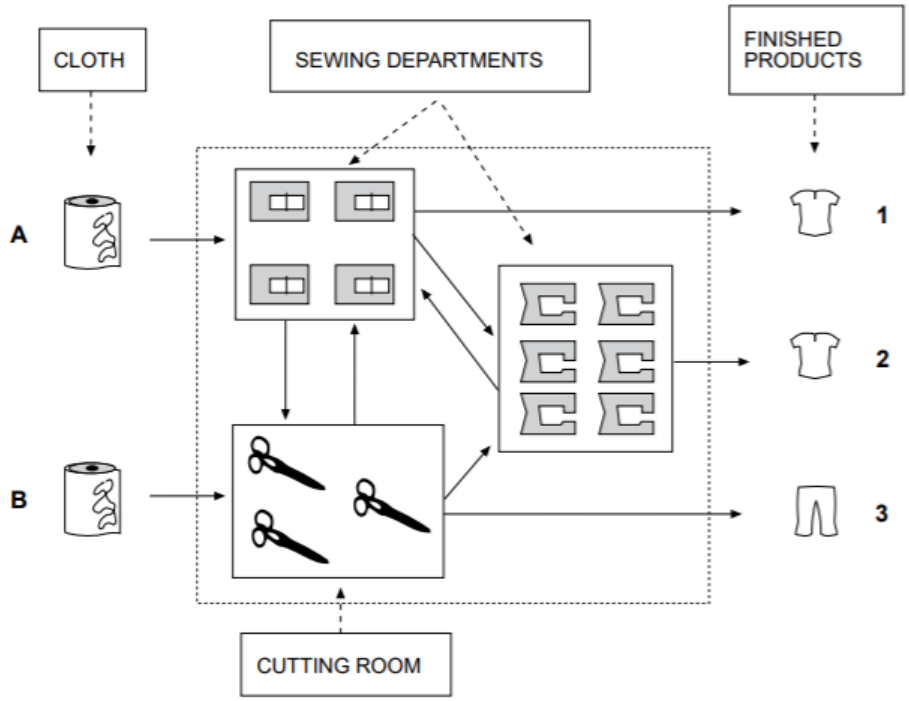


Figure 3: A functional concentrated structure (Dhondt & Benders, 1998, p. 1192)

A low value for this design parameter means that the operational tasks are not coupled to all order types but only to one or at least a few of them (Achterbergh & Vriens, 2009; de Sitter, 1994). For example, a group of workers performs all required tasks belonging to making a t-shirt. This group of workers cut the cotton, sew and assemble a t-shirt, allowing them to see the entire process. As a result, functional de-concentration ensures more integrated jobs, which could lead to a high level of job enlargement (job demands) and job enrichment (job control) (Huys et al., 1999; Doorewaard et al., 2002). Besides, by producing in this way, flows can be realised because a flow can be created by taking a limited set of comparable products (such as all t-shirts of the same type) (Christis & Soepenberg, 2015). Producing in flows has endless advantages, such as reducing the complexity of the production structure by placing interdependent activities in the same unit. Furthermore, buffers are reduced by producing in a flow, positively affecting costs (Christis & Soepenberg, 2015).

The following design parameter linked to the production structure is the degree of differentiation of operational activities. This design parameter can be divided into three types of operational activities, namely making, preparing, and supporting (de Sitter, 1994). When a design parameter has a high value, a department is responsible for one of the three operational

activities (Achterbergh & Vriens, 2009; de Sitter, 1994). In this kind of structure, one department is responsible for making the products while another department is responsible for preparing the activities. If this is differentiated, it will lead to much coordination between the departments, as they can only perform a small part of the overarching activity (Doorewaard et al., 2002). When a design parameter has a low value, the operational tasks include all three types of operational activities (Achterbergh & Vriens, 2009; de Sitter, 1994). In other words, a low value would mean that a department can carry out the planning and preparations in one single operational activity. The same phenomenon can be seen in QRM because "each cluster (focused factory) has its own staff of engineering (manufacturing, quality, design), maintenance and material support" (Nicholas & Soni, 2005, p. 195).

The last design parameter linked to the production structure is the degree of specialisation of operational activities. This design parameter is about the degree to which the operational tasks contain only a tiny part of the complete operational process (Achterbergh & Vriens, 2009). In this kind of situation, an activity is divided into small amounts of sub-activities. When a design parameter has a high value, the complete operational process is divided into smaller sub-activities, which in turn are allocated to different tasks (Achterbergh & Vriens, 2009; de Sitter, 1994). In theory, such a structure is very flexible because many products can be made (Sels & Huys, 1999). Nevertheless, it translates itself into poor transparency and complex planning. Besides, Sels and Huys (1999) mention that large buffers are present to have enough stock. If there is enough stock, the machines do not stop working, and fluctuations in the production volume are reduced as much as possible. However, this will lead to large amounts of stock in the process, difficulty to manage delivery times, and long routing times. An organisational structure with a high value on this design parameter has one department responsible for all preparation activities. The following department takes care of the production (making activities), subdivided into small activities such as sewing and assembling. It can be said that this design parameter is comparable with the one about functional concentration (Achterbergh & Vriens, 2009).

Finally, when a design parameter has a low value, the operational task contains all necessary activities to perform the entire operational process (Achterbergh & Vriens, 2009; de Sitter, 1994). As a result, this will lead to multi-skilled and more flexible team members (Christis & Soepenberg, 2015). Additionally, the employees create a better picture of their contribution to the production process, which benefits involvement. In this way, it is easier to participate in

decisions that transcend their workplace and take on organisational responsibilities in their package of tasks (Sels & Huys, 1999). Working in this kind of structure (team-oriented way) is a frequently recurring and favourite concept when redesigning organisational structures (Dhondt & Benders, 1998; Huys et al., 1999; Doorewaard et al., 2002).

The second structure to which design parameters will be linked is the control structure. The control structure is about how regulation activities are organised, determining the ability of the organisation to counter disruptions when they arise in the primary process (Achterbergh & Vriens, 2009). A design parameter presented to this structure is the degree of differentiation of regulatory activities into parts. According to de Sitter (1994), the regulation activity includes three sub-activities: monitoring, assessing, and acting.

First, monitoring is about a set of indicators that will tell what should be monitored (de Sitter, 1994). Monitoring is essentially about the variables that must be measured to determine whether organisational goals have been met. In the previous example about the clothing industry, it can be monitored whether the quality standards of the clothing are being met. Furthermore, assessing is about comparing the relevant variables with the norm value set by the organisation (de Sitter, 1994). If there is a discrepancy in this, then judgements can be made. A norm value for production time could be considered, looking at the example about the clothing industry. If it turns out that the actual production time of making the clothes is higher than the norm value, then action must be taken to tackle this. Finally, acting is about the actions taken when an organisation detects that actual values are different from the norm values regarding the essential variables (de Sitter, 1994). For example, an organisation could improve waiting times so that the overall production time is reduced. In short, when a design parameter has a high value, monitoring, assessing, and acting are subdivided into different tasks (de Sitter, 1994; Achterbergh & Vriens, 2009). Subsequently, when a design parameter has a low value, these sub-activities are integrated into one task.

The following design parameter related to the control structure is the division of regulatory activities into aspects. This design parameter concerns whether strategic regulation, regulation by design, and operational regulation are assigned to different tasks or that tasks consist of these three forms of regulation (Achterbergh & Vriens, 2009). Strategic regulation focuses on setting and re-setting goals, regulation by design is about the design and redesign of the (infra)structure, and operational regulation is about the capacity of dealing with daily

disruptions that occur in the operational process (de Sitter, 2000; Achterbergh & Vriens, 2009). The parameter has a high value when the different forms of regulation are assigned to different tasks (de Sitter, 1994; Achterbergh & Vriens, 2009). Besides, the parameter has a low value when a task contains all these three forms of regulation. An example of a situation in which a low value can be achieved is the following. An employee is allowed to determine the strategic goals, redesign the activities required to produce and deliver the product, and regulate the quality of the products based on his or her standards. According to Huys et al. (1999), assigning more responsibilities often involves more stress-related complaints. Therefore, it is crucial to find the right balance of regulation and offer plenty of options for support whenever needed.

The last design parameter assigned to the control structure is the degree of specialisation of regulatory activities. According to Achterbergh and Vriens (2009), this parameter is mainly about subdividing regulatory activities into smaller sub-activities. If the tasks do not have a broad scope of regulation activities, the design parameter has a high value. When many regulation activities are subdivided into one task, the scope is broader. This means that the design parameter has a low value. As became evident in research by Doorewaard et al. (2002), if more responsibilities and regulation tasks are given to self-managing teams, this has positive outcomes for employee involvement. Besides, outcomes of work processes like team responsiveness and adjustment time will also improve.

Finally, the design parameter about the degree of separation can be assigned to both the production and the control structure. According to Achterbergh and Vriens (2009), the degree of separation is about the extent to which regulatory and operational activities are assigned to different tasks. When a design parameter has a high value, the operational tasks contain only as few regulatory activities as possible. Therefore, a department can be confronted with disruptions from other places because they cannot fix this within their department. De Sitter (2000) mentions that the department can regulate these disruptions if the parameter has a low value.

2.4.2 Impact of design parameter values

In this subsection, the values of the design parameters will be coupled and explained, whereby they are linked more closely to the subdimensions of this research at the end. The subdimensions are related to the indicators of the two concepts about the quality of work and

performance. In general, when the design parameters have a high value, then this means that an organisational structure can be characterized as a complex network with simple tasks (Achterbergh & Vriens, 2019; Christis & Soepenberg, 2015). In figure 4, an organisational structure with high values of the design parameter can be seen that is functionally concentrated, specialised, differentiated, and where separation is visible between regulatory and operational activities.

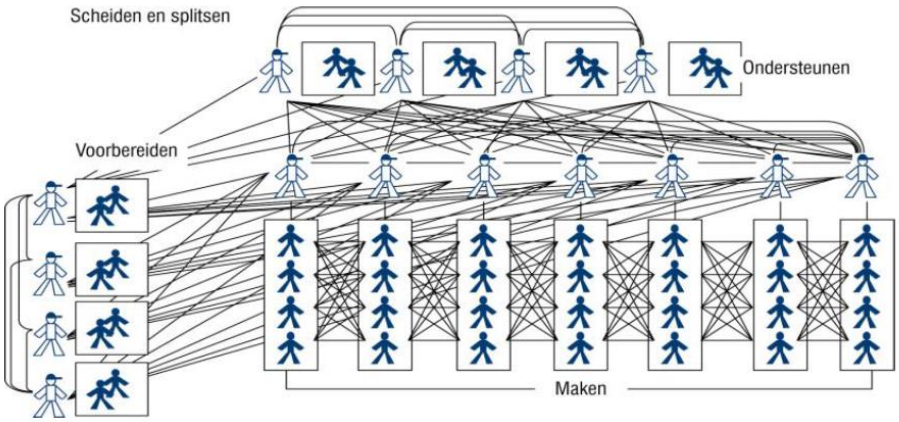


Figure 4: Complex network with simple jobs (de Sitter, in Christis & Soepenberg, 2015)

In an organisation where the design parameters have high values and where the structure looks similar to that in figure 4, the potential for structural blindness and wrong interpretations about economies of scale will exist (Achterbergh & Vriens, 2019). Structural blindness means that managers are not aware of the relationship between the organisational structure and the overall performance. Thereby, wrong interpretations about economies of scale mean that managers think that an organisational structure with high values advocates a more efficient way of working (Achterbergh & Vriens, 2019). Organising in a functionally concentrated and specialised manner will lead to job specialisation (saving on wages), maximum capacity utilization, and production of large series (payback of set-up times) (Christis & Soepenberg, 2015). However, this is not how it happens in reality. By organising in this way, the following matters will happen; the order flow will be disrupted, stock build-up will happen, more coordination costs, and adverse effects on lead times, quality and flexibility (Christis & Soepenberg, 2015). Additionally, the employees' jobs come under tremendous production pressure when split up, leading to more absenteeism and personnel turnover (Huys et al., 1999).

To positively impact absenteeism and personnel turnover, the values on the design parameters should be as low as possible (Christis & Soepenberg, 2015; Huys et al., 1999). In doing so, this will ultimately lead to a positive result on the quality of work. In an organisation that is deconcentrated, non-specialised, and where independent self-managing teams are installed (thus have low values), more autonomy, job enlargement, and job enrichment is at hand (Doorewaard et al., 2002). Besides, in organisational structures with low design parameter values, more rational and broader tasks will be offered that span the entire production process, leading to closer involvement (Achterbergh & Vriens, 2019). According to Bakker et al. (1999), in an organisational structure where job enlargement (referring to high job demands) and job enrichment (referring to high job control) is present, the jobs will become more meaningful and less stress sensitive. This can be explained by employees' ability to solve disruptions themselves rather than referring them to management (Benders et al., 2006). Furthermore, keeping the design parameters as low as possible maximises the ratio between the regulatory potential and the required regulation. In other words, suppose the design principles of the modern sociotechnical design theory are followed. In that case, jobs will become more meaningful and complete, as this design principle assumes the right balance between job demands and job control (Benders et al., 2006).

The impact of self-managing teams on the underlying subdimensions of the quality of work indicators will also be explained, as teams fit an organisational structure that corresponds with low design parameter values (Doorewaard et al., 2002; Christis & Soepenberg, 2015; Achterbergh & Vriens, 2019). According to Tjepkema (2003), it appeared that self-managing teams are often characterised by a high level of autonomy, involvement, and decision space. In such a team, the design parameters have low values because a whole task is performed. Therefore, functional concentration and differentiation of operational activities must be low since a whole part of a transformation is carried out in the team. However, regulatory capacity should also be allocated to function as a self-managing team. Otherwise, the team will not be able to solve the problems that arise in the operational activities themselves. As a result, the relevant design parameters of the control structure are low, leading to the registration of enough control capacity. Furthermore, less interaction with the employees outside the team will happen as larger tasks are performed and teams have operational and regulatory capabilities. According to de Sitter (2000), the chance of disruptions is smaller in such a team because fewer interdependencies make it easier to deal with the disruptions. Furthermore, a

high level of mutual understanding is apparent in a team, reducing conflicts and ensuring that the work can be carried out more efficiently regardless of its complexity (Postrel, 2002).

In the previous two subsections, the subdimensions related to the quality of work indicators have been discussed. This subsection describes the impact of the organisational structure on the subdimensions related to the performance indicator. According to de Sitter (2000), if the network of work tasks becomes less complex and fewer disruptions occur in the production process, lead times is influenced positively. Should disruptions happen and not be remedied immediately, then there is a tendency for disruptions to affect other tasks. In this way, the production process will become even more disrupted, leading to more problems (Achterbergh & Vriens, 2009). This would mean that more time is needed to restore and regulate it afterwards. According to Maduenyi et al. (2015), having an organisational structure with low design parameter values facilitates working relationships between the sub-units within an organisation. Thereby, it improves efficiency and reduces the number of errors. Additionally, they clearly emphasize that an organisational structure impacts performance because of a relationship between the specialisation of work processes and responsiveness. If the tasks are appropriately distributed, the quality of work will be improved, and employees can do their work better, which also increases the performance (Maduenyi et al., 2015). Therefore, it is possible to positively impact the quality of work and performance if low design parameter values characterize an organisational structure.

2.5 Connection between technology (QMS) and organisational structure

All essential concepts have been discussed in the previous four sections. However, this section will focus on the relationship between technology (specified to the technological system about QMS) and the organisational structure. This relationship has been included as it was mentioned that the embedding of technology in the organisational structure was often forgotten (Bal et al., 2021). The link between technology and work tasks will be described in the first subsections to better understand the link between technology and the organisational structure. After that, QMS is linked to the organisational structure by assessing it based on the seven design parameters of de Sitter (1994). Finally, the impact of the link between technology and the organisational structure will be shown. This impact is related to the quality of work indicators' subdimensions, followed by the performance indicator's subdimensions.

Research that has been conducted on the topic of 'technology and work' showed that there was a visible tension between technology that determines employee's work behaviour and the unprecedented impact that technology has as a whole (Form, Kaufman, Parcel & Wallace, 1988). The importance of technology and its impact on job content is a topic that had already been researched in the early years (Trist & Bamforth, 1951). Besides, sociotechnical studies have emphasized from the outset that it is essential to couple the design of the organisational structure and technology together (Huys et al., 1999; Batenburg et al., 2002). Understanding the connection between the organisational structure and technology makes it easier to know how technology is linked with job tasks (Batenburg et al., 2002; Benders et al., 2015). According to Batenburg et al. (2002), there is an interaction between performed tasks and technology that an organisation will use. It was mentioned that the use of new technology is both related to existing jobs and the creation of new jobs as it must be set up and be operated (Batenburg et al., 2002; Benders et al., 2015). Besides, a so-called splitting effect can occur when assessing technology in an existing job (Benders et al., 2015). This splitting effect showed that existing tasks could be transferred more quickly due to the direct input that technology can provide.

Various options can be applied when determining a job by linking technological systems such as QMS with the organisational structure (Batenburg et al., 2002). Therefore, it is essential to know that when assessing technological systems in organisational structures, a distinction is apparent between changes in the number of tasks and designing the tasks themselves (Benders, 1995). The operation of technology remains in human hands. For this reason, the nature of technological systems and the way it is embedded in the organisational structure should not be forgotten (Huys et al., 1999).

Suppose the relation is made between reorganising an organisational structure to achieve the desired design parameter values and working with new technological systems such as QMS. In that case, this could lead to conflicting interests as centralisation and standardisation often come into play when new technological systems are used (Benders et al., 2006). It is crucial to organise first self-managing teams and then automate and use technological systems in the organisational structure (de Sitter, 1994; Achterbergh & Vriens, 2019). Then self-managing teams in the organisational structure can work more efficiently, flexibly, effectively, and productive, which is supported by the technological system (Benders et al., 2006). As a result, it will offer positive outcomes on the quality of work and performance.

How QMS looks like in an organisational structure based on the seven design parameters will be explained next. The first three design parameters are related to the production structure, consisting of the degree of functional concentration, degree of differentiation of operational activities, and degree of specialisation of operational activities (de Sitter, 1994; Achterbergh & Vriens, 2009). In short, these design parameters are linked to the network of activities to provide a product or service. When the link is made to QMS, then it appears that there is no direct effect on these design parameters. QMS can be associated with continuous improvement and process management but will not directly affect the aggregation of operational activities to a particular group of employees or department (Ahire et al., 1996; Jong et al., 2019). In a quality approach aimed at ISO 9000 standards, the organisational structure per se is not adjusted (Escriba-Moreno & Canet-Giner, 2006).

However, the three design parameters that are related to the control structure will lead to a reduction of the parameter values by using QMS. The control structure is about how regulatory activities are allocated (Achterbergh & Vriens, 2009). The degree of differentiation of regulatory activities into parts and the degree of specialisation of regulatory activities are reduced (de Sitter, 1994; Achterbergh & Vriens, 2009). These design parameters are reduced because QMS ensures that employees are experiencing a higher degree of work autonomy and decision latitude (Liu & Liu, 2014). The collaboration between QMS on the one hand and the employees on the other ensure that control options are optimised (Tjahjono et al., 2017). In addition, having control of the quality aspects ensures a decentralised decision-making structure (Escriba-Moreno & Canet-Giner, 2006).

Nevertheless, the design parameter of the degree of regulatory activities into aspects will show a higher value than the previous two design parameters (de Sitter, 1994; Achterbergh & Vriens, 2009). QMS does not entirely place strategic and tactical control options on the users (Africano et al., 2019). Finally, the last design parameter about the degree of separation shows a lower value than the parameters linked to the production structure and higher than the parameters of the control structure (de Sitter, 1994; Achterbergh & Vriens, 2009). QMS is often used as a coordination and control mechanism, where it is less linked to the division of operational tasks (Escriba-Moreno & Canet-Giner, 2006).

Technological systems in the organisational structure can reduce stress caused by high job demands if they are well designed and consider the work performed (Johnson et al., 2020). It

can also ensure that employees can work more autonomously, as technological systems ease the cognitively taxing work. An example will be given that is related to the use of QMS to explain this more broadly. By adequately integrating QMS into the organisational structure, employees need to spend less energy and time communicating errors (Molleman & Slomp, 2006). In addition, they are less involved with administrative tasks. This allows the employees to focus more on the core of their work, giving it the potential to increase their well-being and making them more involved. Thereby, it reduces the potential for personnel turnover and increases the recruitment of new employees (Trist & Bamforth, 1951). Furthermore, accidents in the workplace can also be reduced (Horton, Cameron, Devaraj, Hanson & Hajkowicz, 2018). As a result, the risk of physical injuries in the workplace will be minimised, lowering absenteeism. This subsection has shown that when a technological system such as QMS is well linked with the organisational structure, it can improve the quality of work.

Finally, direct input can be provided by linking the organisational structure with technological systems (like QMS) (Benders et al., 2015). As a result, employees do not have to wait long for specific parts or information, which positively influences the lead times and response times. In addition, technology ensures that tasks can be transferred faster, making the process smoother and improving performance (Batenburg et al., 2002; Benders et al., 2015). Therefore, the quality of work and performance will be improved if the technology fits the organisational structure since both the organisational structure and technological systems (like QMS) can support these concepts if used correctly (Shrivastava et al., 2006).

2.6 Conceptual model

The conceptual model, as shown in figure 5, combines all previous concepts in one visual model. This model shows the impact on both quality of work and performance when QMS is used. Additionally, the impact of a new organisational structure on the quality of work and performance is also apparent here. Finally, a mutual relationship between the use of QMS and the new organisational structure is added. This relationship is added to assess what impact these concepts have on each other and how the combination of the two is related to the quality of work and performance. Based on previous scientific studies, a positive impact is expected in all relationships. Therefore, a plus (+) has been added to each impact in the conceptual model. Through this research, it can be tested whether this is indeed the case. In this way, it could confirm previous scientific studies in this area and adding additional knowledge. The

concepts included in the conceptual model will ultimately lead to a well-founded answer to the research question, as it includes all relevant concepts and relationships.

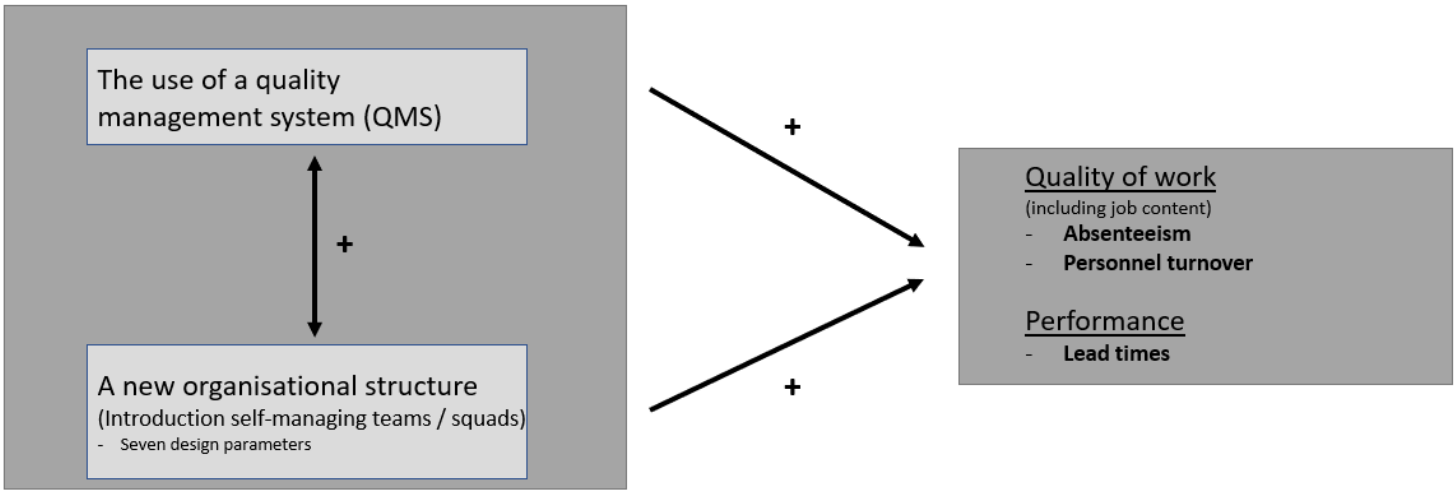


Figure 5: Conceptual model

Chapter 3: Methodology

In this chapter, the methodology of this research will be elaborated. In section 3.1, the design of the research is explained. Subsequently, section 3.2 shows the data collection technique that will be used to conduct this research. Section 3.3 explains how the data will be analysed, and research ethics will be discussed in section 3.4.

3.1 Research design

In this research, qualitative research will be conducted to obtain a definite answer to the research question. As Bleijenbergh (2015) stated, qualitative research is about all types of research aimed to collect and interpret linguistic material that makes it possible to make statements about a social phenomenon in a real-life context. By conducting qualitative research, the experiences in the lifeworld of human beings can be clarified and described (Schwandt, 2001). However, it is challenging to research specific characteristics experienced by people (Polkinghorne, 2005). As a result, qualitative research can help to facilitate this process. This research focuses on the in-depth meaning of the phenomenon to determine the impact on the quality of work and performance in the best way. The phenomenon is reflected in the use of QMS and the new organisational structure. By looking at the more profound meaning, the experiences and feelings of the employees can be better traced. In doing this, insights about bottlenecks and strengths are identified based on the quality of work and performance that QMS and the new organisational structure creates. Furthermore, a qualitative research approach fits well with expanding existing theories, testing theories and providing a comprehensive description (Van Maanen, 1979; Bleijenbergh, 2015). However, the current literature about the impact of QMS, the organisational structure, and especially the relation between these two on quality of work and performance is not extensive. Therefore, it cannot rely on the completeness of knowledge on this subject.

The method that will be used in this research is a case study. The case study method “explores a real-life, contemporary bounded system (a case) or multiple bounded systems (cases) over time, through detailed, in-depth data collection involving multiple sources of information and reports a case description and case themes” (Creswell, 2013, p. 97). According to Myers (2013), a case study is very suitable for looking at hidden explanations in a social phenomenon regarding a specific context of a messy situation in real life. It is chosen to conduct a single case study because the relationships visible in the research question can be

answered using a unique case visible in one organisation (Gustafsson, 2017). A single case study looks at one carrier of a social phenomenon in its natural environment (Bleijenbergh, 2015). This leads in a certain period, using different data sources, to valid statements about the patterns and processes that underlie the phenomenon. To find out the experiences and feelings of the employees about the use of QMS and working in the new organisational structure, the understanding of these employees is vital. This can provide practical implications by looking specifically at a case organisation where the social phenomenon occurs and investigating whether specific problems arise.

The use will be made of the mixed-methods design to provide a well-founded answer to the research question. The mixed-methods design is a single study in which the core component (like an interview) is supplemented with another component (like documents) that cannot be seen in isolation from one another (Morse & Niehaus, 2009). The supplementary component provides additional explanations or insights into the context that takes place in the core component (Morse, 2010). In this research, the supplementary component (documents) will be used to explain and verify the results of the interviews.

Additionally, exploratory descriptive research is carried out. Exploratory descriptive research aims at creating new insights and developing new theoretical concepts (Morse, 2010). Thereby, a sequential method is apparent because the supplementary component (documents) will serve as an informative tool, after which the switch is made to the core component (interviews). The pre-analysis of the documents will provide support for the interviews. In addition, it will provide insight into the indicators that will be examined in this research. This by offering a broadening view of the quality of work and performance, including some analysis that has already been conducted on the impact of QMS and the new organisational structure. A visualisation of this sequential method, including a timeline, is shown in figure 6.

The current scientific literature about using QMS and the (new) organisational structure will be expanded, and new insights will be retrieved from the case that goes beyond the existing theoretical knowledge. This is because the relationships between the concepts investigated in this research are not explicitly described in earlier research. For this reason, an abductive approach is most applicable. An abductive approach is an approach that stems from science that does not follow the pure pattern of deduction nor the pure pattern of induction (Taylor, Fisher & Dufresne, 2002). Rather than confirming an existing theory, this research aims to

develop the existing theoretical knowledge and possibly generate new insights (Dubois & Gadde, 2002). In this research, de Sitter's underlying theoretical framework about the sociotechnical design will provide guidance to identify which crucial indicators should be included in the interviews. However, discovering new insights is essential.

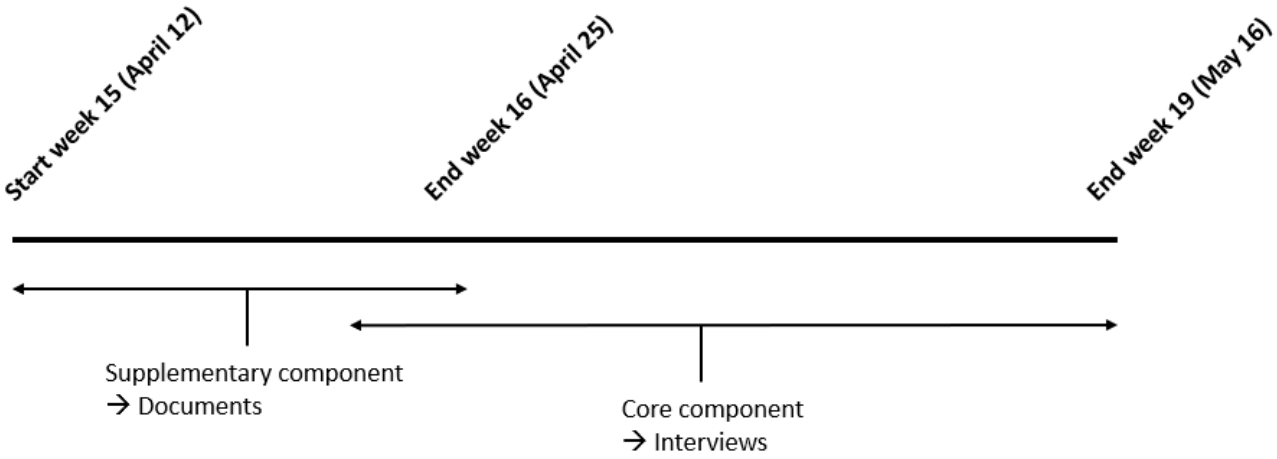


Figure 6: Sequential method

Lastly, an interpretive way of doing research will be used to answer the research question, which focuses on the relativist philosophical stance. According to Symon and Cassell (2012), there is no such thing as objective truth, wherein the researcher is regarded as subjective. Human interpretations will be used as a starting point to receive knowledge from the social world (Symon & Cassell, 2012). In other words, depending on the person asked about using QMS and working in the new organisational structure, another vision about this will be told. In this way, it can ultimately influence the researcher's attitude as well towards this subject. However, some elements of the positivism stance are also used. The theoretical model of the sociotechnical design will steer the research in a particular direction, and objective sources such as excel files will be consulted. According to Lin (1998), positivism can be qualitative, consistently identifying specific points related to a set of outcomes rather than other outcomes.

3.2 Data collection

3.2.1 Case description

The case in this research is the Belgian organisation STAS. STAS produces trailers for construction, recycling, and agriculture (STAS, 2021). In the financial year covering the period from 1 October 2018 to 30 September 2019, there were 180 full-time and four part-

time employees registered in Waregem (STAS, 2020). STAS managed to achieve a turnover of 81,572,391 euros in 2019, which was an increase of 13.48% compared to the financial year of 2018. The year 2019 ended with a profit of 2,027,207.63 euros. Currently, STAS is exporting trailers to more than 20 countries, with more than 30 certified dealers supporting them (STAS, 2021).

STAS is an interesting organisation to have as a case in this research because both an organisational structural change has taken place, and they started working with QMS. In the new organisational structure, the employees within STAS are working in cooperative units that are made up of squads (self-managing teams). Here, everyone is held responsible for the results they deliver. A white paper from STAS shows that more responsibilities were given to the team leaders in the new organisational structure (STAS, 2019). Also, more regulatory potential has been administrated, and squads are organised to encompass a complete task. Subsequently, QMS has been used to clarify the employees when problems arise and need to be resolved. QMS is used on a tablet and serves both for reporting dangerous situations and work instructions. This technological system shows the technological innovation that STAS has undergone.

In a meeting with the director of STAS, it became clear that different squads were visible at two locations, namely at Doornik and Waregem. The squads that were present in Doornik consisted of French-speaking employees. The researcher is not capable of following the French language smoothly. Therefore, it has been agreed on to collect data only for the squads at Waregem. Besides, a single case study is chosen, which focuses on only one carrier of the social phenomenon. This is due to the short period of five months in which this research has to be carried out, as multiple case studies in different settings often take more time (Baxter & Jack, 2008). However, this does not matter for the validity of this research, as the use of QMS and the new organisational structure can be mapped appropriately based on a single case study (Siggelkow, 2007). The choice for a single case study is also theory-based because a single case study fits well with the Gioia method, which is discussed later in this chapter (Langley & Abdallah, 2011). Subsequently, focusing on one location/case provides a deeper meaning of the studied phenomena (Gustafsson, 2017). Lastly, organisational shifts and new technological systems were mainly visible in West Flemish organisations, of which Waregem is one. For that reason, the squads in Waregem have the capabilities to answer the research question substantially.

3.2.2 Data collection within the case

The data collection method of the primary data consists of conducting interviews. According to Myers (2013), primary data is unpublished data and where fieldwork needs to take place to collect it. It is decided to only conduct interviews due to the current developments occurring regarding COVID-19. In this way, it can be ensured that sufficient distance is maintained, and if Belgium goes in lockdown, the interviews can be continued via online tools.

In the context of qualitative research, interviews are called open interviews (Boeije, 2005). Regarding open interviews, a distinction is made between unstructured and semi-structured interviews (Boeije, 2005; Verhoeven, 2010). At the beginning of the interview, the format is unstructured. According to Minichiello, Aroni, Timewell and Alexander (1990), these are interview formats where the question and answer categories are not predetermined, and topics can openly be discussed. The data input in this kind of format depends on the social interaction between the researcher and respondent. This format allows the respondents to share their personal stories and experiences about using QMS and working in the new organisational structure.

In the next stage, the interview will take the format semi-structured. This format means that the questions are fixed beforehand, but the researcher has room to adjust the order of the questions and add additional questions to the answers given by the respondents (Wildemuth, 2017). Furthermore, all topics are discussed, and all respondents are presented with the same questions related to the quality of work and performance. A significant advantage of this way of conducting research is that reliability of data collection can be guaranteed, and a disadvantage is that the researcher will steer the interview in a particular direction (Bleijenbergh, 2015).

The interviews will be held at different organisational layers to receive the broadest possible data available within the case. Therefore, a distinction will be made between the experiences and feelings of the employees at the operational level and tactical level. The squads from Waregem consist of three team leaders and eight white-collar workers. In addition, in the production, another 140 blue-collar workers are present. It has been decided to conduct interviews with three team leaders, eight white-collar workers, and five blue-collar workers. This means that 16 interviews will be conducted, mapping out how the use of QMS and working in the new organisational structure are experienced. Thereby, the effects on the

quality of work and performance can be traced. A few interviews are added if it turns out that certain information is still missing or not entirely clear. In this way, it can be ensured that no important information or insights are excluded, thus achieving data saturation.

Despite the current developments regarding COVID-19, it is decided to conduct eight interviews in physical form and eight interviews online. It is suggested that face-to-face interviewing and interviewing through another medium such as PC or by telephone makes no significant difference in the quality of the data (Sturges & Hanrahan, 2004; Fairweather, Rinne & Steel, 2012). Therefore, it has been decided to take eight interviews in Waregem and the other eight online. Both an advantage and a disadvantage are present when the decision is made to conduct interviews online. A disadvantage is that the conversations could be less interactive than in physical form. However, an advantage is that this is an excellent alternative to conduct interviews in another way.

From now on, the setup of the interviews will be discussed. The first four interviews with the white-collar workers will be held online via Zoom. Zoom is a program that allows video calls. After this has taken place, a journey will be made to Waregem, where three team leaders and five blue-collar workers will be interviewed within two days. This means that a total of four interviews are conducted each day. Subsequently, the other four interviews with the white-collar workers will follow next online via Zoom. This setup has been chosen because the researcher can already take notes of what is being discussed during the interviews with the four white-collar workers in advance. In this way, additional information can be included in the follow-up of the interviews on location and in the last four interviews online.

The interview format is divided into a part about the quality of work and performance. The questions about QMS and squads are listed separately in these parts. It is expected that each interview will last an hour. In the interview guides, the time indicator for the questions about the quality of work and performance can be seen. The interview guide for the team leaders and white-collar workers can be seen in appendix 1, whereas the interview guide for the blue-collar workers is added in appendix 2. Besides, an overview of the held interviews is shown in the table below (table 1). Due to time restrictions, not all interviews were transcribed and coded. For the interviews that are not transcribed and coded, notes were used.

Respondent	Gender	Age	Organisational member	Duration of the interview	Date of the interview	Location	Transcribed and coded
Respondent 1	Male	43 years	White-collar worker	64 minutes	April 20th	Online	Yes
Respondent 2	Male	27 years	White-collar worker	57 minutes	April 20th	Online	Yes
Respondent 3	Male	32 years	White-collar worker	54 minutes	April 21th	Online	Yes
Respondent 4	Male	26 years	White-collar worker	61 minutes	April 22th	Online	Yes
Respondent 5	Male	49 years	Blue-collar worker	41 minutes	April 27th	Offline	No
Respondent 6	Male	41 years	Team leader	65 minutes	April 27th	Offline	Yes
Respondent 7	Male	46 years	Blue-collar worker	47 minutes	April 27th	Offline	Yes
Respondent 8	Male	48 years	Blue-collar worker	30 minutes	April 27th	Offline	No
Respondent 9	Male	25 years	Blue-collar worker	47 minutes	April 28th	Offline	No
Respondent 10	Male	61 years	Team leader	61 minutes	April 28th	Offline	No
Respondent 11	Male	44 years	Blue-collar worker	42 minutes	April 28th	Offline	Yes
Respondent 12	Male	38 years	Team leader	63 minutes	April 28th	Offline	Yes
Respondent 13	Male	29 years	White-collar worker	62 minutes	May 5th	Online	Yes
Respondent 14	Male	27 years	White-collar worker	58 minutes	May 6th	Online	Yes
Respondent 15	Male	44 years	White-collar worker	65 minutes	May 7th	Online	Yes
Respondent 16	Male	28 years	White-collar worker	62 minutes	May 10th	Online	No

Table 1: Overview of interviews

For collecting secondary data, a white paper and excel files available within the case will be used. Some excel files related to the indicators of this research about absenteeism, personnel turnover, and lead times are already available. Besides, a white paper discussing matters about QMS and the new organisational structure is also present. This data can be linked to secondary data because secondary data is data that the primary users have not collected, and it is written by organisational members and not researchers (Hox & Boeije, 2005; Bleijenbergh, 2015). These are indispensable resources for researchers, as it shows what has been said or experienced at any given time. According to Hox and Boeije (2005), secondary data often consists of quantitative data. This data is present in the excel files and white paper used in this research, whereas it also has a dual role. First, it will be used as a supportive tool for the

interviews. Second, it will offer a broadening view regarding the knowledge about QMS, the new organisational structure (squads), and the indicators related to the quality of work and performance.

The operationalisation is related to the two concepts about the quality of work and performance. The concept of quality of work is operationalised into the indicators about absenteeism and personnel turnover, whereas performance is operationalised into the indicator about lead times. Absenteeism and personnel turnover are further divided into subdimensions related to job demands and job control cited in the Job Demand Control model (Karasek, 1979). For job demands, the subdimensions are workload and conflicts. For job control, the subdimensions are decision latitude, work autonomy, involvement, and social support. Furthermore, the subdimensions for lead times are the number of errors, QRM facets, and continuous improvements. These subdimensions do not come from an existing model but were found after reading various scientific articles about it. All these subdimensions and indicators are derived from the theoretical background and the conceptual model. The topic list, including the subdimensions and indicators, can be seen in appendix 3. Subsequently, in the figure below (figure 7), the three focus points are shown where attention will be paid to in this research.

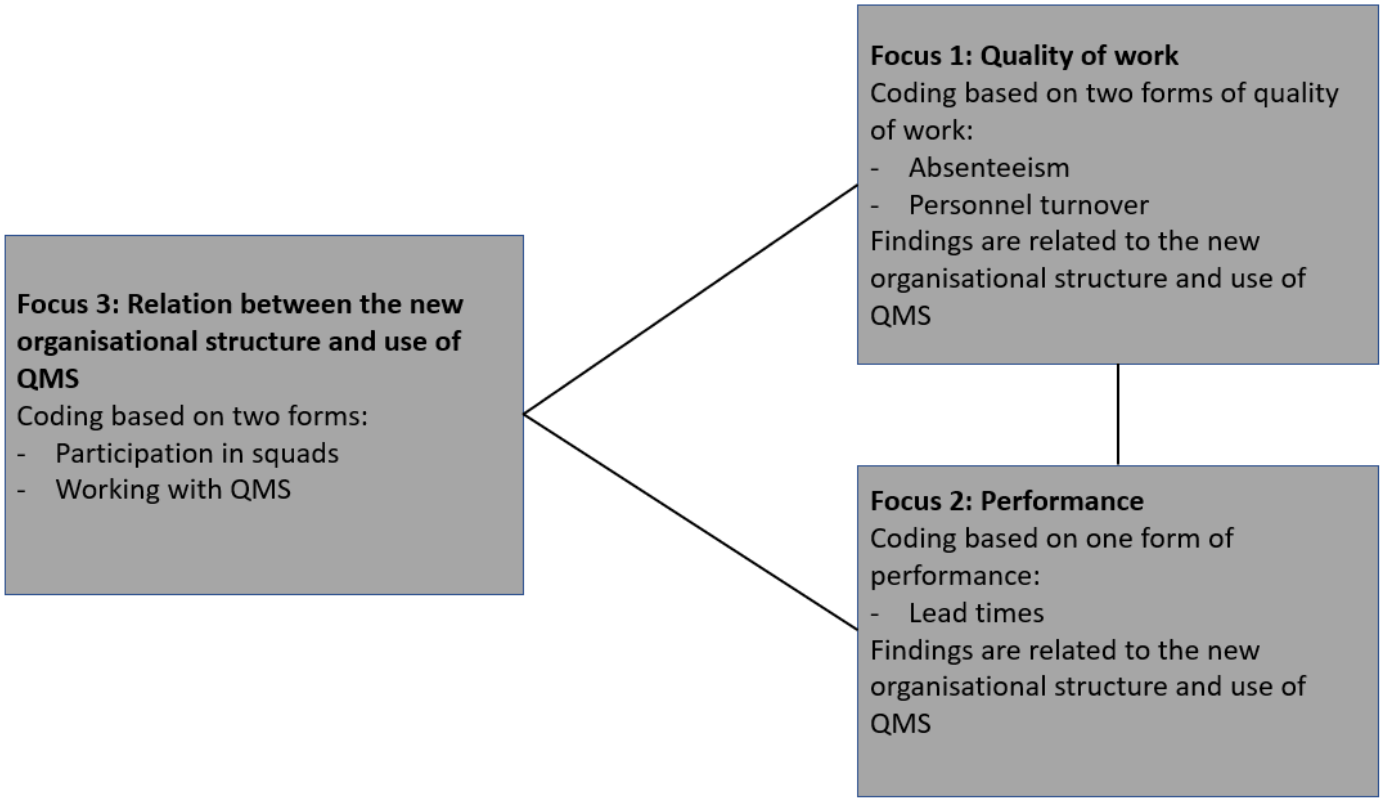


Figure 7: Focus points

Furthermore, at the end of this research, a meeting will be scheduled with the director of STAS in which the results and the recommendations are discussed. If possible, it will be presented on location through a PowerPoint presentation. This makes it possible to monitor ethnographically, meaning that knowledge is made visible, consisting of multiple voices and whereby it mediates the interests between the people involved (Van der Aa & Blommaert, 2011). By doing this, it can be asked what the manager thinks of the results, and it serves as a means of feedback and validation. Finally, a timeline has been added, which can be seen in figure 8. This timeline illustrates the key events that are or have occurred during this research.

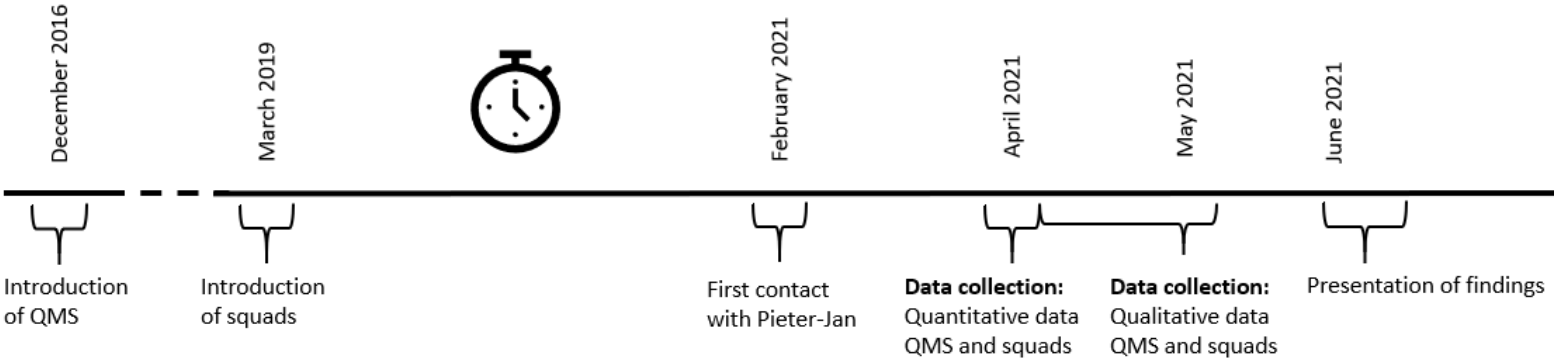


Figure 8: Key events of this research

3.3 Data analysis

The Gioia method is an effective method to understand the respondents' experiences as well as possible (Gehman et al., 2018). Using the Gioia method, single in-depth interpretative cases can be understood (Langley & Abdallah, 2011). In addition, this method can fill literature gaps and is based on respondents' interpretations and stories. Langley and Abdallah (2011) mention that the Gioia method is suitable for obtaining the closest picture to determine how the respondents make sense of QMS and working in the new organisational structure. For these reasons, the data analysis in this research is based on the Gioia method since it is most appropriate and provides an adequate answer to the research question. This method also fits with research aimed at the relativistic point of view, which offers a systematic approach to develop new insights (Gioia, Corley & Hamilton, 2013).

The data analysis process performed in this research is as follows. After the interviews have been conducted on location and online, the transcription part takes place. Each interview is recorded after the respondent has given consent in order to carry out the transcription part. Subsequently, all audio files will be listened to and then transcribed. When this process is

done, the coding part will follow next. The program NVivo will be used for coding the data. NVivo is a qualitative data analysis software where codes can be easily assigned to quotes and divided into themes (Wong, 2008). All transcripts of the interviews are imported into the data processing software NVivo. These interview transcripts are coded one by one.

The coding of the data (interview transcripts) is done according to the Gioia method. To understand how this way of coding is carried out, it will be explained next. First, it will be checked which passages of interest are visible in the transcripts. These will lead to a data structure by first developing open codes. The open codes show the mere meaning of the quotes that have been selected (Symon & Cassell, 2012). The open codes are created by grouping transcripts into first-order concepts by comparing different fragments (Langley & Abdallah, 2011). During the coding process, a research diary is kept. This research diary shows the thoughts and interpretations of the researcher and explains why certain decisions have been made. In this way, it will ensure the credibility and dependability of the research.

After all first-order concepts are clear, second-order themes will be formed through axial coding, leading to themes visible at a higher level of abstraction (Langley & Abdallah, 2011). The second-order themes are made based on the first-order concepts that are very similar. In this stage of the coding process, a coding template will be used that consists of seven parts to process the data thematically. The seven parts are the use of QMS, the use of squads, impact QMS on quality of work, impact squads on quality of work, impact QMS on performance, impact squads on performance, and the link between QMS and squads. The first-order concepts are first assigned to these seven parts, after which they are grouped into second-order themes. The first-order concepts are subdivided into a hierarchy to make it more transparent and accessible for the researcher to analyse and process the data into second-order themes.

Subsequently, after the second-order themes are formed, the connection is made to aggregate dimensions. Aggregate dimensions further compare and summarize the second-order themes, leading to emerging theoretical concepts (Langley & Abdallah, 2011). If no new themes can be found by comparing the first-order concepts, it means that data saturation has been met and the coding process has been completed.

Ultimately, the data is transported from NVivo to a word file, in which the codebook can be viewed. This codebook can be seen in another file provided with the thesis since it consists of 84 pages. The codebook contains codes that originate from operationalising the two core concepts: quality of work and performance. A code is allocated deductively for each subdimension of the core concept. After the interviews have been conducted, some codes are added inductively to the codebook. Doing this can ensure that additional insights may arise that have not been thought of or have not been described before. Only the first-order concepts and second-order themes have been included in this codebook since 3rd level coding (coding to aggregate dimensions) were not possible in NVivo. For this reason, the second-order themes transformed to aggregated dimensions are visible in a separate word document, which is added in appendix 4.

The way the coding process looks can be seen in appendix 5. This coding process is made up of seven coding tables. The seven coding tables will be consecutively discussed in the result section and show how the coding was done. The link between QMS and squads is placed in the last coding table, as it is mentioned both after the quality of work and performance in the results. Besides, the results and recommendations are presented in a meeting scheduled with the director of STAS to ensure the credibility of this whole data analysis process.

Lastly, there are also some limitations present in the design of this research. “A limitation of a study design or instrument is the systematic bias that the researcher did not or could not control and which could inappropriately affect the results” (Price & Murnan, 2004, p. 66). First, the relationship between the concepts used in this research is not extensively discussed in other scientific articles. Therefore, the theoretical basis for confirming the results is not optimal. Further, the measuring instrument for data collection is limited to interviews, whereby observations and focus groups are excluded due to the developments that occur regarding COVID-19. Subsequently, the empirical research will take 12 weeks, meaning that only a limited number of interviews can be conducted. As a result, not all employees have been included, but the sample is restricted to only 16 respondents. Besides, it could be that specific terms used in Belgium are unclear to the researcher since he is of Dutch origin. This can have had adverse effects when coding the data. Lastly, a translation must be done for using quotes in the result chapter since the interviews will be conducted in Dutch. Due to this translation, mistranslations or misunderstandings could have arisen.

3.4 Research ethics

According to Resnik (2011), including research ethics in research is vital to consider as it influences the research decisions and results that emerge. Some essential tasks need to be performed and considered in this research. First, to ensure the transparency of this research, the respondents will be informed and supported whenever necessary throughout the entire research process. It will be asked if they want to sign an informed consent form, by which they declare that they are willing to cooperate during the research and have sufficiently been informed. Additionally, at the beginning of the interviews, the respondents' permission will be asked to record it and play it back later when transcribing the data. Besides, it will be guaranteed that all results and findings are anonymised not to be traced back to the respondent, and private data will be protected. If desired, the results are sent to and discussed with the respondents to ensure that correct information has been processed. The researcher will do his best to process the data as objectively as possible. Objectivity is maintained since the researcher works outside the organisation and has not built up any internal relationships with the organisational members. Finally, data and information which is collected during this research will be treated in confidence and with due care.

Chapter 4: Results

In this chapter, the results are discussed based on the data collection and data analysis that have been taken place. The first section (4.1) starts with the extent to which blue-collar workers, white-collar workers, and team leaders talk about QMS and squads' usage and what it entails. Besides, in this section, seven design parameters are added linked to the usage of squads. In section 4.2, the results are discussed regarding the use of QMS and squads linked to the quality of work indicators and subdimensions. Furthermore, in section 4.3, QMS and squads are described in which the results are shown regarding the performance indicator and subdimensions. Quantitative data from the excel files and white paper linked to the quality of work and performance indicators have also been added at the end of sections 4.2 and 4.3. Based on these results, a well-founded answer will arise to the research question.

4.1 QMS and squads

4.1.1 The use of QMS within STAS

QMS was officially launched within STAS on December 1, 2016. This system was never used intensively, but the employees have been working on it quite a lot for the last seven to eight months. According to the respondents, QMS can be used for various matters, such as reporting errors, dangerous situations, quality checks, and proposals for improvements. A white-collar worker mentioned that QMS serves as a platform to report problems and that lines of communication such as mail contact are reduced. Mail contact and other lines of communication are reduced because QMS ensures the centralisation of information so that data facts can be brought up to respond better to current problems. The following quote illustrates this:

"*It has become easier. Because in the past everything had to be passed on by telephone or then there was a call, then it was forgotten, but now that they centralise it through QMS, it remains open, and it is the person who makes the QMS that can only switch it off.*" (Respondent 11).

To work with QMS effectively, respondents emphasize that the rules that have been agreed upon when using QMS must be followed. Otherwise, errors will not be tackled in the correct way that was intended to do. Although it became apparent during the interviews that QMS is very user-friendly, it is easy to use, the reporting process works well, and the system has not

yet shown any malfunctions. Furthermore, this system is made according to the KISS principle, which was cited in the following quote: "*The system for entering an issue is super simple. In a manner of speaking, with a few clicks you can start logging your issue.*" (Respondent 1).

Besides, QMS is mainly production oriented. It became known during the interviews that the team leader is the only person who enters issues into QMS. After that, other departments such as purchasing and engineering receive information in QMS if something does not go well or needs to be solved right away. The information sent in QMS will only be consultable for the department that it is intended for. That is why QMS provides a direct link between person A and B with no intermediate paths. For this reason, the following was said about the use of QMS: "*It transcends telephones, mails, WhatsApp, and photos. So other means of communication, and it even transcends our current modules in which we perform our work.*" (Respondent 15). In general, QMS is properly monitored now. Not all respondents indicated to look at this constantly, but an attempt is made to check it at least twice a day.

4.1.2 The use of squads within STAS

On March 30, 2019, STAS introduced squads within the organisation. As was mentioned by the respondents, a squad is essentially a cross-functional team that includes employees from all areas of expertise, such as purchasing, engineering, and sales. In the transition to a so-called cross-functional organisation, the following quote was said:

"*We are tearing down those walls, and we are going to organise ourselves; everyone sits together in an open landscape office. Moreover, we will also meet once a day to discuss specific issues in such a way that we can realise our 'why making bulk transporting pleasures' and in the meantime 'long-term pleasures' for our customers*." (Respondent 2).

Even though squads have been introduced into the organisation, it was indicated that the work activities remained the same. The only activity that was added to the work was a daily meeting. In this meeting, figures are presented from all departments that are together in a squad to improve various matters such as quality, process duration, and productivity.

STAS has started to use the squads in the organisation to reduce the classic box thinking and improve communication by reducing the number of communication lines. Besides, now that

the squads are present, the work can be performed more streamlined. In addition, it was told that deploying squads in the organisation ensures that the process, structure, and cooperation between the departments are better facilitated. A quote from a white-collar worker who tells about what purpose he had received from the organisation was the following one:

"*The objective that we received was to improve communication, including the day-to-day operation from selling to handing over the vehicle, to do that as streamlined as possible.*" (Respondent 3).

In the following subsections, two visual figures are shown and explained to assess the organisational structure at STAS based on the seven design parameters that are cited in the theoretical framework of de Sitter (1994). This rating is based on a white paper, supplemented with some quotes told by the respondents. The white numbers in bold indicate the position of the design parameters that are standing on the left. The closer to 1, the lower the value, and the closer to 8, the higher the value. Figure 9 shows the rating of the design parameter values based on the old organisational structure (without squads), and figure 10 shows the rating of the design parameter values based on the new organisational structure (with squads).

Figure 9: Assessment of STAS based on the seven design parameters (old structure)

Figure 10: Assessment of STAS based on the seven design parameters (new structure)

In the old organisational structure at STAS (figure 9), the design parameters' values are higher than those in the new organisational structure (figure 10). This difference is present since squads (also called 'self-managing teams' according to the literature) have been introduced in the new organisational structure. In the new organisational structure, there is organised less functional since the different areas of expertise are placed together in one squad and fulfil one complete task. That is why the design parameter values related to the production structure (1 to 3) have been lowered. However, these design parameters have not reached the lowest point as the work is still done functionally within the squad. The respondents said that they did not take over each other's work and that everyone was still performing their specific tasks. Nevertheless, it was mentioned that the way to go is to take over each other's tasks and that they are already working on this in meetings. A helpful quote which was told by a white-collar worker that illustrates this part is the following:

"*I do think that our way to go should be that we try to interrupt the 'classic box thinking' even more, and that effectively a process engineer can also provide support to a product engineer if necessary, and that a product engineer provides support to a procurement engineer, to accentuate the team even more.*" (Respondent 2).

The design parameter about the degree of differentiation of operational activities (2) has a slightly lower value than design parameters 1 and 3. This is because a squad is composed so that all tasks are included to make a complete product and deliver full service. The different areas of expertise in a squad are heterogeneous because they all perform different functions, but they form a complete and complementary group. In addition, design parameters 4 to 7 have been lowered too in the new organisational structure, as maximum regulatory potential is now granted to the squads. Besides, squads are organised in such a way to deal with the operational activities themselves. The squad members can now follow up problems themselves and are less dependent on the employees outside the squad. The following quotes clearly show that the various departments can equate each other in the field of regulation: "*We have all been given the same responsibility. We are all held jointly accountable for our department on the same level, and we make our decisions based on each other."* (Respondent 12) and "*There is more participation and consultation with all the other departments responsible for production."* (Respondent 12).

The reason why the design parameter about the degree of differentiation of regulatory activities into 'aspects' (5) has a slightly higher value than the others have to do with the following. This design parameter states that strategic regulation, regulation by design, and operational regulation are assigned to one task, which results in a lower value. However, tasks are delegated to the squads in terms of strategic regulation, but they cannot fully set their own strategic goals. Also, restructuring activities are not fully controlled by the squads. For example, suggestions for improvements are made and discussed within the squads, but more significant parts must first be presented to management or done in consultation with management. This is illustrated in the following quote:

"*All results are discussed every two weeks, and bigger results such as turnover, margins, profit, and effective operating results are discussed at certain moments with also the participation of the management*." (Respondent 2).

Finally, it is striking that the design parameter about the degree of differentiation of regulatory activities into 'parts' (4) was slightly lower than the other design parameter values in the old structure (see figure 9). As an explanation, the regulation types that fall under this design parameter already scored well in the old structure. At that time, sub-activities like monitoring,

assessing, and acting was already assigned to the employees. Besides, the white paper showed that the organisational structure at STAS was already organised quite horizontally.

4.2 Quality of work

To analyse the impact of QMS and squads on the quality of work, underlying subdimensions that determine absenteeism and personnel turnover are used. Thereby, important insights have been added that were mentioned in the interviews which go beyond the existing literature. The subdimensions are related to job demands and job control cited in Karasek's Job Demand Control model (Karasek, 1979). Workload and conflicts are the subdimensions for job demands, whereas decision latitude, work autonomy, involvement, and social support are the subdimensions for job control. At the end of this section, some quantitative data is shown to see whether absenteeism and personnel turnover indicators have decreased and, thus, the quality of work has been improved.

4.2.1 Impact of QMS on quality of work

Based on job demands, the respondents generally state that the work is better performed by using QMS. First, there is a broader understanding of the production errors and how they can be solved. In this way, work can be done more effectively and efficiently, and there will be no duplication of work. Furthermore, QMS ensures that employees are less disturbed in their work because errors are tackled at the base. In addition to that, the employees are informed right away when something is not going correctly in the work process. There is less need to search, and it gives employees more certainty in performing their work. In addition, the blue-collar workers indicated that through QMS, they could perform their work much faster and better even though they do not come into direct contact with QMS. This is because the input of their work is better than before since materials are available in no time and are immediately at the right place. In addition, the blue-collar workers can more easily contact the team leaders to report errors, allowing that there can be responded more quickly on matters.

In the area of workload experienced through QMS, it appears that by using QMS, no higher workload is placed on the employees. Several respondents indicated that the workload has remained the same and therefore did not changed. However, other respondents indicated that the workload had been reduced. For those who said the workload was reduced, there was less duplication of work because errors are better handled, and employees will be less distracted from work through the reduction of emails and calls. Also, now that fewer (repeated) errors

occur, fewer problems arise. In this way, the time they gain in doing so can be used for other purposes. The following quote was given to a question whether something had been noticed in time and workload by having QMS:

"*Better, because it saves us time to do other tasks. We had to follow the parts in the past, which is a lot of extra work and duplication of work, especially when parts were too short. Now that we no longer have to do that, it has provided us more time to put even more on quality.*" (Respondent 12).

However, sometimes there were some stumbling points mentioned in work due to QMS. Suppose there were many reports for a department. In that case, it could demotivate employees towards using the system, the overview could be lost, and employees will not be able to follow up and resolve all QMS reports. However, the respondents indicated that the work had not been made more difficult now that QMS is used. Also, barriers that arose in the past are now being tackled. For example, the threshold for blue-collar workers to report errors more quickly and the language barrier that often arose from telephone conversations between the production and product department. The following quote has been added to explain this:

"*Communication was often done by telephone. The first thing production did was call on top of; yes, we have a problem. Then we often had a language barrier between our team and production. In production, employees mainly speak French. In our product department, most employees speak Dutch. So, that was already a translation process to a language barrier that existed. The communication was certainly made more difficult by the phone.*" (Respondent 13).

So, it became clear in the preceding quote that many telephone conversations about errors arose in the past, but these have now been reduced enormously. Nowadays, telephone conversations are mainly used for urgent matters. Nevertheless, they try to reduce this as much as possible because it has often led to the forgetfulness of errors in the past.

In addition, questions were asked whether conflicts arise on the work floor when using QMS. It was explicitly stated that the number of conflicts is reduced and avoided through QMS. The following quote illustrates this line of thoughts: "*Typically, QMS avoids the number of conflicts, it is because the data becomes clear and therefore you can deal with it on the right*

way." (Respondent 1). Besides, it was told that the work had been made less complex because the tasks can be completed simply and consistently. This by having a transparent and well-arranged system. However, conflicts are not entirely avoided because it was repeatedly said that some employees did not always agree on the errors put in QMS and that the input in QMS did not always match what the other person had in mind.

From now on, the subdimensions that belong to job control are described. In the field of decision latitude, there is a divided impact of what influence QMS has on this. The respondents indicated that the decision-making space for the team leaders had been increased. Thereby, it has been told that team leaders have been given the absolute authority to deal with errors and log them. For this reason, the initiative and the effort to do something with the production errors improves. In this way, errors will be tackled more quickly by the team leaders. This story is illustrated by a quote which a white-collar worker said:

"*On the side of reporting the problem, a little more effort is often made to describe the problem before they call us. In the past, it was often said, certainly for non-urgent matters, come and have a look we have a problem with the vehicle or sent an email. However, now, because there is the possibility to add a photo to mention the order number certainly, more responsibility is often placed on the person logging the problem as well.*" (Respondent 13).

However, the white-collar workers and blue-collar workers indicated that for them, the scope for making decisions and responsibilities have not been increased, but that they have remained the same regardless of QMS. It was said that increasing the decision-making room is not a starting point of QMS. This can be seen in the following quote:

"*You should see QMS as a means of communication. It is a kind of communication tool that will help our team leaders and our operators in case of issues. Does it provide more decision-making rights? No. I do not think that that is the premise of the QMS application.*" (Respondent 2).

When looking at the subdimension of work autonomy, the respondents say that the work autonomy has been increased for team leaders. Again, this does not apply to white-collar workers and blue-collar workers. It appears that the team leaders can now make more independent choices about how to handle production problems that arise. A quote from a team

leader illustrating this is the following: "*Where in the past I always had to consult someone above me, I can now do it myself.*" (Respondent 12). A white-collar worker confirmed this story: "*For the team leaders especially, they can decide independently from look; I now have that problem on that work card, on that bill of material. I now have that error on the drawing, and I will now put that in QMS. It will immediately become clear throughout the organisation, and it is the team leader who can independently address this.*" (Respondent 1). The blue-collar workers and white-collar workers let know that for them, the level of work autonomy is the same as before and that QMS has not helped in this to increase it.

If the degree of involvement is examined, it appears that employees feel more involved in their work through QMS. The employees are better informed about matters and have a more precise overview of their work by exposing errors. A small quote that supports this story is the following: "*Now, we also inform the buyer, and then we notice that when we tell him that, there is also a lot more involvement.*" (Respondent 14).

Regarding the social support received concerning QMS items, the blue-collar workers are experiencing relatively low support. The organisation has not yet supported this group of employees sufficiently. In this way, the blue-collar workers cannot always handle the QMS issues they encounter in their work, which can sometimes burden the team leaders. The reason for this is that communication sometimes falls short. This is for the reason that not everyone in the workplace is aware and informed about QMS items. The following was told by a team leader: "*If a QMS is sent to the warehouse about a part that is missing in a container, then I am the only one currently who receive that information.*" (Respondent 12). This lack of communication can cause restrictions for the efficient operation of QMS within production.

However, the white-collar workers and team leaders are experiencing social support quite well. They support each other with questions about QMS and keep each other sharp if many QMS items are open. In addition, sufficient support is provided from the organisation for the use of QMS, and what is being told is listened to. Lastly, the respondents said that decisions can be better supported by using QMS and that more effective support can be given to problems in QMS. This is because errors are more visualized, and employees can use data from QMS to validate their decisions and support the management and colleagues.

4.2.2 Impact of squads on quality of work

In terms of the job demands placed on the employees, it appears that squads generally positively contribute to the execution of the work. It became clear that squads make it easier to respond to illness and pain complaints of fellow employees, that the efficiency of the work increases because problems are more clarified, and that collaboration between the different departments has been improved. The collaboration has been improved because problems are now tackled together as a team, and no one is left alone. This makes it possible to deal better with the work requirements set for individual squad members. However, there was also something that did not run smoothly in the beginning. According to some respondents, the squads' extra short lines of communication were sometimes experienced as a nuisance. If an employee was concentrated on his/her work and another employee asked a question, it was more of a distracting factor. Almost all respondents needed time to get used to working in the new squad structure.

Regarding workload, different reactions of the respondents were given. Some respondents indicated that the workload had remained the same, while the workload had increased for others. A few respondents also indicated that the workload has even been reduced because activities run more smoothly due to squads. In addition to that, the time to perform the work has been relieved. A white-collar worker said the following regarding workload: "*You will have differences in the participation or effort because it is not equally divided among all colleagues of a squad.*" (Respondent 15). Because of this, divided experiences in the workload are apparent. When looking at the extra work brought forward by squads, no extra effort is required because only daily meetings have been added.

In the field of conflicts, respondents said that squads ensure that future conflicts are reduced as much as possible due to the group feeling that it creates. There is more understanding of each other's problems since problems are mentioned in the squad meetings. A quote that illustrates well why having squads results in fewer conflicts is the following:

"*Much less, because everyone has a better idea of what problems often arise in other departments now, or how matters are going in other departments. So, there is more mutual understanding than before, which ultimately results in fewer conflicts.*" (Respondent 3).

The only conflicts or complexities currently occurring in a squad are the language barriers in the team leader's squad and dealing with the different personalities/ characters (expertise) of employees. Besides, a work task that is now made more complex, which the respondents mentioned quite a lot, was determining the priorities within a squad. There is not always the same understanding for priorities mentioned by other squad members, potentially leading to conflicts. This phenomenon can also be seen in the projects that are done within the squad. Often, there is no insight into the project priorities of other departments, which makes this process of prioritisation even more difficult. That there are some difficulties with the prioritisation within a squad is illustrated by the following quote:

"*We are now quite horizontal within those squads. Therefore, it is challenging to determine priority. We have chosen that entire product ourselves, but now that is gradually becoming more decided for us. Also, because you choose the projects yourself, you are going to take on far too many, and nothing is progressing anymore, so it works as a delaying factor*." (Respondent 14).

If the switch is made to the subdimensions of job control, it will be started with decision latitude. According to almost all respondents, working in squads provides more decision latitude and more responsibilities as well. Despite that squads gives employees more opportunities to make decisions themselves and provides more ownership, this has to be appropriated. Otherwise, nothing will change. Through the joint responsibility that everyone is assigned to within a squad and because employees are more widely informed, better decisions can be made. This is illustrated in the following quote:

"*Since you have that squad organisation, you are aware of more different matters, which also gives you more background information to make certain fundamental decisions. So, in that respect, I think that I have already grown and can start to base myself more on sufficient facts to make decisions. Where it used to be purely from a production point of view without thinking about the other functional departments*." (Respondent 2).

Furthermore, the work autonomy has also been increased by working in squads. The respondents indicated that employees are more widely informed and therefore have more knowledge about other matters. As a result, they see the bigger picture, which lowers the threshold to work more independently. The following quote gives support to this story:

"*By the fact that we can see more of the bigger picture, that we also get to know more about the business as such, that we learn; how does an organisation effectively work financially, where do we make a margin, where do we make a loss, what are the parameters that play a role in our organisation. Since we have gained more insight into this, the autonomy has only increased if you want to take that autonomy.*" (Respondent 2).

The subdimensions about decision latitude and work autonomy are also supported because the respondents indicated that working in squads creates a broader view of the overall production process. Employees have more visibility into the work of other squad members and are better informed about the total picture. Therefore, they can give better tips about matters outside their expertise. A respondent indicated that the work can be carried out more purposefully because of the overall picture that is visible now. This is illustrated in the following quote: "*The flow itself has become much clearer to everyone now that we work in squads and the matters that we need to take into account are now also much clearer.*" (Respondent 3). All of this has led to an increase in the subdimension about involvement. The respondents stated that due to the extensive knowledge sharing between departments, the shared responsibility, and the collaboration, employees feel more united in their work.

The last subdimension of job control is about social support. According to almost all respondents, there is sufficient support, and employees help each other whenever necessary. In addition, the management gives full support to the squad story, meaning that they help the squads with the work that must be carried out. Even though the management offers full support, the colleagues in the squad are already tackling issues well by themselves. As a result, the management is not always involved in decisions made within the squad. Good support can be provided because respondents said that employees get to know their colleagues through the squads. In addition to that, there is regular contact between the different expertise groups. A good quote that illustrates this reduction of the barrier between employees is the following:

"*You also get to know your colleagues a lot more. That barrier between employees will be demolished. It will become much more accessible. Otherwise, you are thinking; would I do that? And is that something for me? And should I do that? And is that person going to deal with that? While now, you feel each other, you see each other. They become your roommates.*

It is much easier to share something, do something together, even if it does not give the result the next time it will give a result." (Respondent 15).

However, there is also a significant disadvantage to the group formation of different colleagues within a squad because respondents said this reduces contact with colleagues outside their squad. Thus, the following was mentioned: "*The walls that we used to have between departments are now between squad one or squad two or between certain employees of a certain squad so that you no longer have collaboration.*" (Respondent 15). Finally, it was also mentioned that some squads operate in both Waregem and Doornik (the other branch of STAS). In this way, the contact within the squad reduces, and it is harder to inform the other squad members at the other location. As a result, communication is sometimes somewhat divided, and it creates extra distance between employees, which makes offering support to each other even more difficult.

4.2.3 Joint impact of QMS and squads on quality of work

Efforts must be made on both QMS and squads to achieve a positive result on the quality of work. The following quote shows that having both QMS and squads are necessary to achieve a positive result on the quality of work as these two cannot be seen separately from one another: "*I do not believe in the QMS application without a squad structure, because then you will retain the separate departments, fights between them will occur, and then you can still communicate with a telephone.*" (Respondent 2). For the reason that the two have a link, a QMS application without squads will not work because squads is a supporting factor to the use of QMS. However, a squad structure without a QMS application will not work either because QMS support the squad process. This can be seen in the following quote: "*The squad structure without QMS will not work either, because then you will not be able to put into use the information from the workplace enough.*" (Respondent 2). In addition, the previous two subsections (4.2.1 and 4.2.2) showed that both QMS and squads increased the subdimensions related to the quality of work indicators to a certain extent.

Besides, some respondents indicated that QMS and squads run along with each other and do not work well together. However, it is necessary to have both within the organisation because they are both effective in other areas. Their effectiveness in other areas requires efforts in both parts to achieve a good quality of work. The following quote shows that QMS and squads are effective in other areas:

"*I see them quite separate from each other. Our QMS is less linked to the entire squad operation, but QMS is more linked to the communication between the different departments or with production and between the different departments. So, QMS is centralised from production, and the squad operation is something to organise the support services for production better.*" (Respondent 13).

4.2.4 Impact QMS and squads on absenteeism and personnel turnover

First, when looking at the link between QMS and absenteeism, some respondents indicated that QMS has nothing to do with illness. Therefore, they said that the link between QMS and absenteeism was hard to establish. However, some respondents indicated that QMS could reduce accidents at work through the awareness that it creates in the mind of employees. When a dangerous situation is registered in QMS, it is harder to forget because employees are confronted with it visually. A team leader indicated that this has improved safety and that the total number of accidents has decreased. The following quote shows an addition to this: "*The more that these dangerous situations can be logged, the more aware that everyone is dealing with them, and the more solutions are sought for the dangerous spots in production.*" (Respondent 13). As a result, QMS can influence absenteeism in terms of accidents because dangerous situations can be made visible. Furthermore, the link between personnel turnover and QMS was more difficult for the respondents to answer. It was often unknown to them whether QMS influenced this.

The respondents' thoughts regarding squads and the influence it may have on absenteeism were also quite divided. A few respondents indicated that there was no visible link between having squads in the organisation and absenteeism because it was more of a personal thing. However, some respondents said there could be less absenteeism due to squads. The squad members feel better at work due to belonging to a group and the visible social contact and control. Thus, the following was told about this:

"*I think it does bring something positive after all. You see each other every day, and you speak to each other every day. You also have those social contacts, and you see and feel whether someone is having a bad day because someone has a problem. Eventually, you also notice when someone is not there."* (Respondent 15).

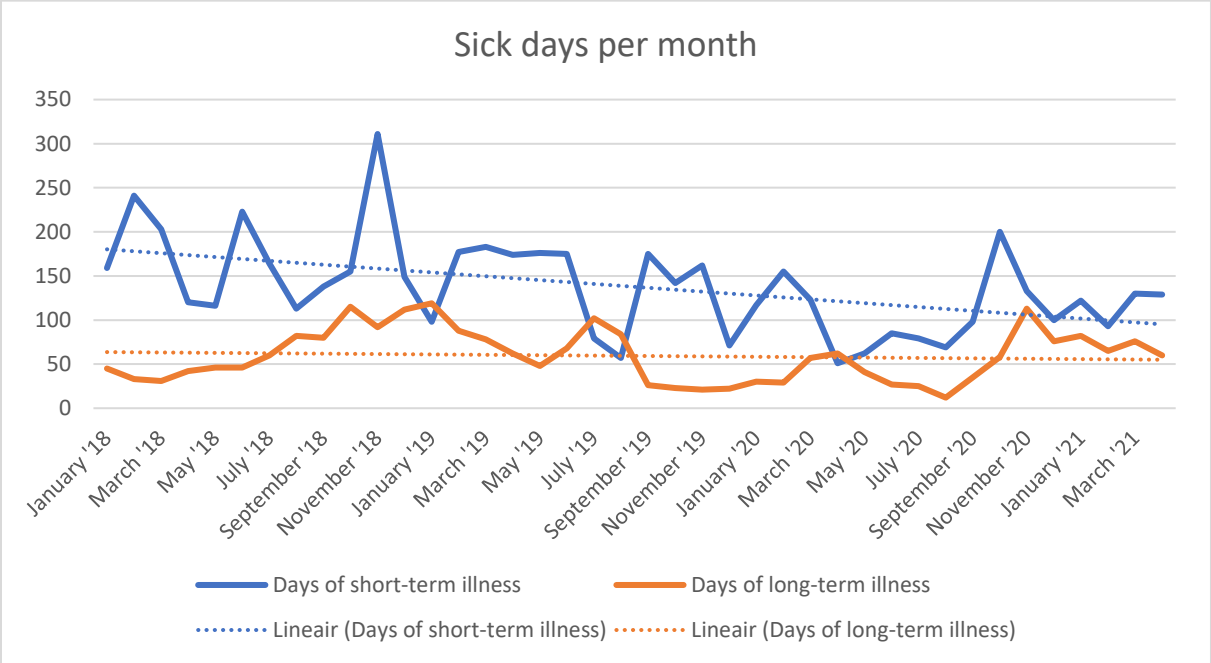
This line of thought shows that having squads may positively affect absenteeism. However, it could influence personnel turnover as well. It was stated that within the squads, employees are sitting much closer to each other than before, working for the same goals and thus building a better bond. As a result, employees may be less inclined to leave the organisation. Nevertheless, not all respondents saw a direct link between having squads and personnel turnover within an organisation.

At this point, some quantitative data is showed to verify whether the results of the qualitative data (interviews) have ensured that absenteeism and personnel turnover have decreased. In this way, it can be assessed whether the quality of work has been improved. According to the literature, it was essential to have a healthy balance between the job demands and the job control given to deal with those job demands (Karasek, 1979). This will lead to more involvement and less stress, which lowers the level of absenteeism and personnel turnover (Karasek, 1979; de Sitter, 1994).

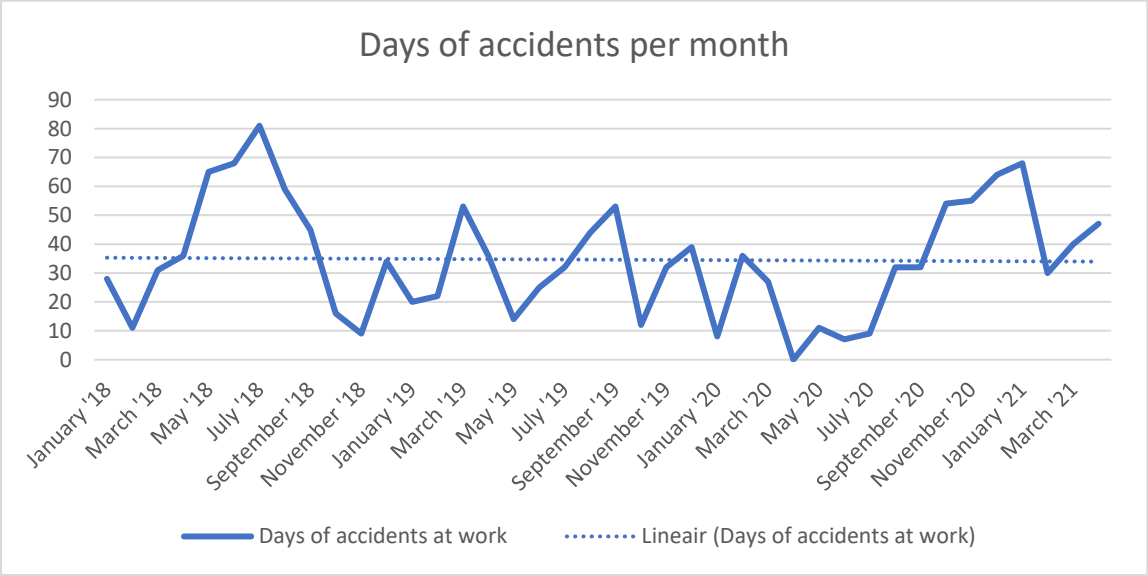
Regarding absenteeism, graph 1 shows the development of the number of sick days (short-term and long-term) per month, starting on January 1, 2018, and ending on April 30, 2021. The number of days of short-term illness has decreased in recent years (see the blue trend line). The longer-term sick days have also decreased (see orange trend line), but this decrease is smaller than the short-term days. This graph does not say anything about the total number of employees sick each month because the total number of sick days per month is taken. It is noticeable that in October 2020, the number of short-term sick days, and in November 2020, the number of long-term sick days, suddenly increases considerably. After this point in time, it drops in the following months. However, the peak of the number of short-term sick days was visible in November 2018.

Another aspect that can also be linked to absenteeism is accidents at work (Horton et al., 2018). The number of days in each month that there were accidents is shown in graph 2. This graph runs from the same date as graph 1. It has been decided to include this data since it was told in the interviews that dangerous situations can be registered in QMS, reducing the number of absent employees. Therefore, it will be examined whether there is a connection there. As is shown in graph 2, the number of accidents at work has decreased slightly in recent years, but not drastically. It is noteworthy that until July 2020, the days of accidents at work

became fewer. However, after this month, it increased again significantly until January 2021. After this point in time, it shows a significant decrease in the following months.



Graph 1: Number of sick days (short and long term) per month



Graph 2: Number of accident days per month

Subsequently, in table 2, the number of employees who left the organisation from 2018 to 2020 with the corresponding position is shown. Compared to 2018, 22 employees left the organisation in 2019, consisting of 19 blue-collar workers and three team leaders. In the following year (2020), this had decreased by more than half.

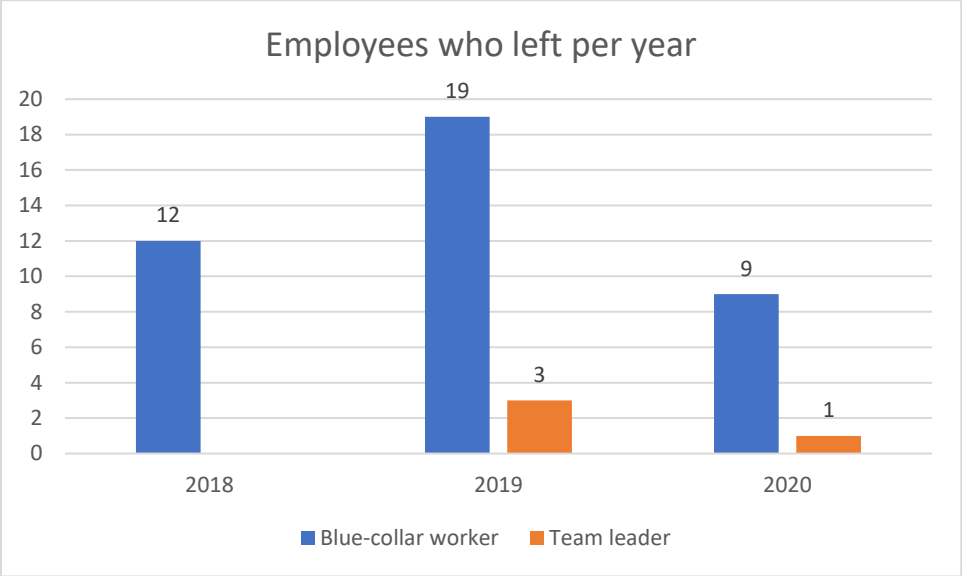


Table 2: Number of employees who left the organisation

4.3 Performance

The underlying subdimensions that determine lead times were examined to analyse the impact of QMS and squads on performance. Thereby, meaningful insights mentioned in the interviews have been added which go beyond the existing literature. The subdimensions used for lead times were the number of errors, QRM facets, and continuous improvements (including providing feedback) (Barros et al., 2014; Godinho Filho et al., 2017; Africano et al., 2019). At the end of this section, some quantitative data is shown to see whether the indicator of lead times has decreased and thus the performance has been improved.

4.3.1 Impact of QMS on performance

Based on the subdimension about the number of errors, several respondents mentioned that before QMS was used, employees forgot problems more quickly. Consequently, they were not followed up and remained visible in the organisation for a longer time. Additionally, problems were also sometimes simply ignored. The email traffic that was widely used in the past was not always clear to all employees because they did not know who should tackle the problem, primarily if several errors coincided. Tackling problems was made even more difficult because there was no central point of contact. The employees had to move a lot on the production floor themselves to identify and communicate the problem.

At this point, QMS is used intensively within the organisation. As a result, almost all the problems mentioned in the previous subsection have been solved. The respondents indicated

that blue-collar workers are now more alert to production errors and that fewer movements have to be made in the factory to report or fix the errors. In addition, it is now also clear through QMS which errors occur and for which department they apply to offer a solution. In this way, errors are less likely to be forgotten. A team leader told the following: "*Now that we have QMS, they follow, and we no longer have to call. They follow the list where the problem is, and then you cannot forget, because then we will receive a notification that the problems have been addressed.*" (Respondent 6). In doing so, urgent and repeated problems can be placed in front, so the worst mistakes are tackled first.

In general, QMS can be used for almost all production errors. It became clear that the problems can be tacked faster and are easier to recognize because errors are now clarified insightfully in QMS, and the cause of the problem can be identified more quickly. Within the team leader's work, it was indicated that the errors have decreased in recent months. That QMS can indeed serve for a reduction in errors is illustrated by the following quote:

"*In some departments, we already see that the errors were halved by tackling only the biggest problems that came out of QMS. For example, there was a certain bolt not tightened. This problem was something that came back a lot. It was achieved from the data that was communicated, and since then, we see that the total errors have been halved.*" (Respondent 4).

Besides tackling the most significant errors, the respondents also let know that QMS is very useful for making repeated errors visible and anticipating avoiding errors in the future. A quote that supports this story is one from a white-collar worker:

"*QMS can be used to identify and communicate those problems and to avoid them in the future. In the past, without QMS, the problems were not known. Now they are known, and we can correct our data in the system not to make those mistakes again.*" (Respondent 2).

Unfortunately, it was indicated that there are still quite a few problems regarding using QMS in some departments. An increasing number of QMS reports can be seen at the purchasing department, mainly due to late deliveries from supplies as several raw materials are now relatively short on the market. Within the warehouse, it was mentioned that errors regarding order picking regularly occur due to the wrong input they receive from engineering. Mistakes

regarding the work instructions and material lists are made quickly since this involves many parameters, like a mistake if the wrong click is made in QMS. Besides, another negative issue is that a couple of respondents mentioned that sometimes problems arise by putting information in QMS. It was told repeatedly that article numbers were often not communicated correctly or were even forgotten by the team leaders. The following quote from a white-collar worker illustrates this occurrence:

"*A team leader sometimes reports too little information in the system. For example, there is a broken pole, and then they say, 'broken pole of a back piece', but for a buyer who is not technically trained at all, a back piece says nothing. They want to have an article number with which they can get started in our system, and that sometimes causes problems.*" (Respondent 2).

Besides, the duration of errors is also not correctly entered in QMS and errors on drawings are not yet included in QMS. Furthermore, the person responsible for the problem is not always registered in QMS, and it is not possible to add photos in QMS. As a result, the notification of the problem is not always clear to the employee who has to solve it. Furthermore, not all errors are always communicated in QMS. Errors that happen under the radar or are resolved by blue-collar workers themselves are not logged in QMS. For this reason, the information that the data of QMS shows may not always match the actual situation. Additionally, the creator does not get a pop-up message when changes are made to QMS items by other users.

If the subdimension about QRM is included, a respondent said the following: "*That is the response time of sending or preparing a QMS.*" (Respondent 12). The respondents mentioned that QMS provides a higher reactivity to solving issues. QMS leads to a higher reactivity because information can be passed on faster and more correctly. In the past, there used to be a large communication chain within the organisation. However, this communication chain has now been reduced to the situation where two employees are involved when an error occurs: the reporter and the solver of the problem. Thus, the following was told about this by a white-collar worker:

"*There is no one else involved between the creator and me who then follows it up. I do not need the colleagues or five others, or the creator needs other colleagues. No, that is resolved*

immediately, and often all complaints or all reports are within a good working week resolved." (Respondent 15).

Furthermore, since emails and phone calls have been significantly reduced, more direct communication is now from person A to person B. This makes communication more correct and faster while unclogging is prevented. However, it was mentioned by the respondents that currently, little is achieved proactively with QMS. Even though the reactivity has increased, and the response times have improved through QMS. The following quote explains why:

"*Reactively, it is perfect, but it is difficult to do something with it proactively. To give an example, let us say; the wheel is broken. Then we can see; the wheel is broken, so we can say that we will order a new wheel, problem solved. However, suppose that a wheel is broken every day, then that is more difficult to get out of QMS now.*" (Respondent 4).

Another respondent indicated that the data is present in QMS, but they cannot use it. In other words, in the field of proactive working, little gains are currently being made using QMS. Nevertheless, it can be said that by using QMS, work can be done faster within the organisation. Due to the broad information provision in QMS, support could be provided better and faster in the event of problems. Besides, everything is linked in real-time, and less movement needs to be made to report errors.

Regarding continuous improvements, the respondents say that QMS can bring forward better improvements and innovations. QMS gives a broader view of the production process, and problems can now be better monitored. For example, a new way of scanning has been implemented in the warehouse after it was visible on QMS that many problems occurred by this action. This improvement, made with the use of QMS, is illustrated in the following quote:

"*The biggest thing I have been able to achieve thanks to and based on QMS is a very new process of order picking, a very new process of scanning. In other words, that was a problem which was uncovered, and thanks to QMS, we have adapted a few modifications to it.*" (Respondent 12).

In addition to the previous part, the input in QMS ensures that the problems can be better estimated, making them easier to qualify for an improvement. Thereby, decisions to make improvements can also be supported by the data provided through QMS. A respondent indicated that the supply of materials has improved because QMS provides insight into material shortages. This insight has led to constant improvements in the quality of the product and the way of performing the work because employees are much more aware of making improvements and tackling problems.

However, a problem was visible when respondents want to analyse the data from QMS. It was told that it is often complicated and time-consuming to analyse the data that QMS provides. Several respondents say that the data processing should be made a lot easier, making it even easier for them to make suggestions about improvements. Also, more data could be retrieved from QMS than is currently being done, as illustrated by the following quote:

"*We will be able to extract even more data from QMS. When I think of procurement, we are now busy writing down why material is not available. That is quite varied, which can be because the suppliers deliver too late. However, it could also be because there was a wrong stick count in the warehouse, which suddenly turned out to have fewer items in stock than was expected according to the system, and then I could keep seeing this problem and so on.*" (Respondent 1).

As an example of making the data analysis more accessible in QMS, relationships with suppliers can be improved. Employees see more often which suppliers deliver too late, after which they can schedule a meeting with that supplier to discuss this with some physical evidence that QMS provides. Furthermore, there were also some improvements mentioned. These improvements included adding their photos in QMS, enabling push notifications when parts are changed in QMS, and selecting parts about the materials list. Besides, a visual screen could be placed in the production where it is visible to everyone which QMS items are there and by whom they will be handled.

Finally, it was told that constant feedback is provided on QMS items during meetings. In the morning meetings, where the production is reviewed with the blue-collar workers, QMS reports are involved. This meeting has already led to a reduction of errors by 15%. One respondent mentioned that a sign was visible during this meeting where QMS items are

assigned to different colours, so what was going on was immediately visible. Besides, it was indicated that the QMS items are discussed in the KPI meeting every week. In this meeting, the problems that arise with QMS are discussed, feedback is given, employees stimulate each other to give feedback, and thus knowledge is shared. That the employees within the organisation are active with giving feedback to each other about the errors that occur can be seen in the following quote:

"*I think in terms of engineering, many more errors are coming up than before. However, it is also logged there, and it is also repeated a lot within the KPI meeting that there are probably many more errors and that they must continue to encourage employees to give feedback via QMS.*" (Respondent 14).

4.3.2 Impact of squads on performance

Regarding the number of errors, the respondents said that better and faster could be responded to upcoming errors by having squads. Previously when the squads did not exist, there was no support from other divisions for problems within their division. However, now it is ensured that employees from other departments help each other and that mistakes can be avoided as much as possible. This is due to the shortened lines of communication within a squad and because everyone is sitting together. Furthermore, the respondents say that the errors are tackled in the squad meetings and that they jointly ensure that errors are solved immediately. Thus, the following was told:

"*We all have one meeting a day with the squad, and all problems are notified there; we do not have that part or this or that, or we have so many employees ill. We can respond more to where the problems lay even though it is in a different department.*" (Respondent 6).

Based on QRM, almost all respondents who are participating in a squad have said that communication has improved significantly. Previously, the communication did not run in a streamlined way. Besides, the efficiency of meetings and conversations between squad members has also increased because they regularly sit together with different groups. For the reason that communication runs very well within a squad, information can be shared more efficiently, and matters are more quickly known to the employees. As a result, there can be responded more quickly to the production. The following quote is added to show a good illustration of this:

"*You are much closer together. So, a problem is that it is known that a supplier does not deliver on time, and that is passed on to that squad. It will be told there, and you can already have different team leaders that can respond to it, so communication.*" (Respondent 6).

At this point, the last subdimension will be discussed, which is about continuous improvements. The respondents well experienced the process of proposing improvements and innovations by working in squads. A more overarching picture was created, and the input from various departments was provided and discussed during squad meetings. This is shown in the following quote:

"*Because we are now being informed of that information, we can also contribute more ideas as a squad to take those results to the next level. In the past, we sometimes saw less of the bigger picture and sometimes made the wrong decisions. Nevertheless, now, it is a lot less possible because we are actually aware of more matters and can therefore consider more to make the right decisions in a well-founded way.*" (Respondent 2).

The submission of improvement proposals has become one of the pillars in the meetings, causing that improvements are discussed structurally. However, in the beginning, when the squads were just introduced, there was little structure visible. Causing that many topics were not always included and that a meeting sometimes ended very quickly. Now that the meeting structure has been adjusted several times to create an even better and more effective operation in the squad meetings, employees are more encouraged to provide input on various topics. In other words, by adjusting the structure of the squad meetings, the complete life cycle of trailers is now going through, and important topics are not forgotten. Themes such as planning and ETO have also been added, so employees can more actively mention specific topics related to other themes.

Another aspect mentioned was that the problems are now more openly discussed during a meeting and that fellow squad members are more actively asked about how they can solve issues. The results that are achieved in a squad are also included in the KPI meeting. These results are evaluated weekly with sometimes the participation of the management. Besides, the daily meetings ensure that all topics are repeatedly discussed and fed back. The following quote gives a clear explanation for this:

"*We go through it every day, and sometimes we have many topics, sometimes we do not. The advantage is that everyone can have a say, so everyone from the squad is there or almost everyone, and then you can also discuss everything, which makes it more accessible. In that way, more topics come up, while in the past, before squads, we used to have no stand-ups at all.*" (Respondent 1).

4.3.3 Joint impact of QMS and squads on performance

As was mentioned by a respondent, the strength of QMS and the squad story lies precisely in the combination of both. In that way, employees can tackle problems as quickly as possible, reduce errors, and ensure that the customer is informed and delivered correctly. This shows that attention must be paid to both QMS and squads to achieve a high level of performance. The following quote illustrates the reasoning why both are important to have:

"*For me, the two work undeniably together. Working in squads ensures that you will effectively make your team as a whole and that we all effectively work for the same goal. Moreover, the QMS application can ensure that you will shorten and improve your communication line with production so that we can once again make our customers happier.*" (Respondent 2).

Respondents were also asked whether they considered QMS or squads more critical to achieving the organisational goals. Opinions on this question were divided, as some respondents indicated that having squads is more critical than QMS. However, other respondents mentioned that QMS and squads are equally important and necessary for a business to run smoothly. Although one may be considered more important, it turns out that both are essential to work fluently. Someone from the process department said, "*The one has no greater effect than the other in operation.*" (Respondent 3). Besides, a couple of respondents said that QMS is not related to the squads and that the squad itself has no influence on QMS. The following quote illustrates quite well the thoughts why QMS is separate from squads:

"*We as a warehouse have to monitor those QMS items much more than the other departments in production. So, it is not so much related to the operation of a squad as I should put it that way. It is part between the warehouse, the squads, and the division separately, but it does not affect the squad itself.*" (Respondent 12).

Above, it can be understood that QMS and squads are both necessary to have within an organisation because some departments have more to do with one than others. As a result, QMS may have a more significant impact on performance in one department than in another department, while another department sees more relevance in having squads. In other words, even though both cannot be seen as one by some respondents, it was indicated multiple times that they have both proven their value in the organisation. In addition, it was shown in the previous two subsections (4.3.1 and 4.3.2) that both QMS and squads increased the subdimensions related to the performance indicator. Finally, both QMS and squads ensured that continuous improvements could be made in the organisation and that feedback can be given more quickly and effectively.

4.3.4 Impact QMS and squads on lead times

According to a team leader, the lead times has been improved by QMS because now it can be better acted in production, and employees can be exchanged more effectively. Besides, by using QMS, the blue-collar workers no longer have to wait for certain parts because these are now faster on location. This makes it possible to deliver more quickly to the customers, and delivery times have become more reliable. However, one respondent mentioned that QMS alone could not be seen as the main reason for shortening lead times but that other aspects also influence this. This can be seen in the following quote:

"*To say that QMS could be appointed as the main cause for a smoother lead time of trailers and stuff, I do not think that. I think that the aspects that block the lead time are greater than just the QMS items that go around.*" (Respondent 12).

The respondents repeatedly stated that squads positively impact lead times because, for example, vehicles are not started when it appears that axes are not there. Furthermore, the administrative processing time of files within the product department has been shortened with the communication lines. Having squads makes it possible to switch faster and better because of the close control and rapid feedback. In this way, delays and problems are tackled faster than before. Furthermore, the respondents said that the departments' buffers have now been virtually eliminated, as a better prognosis can be given in all departments. This is illustrated in the following quote:

"*The buffers between the departments are eliminated. For example, if a department has made eight frames in one day and the parallel department of the container line has only three containers, we have a production problem afterwards. All of this is now referred to in more detail and coordinated with each other.*" (Respondent 12).

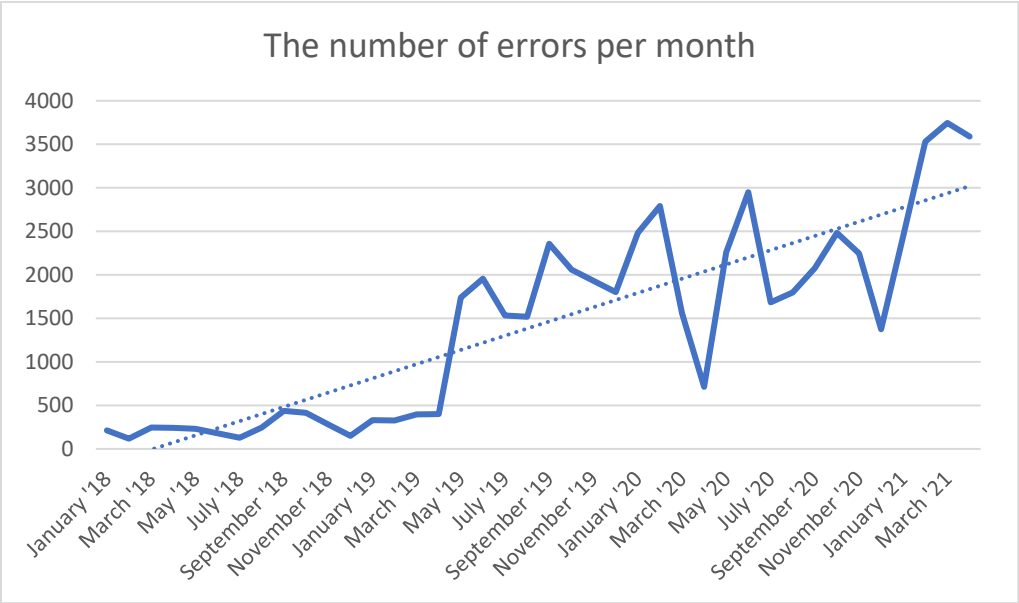
At this point, some quantitative data will be shown regarding lead times to verify whether the results of the qualitative data have caused it to decrease. The literature stated that QMS could ensure that errors can be minimised and that continuous improvements can be promoted (Barros et al., 2014; Africano et al., 2019). Subsequently, having a well-designed organisational structure in which the specialisations of the work processes are arranged will lead to higher responsiveness and work performances (Maduenyi et al., 2015).

In a white paper about STAS, some improvements were shown regarding performance (STAS, 2019). It turned out that quality improvements had increased by 11% and that the lead times had been reduced by 30%. These positive changes in performance arose after two new guiding principles were introduced within STAS. On the one hand, it was granted more regulatory potential, and, on the other hand, investments were made in extra support and a working escalation mechanism (QMS). Besides, STAS's first QRM improvement process in 2016/2017 shortened the administrative lead times from 15 to 9 weeks. This reduction was done by eliminating administrative buffers (stacking files) and shortening delivery times for order-driven materials.

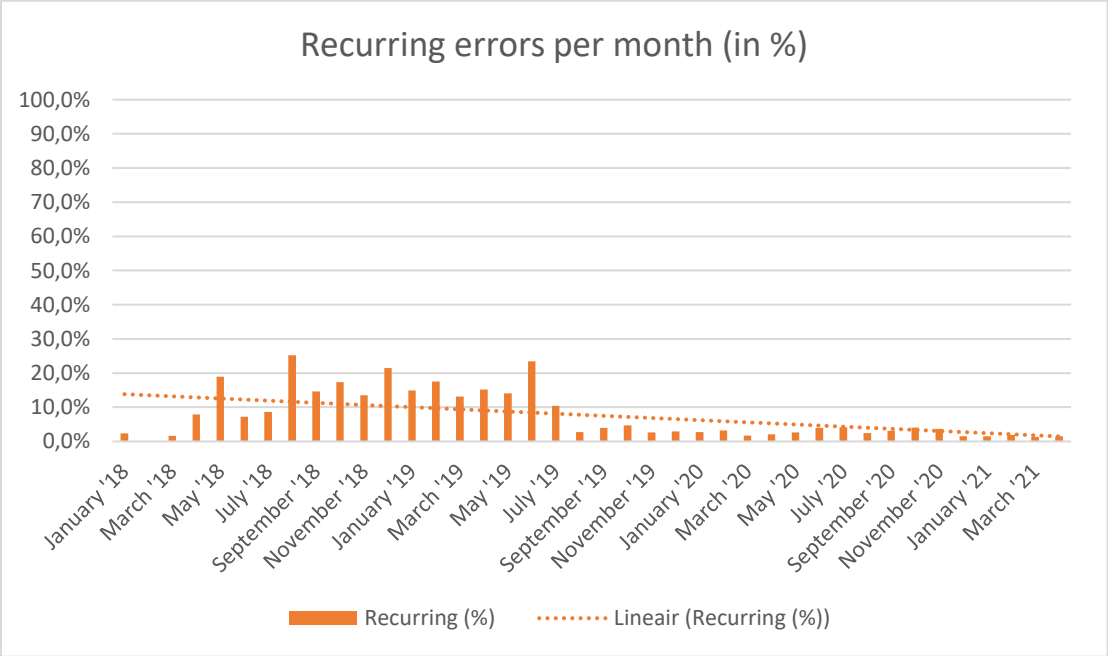
Furthermore, in graph 3 (beneath), a visual representation of the number of errors per month registered in QMS is added. The timespan from this graph starts in January 2018 and ends in April 2021. It can be seen that the number of errors per month has increased in recent years with a drop in two months (April '20 and December '20). More errors are visible in the last year because a team leader mentioned that more errors are registered in QMS than before and that QMS is used more intensively to report and log repeated errors.

Finally, graph 4 shows the number of recurring errors that have been reported in QMS. This chart also runs from January 2018 until April 2020. The number of recurring errors is shown in percentages to avoid a distorting image since not all fields in the QMS data file were filled in. In recent years, the number of recurring errors (orange trend line) has decreased. This means that the number of non-recurring errors has increased since this contains the other half

of the percentages. It is a positive result, as the proportion of recurring errors decreases compared to the non-recurring ones. To add to this, a respondent said that because fewer repetitive errors arise, ultimately, fewer errors will occur in total.



Graph 3: The number of errors per month



Graph 4: Recurring errors per month

Chapter 5: Discussion

In this chapter, the findings of this research are related to the available scientific literature. This means that the results of the empirical research are coupled to previous scientific research mentioned in chapter 2. Besides, in section 5.1, the scientific contribution is mentioned. Finally, section 5.2 describes the practical implications.

In terms of **quality of work**, it becomes apparent from the findings of this research that both QMS and squads have a positive contribution to the execution of work. Regarding job demands, it appears that through QMS, employees are less disturbed in work, better input is provided, and the work can be better performed because communication is facilitated. As was stated before, the use of QMS can ensure that employees are provided with the means to meet the job demands (Groebner & Merz, 1994). This research shows that QMS reduces the workload in some cases and relieved work time. This is confirmed by previous research, as it was said that QMS could ensure that the workload is diminished (Liu & Liu, 2014). Besides, the empirical findings of this research showed that conflicts are avoided and reduced by QMS. The scientific literature cited that potential conflicts are avoided through QMS, as improved communication could lead employees to feel that they were being heard, respected, and perform their work better (Liu & Liu, 2014).

By having squads, job demands can also be handled better through improved collaboration and clarification of issues. The experience turned out to be divided in terms of workload, but it was indicated that the effort within a squad is not the same for everyone. It was shown that through squads, no extra work had been put on the employees besides participating in the daily meetings. Next, the number of conflicts was reduced by having squads because there was understanding for problems at other departments. Postrel (2002) stated that when a high level of mutual understanding is visible within the squad, this will reduce potential conflicts and make work more efficient regardless of its complexity. However, there was some complexity visible in the work of the squads because the determination of task priorities was difficult. The squad members were not always able to handle this responsibility well. Huys et al. (1999) already indicated that enough support must be offered to fulfil this responsibility and that careful consideration has to be made to the number of assigned responsibilities. More responsibilities can be associated with increased stress complaints, leading to higher absenteeism and personnel turnover (Kristensen, 1991; Moore, 2000).

This research also found that based on job control, QMS increased the decision latitude and responsibilities of the team leaders unless these did not make any difference to the white-collar workers and blue-collar workers. Besides, the team leaders' work autonomy increased because they can now tackle and solve errors themselves. However, for white-collar workers and blue-collar workers, the increase in autonomy was not related to QMS. Previous scientific research stated that QMS affects employee-related outcomes (Liu & Liu, 2014). Nevertheless, employee-related outcomes, such as greater decision latitude and work autonomy, must be appropriated (Hunt, 1987). Otherwise, nothing will change. Besides, using QMS resulted in increased involvement of the employees because employees were better informed and had a more transparent overview of their work by exposing errors. The research conducted by Hodson (1996) confirmed this by stating that QMS enables employees to be more connected to work, thus making them more involved. Based on the social support offered, it became known that blue-collar workers are little informed about QMS, making it challenging to deal with errors themselves. This can cause an increase of stress-related complaints to the blue-collar workers, as they cannot handle the errors well (Johnson & Hall, 1988; Karasek & Theorell, 1990).

Subsequently, it turned out that squads did provide an increased scope of decision latitude and responsibilities for everyone who participated in a squad. This resulted in less stress, as employees can solve the problems in the workplace themselves (Benders et al., 2006). It was also discovered that the work autonomy was increased because employees gained more knowledge in different areas and thus saw the bigger picture, lowering the threshold to work autonomously. Besides, shared responsibility, knowledge sharing, and a good collaboration within the squads increased involvement because employees feel now more united in their work. According to Achterbergh and Vriens, 2019, working in teams (squads) resulted in closer involvement, as more rational and broader tasks are carried out. Furthermore, this research's findings show that both colleagues and management fully provided the social support for the squad story. The support was so well experienced that colleagues could tackle the problems within the squads independently and therefore no longer needed support from the management. However, the close contact within a squad diluted the contact with employees outside the squad. This disadvantage was already mentioned in earlier research. Since team members can perform the task well, less interaction will be needed with the employees outside the team (Tjepkema, 2003).

This research suggested that both QMS and squads were needed to achieve a good result on the quality of work, as both had a link and supported each other in their way. Besides, they were effective in other areas (departments). Therefore, efforts in both are required to achieve the ultimate effectiveness regarding the quality of work. In this matter, Johnson et al. (2020) explained that when a technological system was adequately linked to the organisational structure, matters like stress levels could be reduced. If a glance is taken at the indicator of absenteeism and personnel turnover, it appeared that QMS could reduce absenteeism by making work accidents visible. Horton et al. (2018) confirmed this by stating that emerging technological systems such as QMS can reduce workplace accidents and lower overall absenteeism. However, the link between personnel turnover and QMS was during the interviews more difficult to establish. As Moore (2000) and Hoonakker et al. (2013) stated, since stress can be reduced, this will provide favourable outcomes for personnel turnover, as stress and personnel turnover are correlated.

While opinions were divided on the impact of squads on absenteeism, several respondents expressed that there could be less absence due to squads because everyone feels better at work through belonging to a group and having social contact and control in a squad. In addition, personnel turnover could be reduced because everyone is working towards the same goal, the group is much closer than before, and a better bond was built up with colleagues. As working in squads resulted in low values of the design parameters, and a complete task is being performed, lower levels of absenteeism and personnel turnover are achieved (de Sitter, 1994; Huys et al., 1999; Christis & Soepenberg, 2015).

In terms of **performance**, it was showed that through QMS, employees are now more alert to errors, and problems are less forgotten and ignored due to the shortening of communication lines. However, to guarantee performance, it remains vital that employees remain committed to deal with the errors (James, 1992). This will ensure that as few errors as possible occur in the production process, reducing the total number of errors (Jong et al., 2019). Besides, the findings of this research showed that through QMS, urgent and repetitive problems are exposed. This causes that there can be anticipated better to lose as little time as possible between the departments and work lines. Furthermore, faster and better can be reacted to emerging errors by having squads, as support is provided about errors to other departments. The chance of disruptions and errors is smaller by working in squads since employees are less dependent and have more control options (de Sitter, 2000).

In the field of QRM, the findings show that QMS has a positive contribution to the responsiveness of errors. The improved communication allows for faster response to problems, resulting in less waste between the working lines. The research by Yadav et al. (2020) confirmed this by showing that when QMS was used in an organisation, the performance indicator of responsiveness changed positively. Besides, it has also been shown that due to QMS, problems are now logged in real-time, broader information is provided, and better and faster support is offered, causing that work to be done more smoothly. It was already mentioned in previous scientific research that QMS could ensure that a smoother flow of work activities arises (Anderson et al., 1995; Ahire & Dreyfus 2000). Squads have helped with this, as this provided a communication improvement, and as a result, the information from QMS is shared faster than before. It was shown that matters are earlier known to employees, which means they can respond more quickly to production. As was already stated by Maduenyi et al. (2015), since the new organisational structure facilitates working relationships, efficiency and responsiveness are increased.

Furthermore, it is shown that both QMS and squads are bringing about better improvements and innovations in the work processes. QMS makes it possible to monitor problems better, and the input from QMS ensures that a better estimation can be provided of the problem. It was confirmed by Barros et al. (2014) as QMS promotes continuous improvements. Besides, the improved collaboration through working in teams (squads) makes it easier to exchange feedback between the departments, while the operation of QMS enables better and faster improvements (Molleman & Slomp, 2006; Yukongdi, 2001).

Besides, it is easier for the employees to provide feedback when technical systems are used (Sanders et al., 2016). This research showed that due to the feedback provided during meetings, the number of errors has reduced by 15%. Regarding squads, it became clear that the bigger picture can be seen and that improvements can be better substantiated through the input from the other departments and QMS. It was even told that proposing improvements has become a central part of the daily squad meeting. This is a very positive development, as it is essential to continuously improve and evaluate the main processes to achieve the desired performance (Ebrahimi & Sadeghi, 2000).

Based on the performance indicator, the findings show that QMS reduces the lead times because faster action can be taken, errors become more visible, and errors can be tackled more

effectively. This means that the customer can be delivered faster. These results are confirmed by previous research. By tackling and minimising errors and continuously improving the production process, QMS can shorten lead times (Africano et al., 2019; Goldratt & Cox, 2014). However, QMS cannot be the main reason for the reduction of lead times because it became evident in this research that the proportion of squads in this is also essential to consider. Benders et al. (2015) already mentioned that direct input could be provided by adequately linking a technological system like QMS to the existing organisational structure. In that way, employees do not have to wait long for parts of information. This leads to shorter lead times and faster response times.

Besides, by making a proper connection between technology in the organisational structure, technology can ensure that tasks are performed more efficiently, reducing lead times (Batenburg et al., 2002; Benders et al., 2015). The findings of this research add that squads can ensure that better and faster can be switched in work, that more close control is apparent, that employees can provide each other with feedback in an easier way, and that employees jointly pursue the organisational goals. This resulted in that delays and buffers between departments have been virtually reduced and that a better forecast of the production can be provided. By placing interdependent activities in the same space, other researchers already suggested that in this way, buffers can be reduced as much as possible (Christis & Soepenberg, 2015).

5.1 Scientific contribution

This research contributes to scientific knowledge because this research explicitly focused on the quality of work and performance indicators where a new organisational structure has been introduced and QMS. Currently, there is no research available that combines the organisational structure and QMS on both the quality of work and performance in one single research (Groebner & Merz, 1994; Liu & Liu, 2014; Yadav et al., 2020; Tjepkema, 2003; Dhondt & Benders, 1998; Maduenyi et al., 2015). Thereby, the relationship between the use of QMS and the combination with the organisational structure is also not specifically evident (Benders et al., 2006; Benders et al., 2015; Johnson et al., 2020). As a result, this research makes an essential contribution to the scientific literature, as both relationships can be seen in this research.

Besides, this research complements existing studies. It was described in previous studies that the structure of an organisation and the type of technology used should be linked to each other (Trist & Bamforth, 1951; Batenburg et al., 2002; Shrivastava et al., 2006; Benders et al., 2015). The research results give strength to this because it is shown that the introduced technological system (QMS) and the new organisational structure complemented each other and were well in line. In this way, only the confluence positively affected the quality of work and performance.

Furthermore, the scientific research available in the field of QMS linked to the quality of work was relatively minimal (Fink & Ludíková, 2013; Liu & Liu, 2014; Stefanovic & Djordjevic, 2016). The focus was often on the performance of the organisation (James, 1992; Yadav et al., 2020; Sfreddo, Vieira, Vidor & Santos, 2021). This research was aimed to fulfil this shortage of scientific knowledge about the use of QMS related to the quality of work. However, a difference was visible when comparing the results of this research with the study of Liu and Liu (2014), as they stated that the use of QMS would ensure that the workload is reduced. This finding does not fully correspond with the results of this research, as it turned out that the workload has remained the same in some situations. Additionally, Liu and Liu (2014) showed that QMS would increase decision-making latitude and work autonomy. However, it was showed in this research that this only appears for the direct users of QMS.

In addition, the Job Demand Control model of Karasek (1979) has been used to determine the quality of work. Therefore, this research supports earlier research conducted on this model (Schaufeli & Demerouti, 1999; Karasek & Theorell, 1990; Schaufelli, Bakker & Van Rhenen, 2009; Johnson & Hall, 1988). Besides, previous research on technology using this Job Demand Control model was performed with a quantitative research method (Bal et al., 2021; Salanova, Peiró & Schaufeli, 2002; Mullarkey, Jackson, Wall, Wilson & Grey-Taylor, 1997). However, this research links a qualitative research method to using new technological systems with Karasek's Job Demand Control model (1979). Furthermore, in the field of conflicts, previous research that has been conducted was based on work-family conflicts (Duxbury et al., 1994; Butler et al., 2005; Hammer, Saksvik, Nytrø, Torvatn & Bayazit, 2004). Nevertheless, in this research, the subdimension of conflicts was focused on the internal conflicts between employees within the organisational boundaries based on complexity. As a result, this research has expanded Karasek’s existing Job Demand Control model by focusing on the subdimension conflicts within the organisation itself.

Based on the new organisational structure, this research shows the impact of having self-managing teams (squads) and what this does to both the quality of work and performance. In the field of quality of work, research had already been carried out on what this did to the ambitions and the employees themselves (Achterbergh & Vriens, 2019; Benders et al., 2006; Dhondt & Benders, 1998; Doorewaard et al., 2002). This research showed how this had changed the employees' overtime, thereby supplementing previous research. This research offers insight into how it was before, what experience they have had during the time in between, and how they are experiencing it now. The latter was often being mentioned as the outcome in the previous studies. Furthermore, this research showed that working in self-managing teams (squads) positively influences efficiency and work performance. Doing this complemented other scientific research based on this topic (Maduenyi et al., 2015).

Finally, Benders et al. (2006) stated that conflicts could arise when a new organisational structure is introduced with new technological systems. Conflicts could arise because centralisation and standardization often come into play, contradicting de Sitter's (1994) sociotechnical design principle. The findings of this research showed an understanding and verification of this. It turned out that QMS centralises information and standardises processes as QMS must be used uniformly.

5.2 Practical implications

The research findings showed situations that can arise when QMS is used and when the management decides to work according to a new organisational structure. One of the critical points about using QMS is the functionality of pop-up messages that must be installed when a change is made in a notification of a problem. In this way, it can be ensured that the person responsible for the notification will be informed. Otherwise, it creates unclear situations and unreasonable delays. Besides, to ensure that the proactive nature of QMS is preserved, data analyses should be simplified. This allows employees to analyse the data independently, given them the opportunity to more easily substantiate their decisions to suggest improvements.

Furthermore, suppose the switch is made to a new organisational structure that introduces self-managing teams (squads). In that case, it is essential to continuously support the employees and let them get used to the new situation. If insufficient support is provided at the beginning of this process, they can lose employees on the way. This is because employees may find it challenging to work with new people and get used to the new way of working. In

addition, working in self-managing teams could lead to diluting contact with the employees outside the team since employees spend much time within their team and sit together very closely. To avoid the disappearance of this contact, organisations could organise monthly gatherings with employees outside the team, or occasionally events where all employees are involved.

In addition, organisations can use the findings of this research to understand the concepts of the quality of work and performance in a broader way to develop QMS and the squads even further. One of the insights in this research shows suggestions for improvements, such as putting up a visual screen in the production. In this way, all QMS items are displayed, along with the person who will handle them, so that errors are immediately visible and clear to everyone at any time. It is strongly recommended that both STAS and other organisations carefully read these suggestions for improvements, as they can only improve the quality of work and performance. Furthermore, because the employees at the operational level are close to reality and get to work with QMS, they can better identify areas for improvement that would otherwise not be immediately apparent to senior staff. Therefore, it is recommended that employees have the option to suggest improvements and to listen carefully to them.

Besides, this research showed how the situation has changed from the past to the present and how the employees experienced it during the journey. Other organisations could use this information to ensure that some milestones that are occurring are already known. This allows milestones to be addressed in advance to make the process of QMS and working in self-managing teams as smooth as possible. Finally, this research is case transcending since a case has been used that maps different relationships in a single research. For this reason, it can be helpful for external parties such as the government to use the outcomes of this research. For example, they can set requirements when new technology is used in an organisation, in which they prepare policy reports that provide a clearer picture of the success and hindering factors. Other organisations can use these reports to better link their new technology to their organisational structure and achieve the desired results on both the quality of work and performance.

Chapter 6: Conclusions

In this chapter, the conclusions of this research are described in section 6.1. After that, the limitations are presented in section 6.2. Lastly, recommendations for further research are described in section 6.3.

6.1 Conclusions

This research aimed to get insight into the new organisational structure (introduction of squads), QMS, and the relationship between the two on quality of work and performance within STAS. It was essential to determine the impact of the new organisational structure and QMS, and how the employees were experiencing this. Some bottlenecks and strengths were identified based on the subdimensions coupled with the quality of work and performance indicators. This goal resulted in the following research question: "*How does the use of QMS and the new organisational structure affect the quality of work and performance at STAS?*". To this end, qualitative research was carried out. Thereby, some quantitative data was analysed to see whether the qualitative data can be verified based on some excel files and a white paper available within STAS.

It can be concluded that the joint use of QMS and the new organisational structure within STAS increased the quality of work and performance. During the interviews, it became known that QMS and squad positively impacted the quality of work subdimensions related to absenteeism and personnel turnover indicators. The quantitative data verified this because the indicators of absenteeism and personnel turnover decreased in the last years. Furthermore, it became known in the interviews that the performance, in turn, was increased by QMS and squads, as the underlying subdimensions related to the indicator about lead times showed a positive impact. This was again verified by the quantitative data present, as the lead times have been shortened, and errors return less quickly.

To sum up, both QMS and the new organisational structure at STAS positively impact the quality of work and performance indicators formulated by de Sitter (1994). In addition, QMS and the new organisational structure were linked well and mutually complemented each other, impacting these two positively. Finally, it turned out that both were necessary to achieve positive effects on the quality of work and performance, which illustrates the importance of the relationship between QMS and the (new) organisational structure.

6.2 Limitations

By conducting research, a researcher is bound to several decisions that have to be made regarding the methodology, theory, and analysis. Although efforts are made to guarantee the quality of the decisions as well as possible, there will always be limitations associated with research. According to Ioannidis (2007), it is crucial to understand the limitations because it ensures that the research's credibility can be better assessed, that the research results are presented in a proper context, and that the validity can be better interpreted. The limitations of the methodology, theory, and analysis will therefore be discussed in this section.

Methodology

In this research, a total of 16 interviews were conducted with employees in different organisational layers. In this way, an attempt was made to obtain a complete picture of employees' experiences at the different organisational layers of STAS. Although care was taken to achieve data saturation and not missing essential insights and information, it was decided to choose one STAS location to conduct the interviews. The Waregem location was chosen to avoid language barriers, as no Dutch or English was spoken in the other locations, and by substantive considerations. After the interviews were taken, there was no need for additional interviews. However, it can be stated that generalising the results to the entire organisation is only possible to a certain extent. Also, this research was carried out within one production organisation, making it difficult to generalise the results to other production organisations. Nevertheless, the main goal of qualitative research is not to generalise the results to all contexts but to a specific phenomenon where a particular population is visible (Leung, 2015). Since the case organisation is described in detail, this research may be offered to other organisations to assess whether the results can be applied in their organisational context (Symon & Cassel, 2012).

Besides, not all respondents spoke and understood the English language. Therefore, the questions related to the subdimensions and indicators about the quality of work and performance had to be translated to an interview format that had to be entirely in Dutch. This could have led to a decrease in construct validity due to the translation process between the English information that was known and the translation that had to be made for the interview questions.

Furthermore, the interviews were first transcribed to use the respondents' arguments to substantiate the interview results. The respondents were all of Belgian origin, and some had a Belgian accent. Therefore, it is possible that when transcribing the interviews, certain misunderstandings or misinterpretations arose. Besides, 50 quotations from the transcripts (see chapter 4 'Results') have been translated from Dutch into English, as this thesis must be written entirely in English. Here, it could happen too that specific quotations have been mistranslated or misunderstood. In addition, due to a lack of time, it was decided to transcribe 11 out of 16 interviews. Notes were used in the other five interviews. Using notes can negatively influence the internal validity because the respondents' answers may deviate from the interpretation given by the researcher (Symon & Cassel, 2012).

During the entire research process, two fellow researchers were regularly informed, and an update of the research process was provided to increase the reliability. However, these researchers were not physically present during the interviews. Therefore, the validity of the interview results was exclusively assigned to the capacities of the researcher. Finally, during the online interviews that were held with employees at Waregem, it was mentioned that some respondents were also present in another STAS location, namely Doornik. As a result, the generalisation of the research results has certain applicability to this location.

Theory

In conducting this research, an abductive research approach was chosen. Existing literature was used deductively to formulate the interview questions, after which coding was done inductively to provide new insights. Four interview questions were more open and less focused on a particular subdimension, allowing the respondents to think about how they experienced the concepts. Besides, two concepts were chosen for operationalisation, namely quality of work and performance. The impact of QMS, the organisational structure, and the relationship between the two on the quality of work and performance were examined. The current scientific literature does not extensively discuss all three of these relationships. Therefore, it is difficult to confirm the results of this research optimally.

In addition, the concept of performance was first mapped using de Sitter's theory (1994), after which some underlying subdimensions related to the indicator of lead times were investigated (Barros et al., 2014; Godinho Filho et al., 2017; Africano et al., 2019). The underlying subdimensions of lead times do not directly come from an existing model but have been

considered necessary after reading several articles about it. For this reason, it cannot be said with certainty that these underlying subdimensions form the most substantial basis for measuring the indicator of lead times in this research. Besides, de Sitter's theory about the quality of organisation, which is linked in this research to performance, consists of more components than just the production-cycle time (Achterbergh & Vriens, 2009). As a result, it cannot be assumed that the entire performance has been mapped. Lastly, the sociotechnical perspective argues for an integral view of the organisation (de Sitter, 1994). This integral view means that the organisation must be assessed as a whole. Due to the limited time available, only the squads (also called 'self-managing teams') were considered in the organisational structure for this research.

Analysis

As discussed earlier on the validity of the interview results, fellow researchers offered no help in coding and analysing the qualitative data. As a result, the coding and analysis have been assigned to the capacities of the researcher. Besides, coding the data was done according to the Gioia method. Therefore, it is assumed that certain data may have been unconsciously influenced by the interpretations and prejudices that the researcher had in advance (Symon & Cassel, 2012). For this reason, other themes could have emerged if another researcher had coded the same data. In addition, the transcripts were also written out according to what has been told during the interviews. This may have resulted in some adverse effects during coding because the Belgian way of speaking was not fully known to the researcher.

6.3 Recommendations for future research

It is strongly recommended to conduct further research into the impact of QMS and the (new) organisational structure (working in squads) on the quality of work and performance. Currently, this research has only been carried out for one production organisation that specialises in building trailers. However, to validate and generalise the results, it will be necessary to carry out the same research at other production organisations. Besides, this allows the insights of this research to be validated on extra-scientific literature, as there was not much theoretical knowledge existing that discusses all three relationships examined in this research.

In addition, several subdimensions and indicators have been chosen in this research to map the quality of work and performance. As more subdimensions and indicators exist to

operationalise these concepts, a future researcher could test the quality of work and performance based on other theories. Furthermore, it may be the case that the operation of QMS and the self-managing team (squad) differs between organisations. This makes it interesting to investigate whether there are differences in the operation of QMS and self-managing teams (squads) within organisations and which similarities can be seen.

Besides, it is recommended to re-evaluate this research as the limitations showed that certain language restrictions might have arisen in the research process. By conducting similar research in the same setting, it is possible to assess whether the insights correspond and, more importantly, whether differences can be seen. Finally, the results showed different thoughts of the respondents about the link between QMS and self-managing teams (squads). Therefore, it is recommended to re-question this relationship to other people to see their thoughts about this link. It is essential to ask this relationship to other people since early literature already stated that technology and the organisational structure must be linked to remain competitive as an organisation (Trist & Bamforth, 1951; Huys et al., 1999; Batenburg et al., 2002). Having this extra insight allows for better conclusions and increases generalisability, as the scientific literature sees the two as one.

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Appendix 1: Interview guide team leaders and white-collar workers

Introductie [+/- 3 minuten]

- De respondent bedanken voor het interview
- Jezelf voorstellen en uitleggen waarom je dit interview gaat afnemen met daarbij een korte toelichting waar de vragen over gaan
- Anonimiteit benadrukken
- Kenbaar maken dat het gesprek vanaf nu opgenomen gaat worden[1]

Kwaliteit van arbeid [+/- 35 minuten]

De volgende vragen zijn gebaseerd op het <u>gebruik van QMS</u>:

<u>Algemene vraag</u>

- (1): In jouw organisatie wordt gewerkt met QMS, wat is QMS precies? En wat zijn je positieve- negatieve ervaringen hiermee? *(Praat zo lang als je wilt. Dit mag chronologisch zijn of niet. Ik zal je niet onderbreken. Je mag een verhaal vertellen. Hierna zal ik doorvragen op bepaalde zaken die u heeft benoemd)*
    - (1.1): Hoe sta je hier tegenover? *(Wat vind je ervan?)*
    - (1.2): Hoe is de situatie verbeterd ten opzichte van voorheen (toen QMS nog niet gebruikt werd) en wat is er minder goed gegaan? *(Dit ook bij elke andere vraag hieronder laten terugkomen)*
    - (1.3): Wat betekent QMS in jouw werk situatie en wat zijn de gevolgen voor jouw job (zowel positieve punten als knelpunten)?

<u>Job demand</u>

- (1): Hoe ervaar je de werk- tijdsdruk nu dat QMS gebruikt wordt?
    - (1.1): Kunnen jullie door QMS het werk beter of slechter uitvoeren? *(Kan je dit toelichten?)*
- (2): Hoe is de dynamiek (beweging) binnen het werk doordat QMS gebruikt wordt? *(Kan je dit toelichten?)*
- (3): Ontstaan er onderhuidse conflicten/ onenigheden wanneer QMS gebruikt wordt? *(Kan je dit toelichten?)*

<u>Job control</u>

- (1): Kan jij zelf meer of minder beslissen op het werk nu dat er met QMS wordt gewerkt? *(Kan je dit toelichten?)*
    - (1.1): Hoe ervaar je de zelfstandigheid nu dat QMS gebruikt wordt? *(Kan je dit toelichten?)*

- (2): Wat is jouw rol als er zich een error/fout voordoet in jouw expertise gebied (voor bediende), het productieproces (voor werknemers) of beide (voor leidinggevende)? *(Kan je dit toelichten?)*
    - (2.1): Is dit nu anders dan voordat er gewerkt werd met QMS?
- (3): Krijg je vanuit de organisatie voldoende informatie over de werking van QMS en het doel van QMS (wat is het doel?)?
    - (3.1): Hoe voorzien ze die informatie?

Vraag 4 is alleen voor de bediende. Vraag 5 is alleen voor de leidinggevende.

- (4): Word je al dan niet gesteund door je collega's (inclusief leidinggevende) voor de eventuele hulp die nodig is bij het gebruik van QMS? *(Kan je dit toelichten?)*
- (5): Hoe ervaar je de steun vanuit het management bij het werken met QMS?
    - (5.1): Is vanuit het management en de collega's op de werkvloer aandacht voor datgene wat jij zegt over het gebruik van QMS? *(Kan je dit toelichten?)*

Koppelingsvraag kwantitatieve data

- (1): Denk je dat QMS een invloed heeft op absentie (aantal ziektedagen/ bij ongeval thuis zitten) en/of personeelsverloop? *(Kan je dit toelichten)*

De volgende vragen zijn gebaseerd op het werken in squads:

Algemene vraag

- (1): In jouw organisatie wordt gewerkt in squads, wat zijn deze squads precies? En wat zijn je positieve- negatieve ervaringen hiermee? *(Praat zo lang als je wilt. Dit mag chronologisch zijn of niet. Ik zal je niet onderbreken. Je mag een verhaal vertellen. Hierna zal ik doorvragen op bepaalde zaken die u heeft benoemd)*
    - (1.1): Hoe sta je hier tegenover? *(Wat vind je ervan?)*
    - (1.2): Hoe is de situatie verbeterd ten opzichte van voorheen (toen er nog niet in squads gewerkt werd) en wat is er minder goed gegaan? *(Dit ook bij elke andere vraag hieronder laten terugkomen)*
    - (1.3): Wat betekenen de squads in jouw werk situatie en wat zijn de gevolgen voor jouw job (zowel positieve punten als knelpunten)?

Job demand

- (1): Hoe ervaar je de werk- tijdsdruk nu dat er in squads gewerkt wordt? *(Kan je dit toelichten?)*
    - (1.1): Kunnen jullie door de introductie van de squads het werk beter of slechter uitvoeren? *(Kan je dit toelichten?)*
- (2): Wat houdt precies de squad werking in en is deze voor bepaalde bediende anders dan voor andere (qua taken)?

- (2.1): Hoe ervaar je het werken nu in vergelijking tot voordat er in squads gewerkt werd?

- (3) Ontstaan er onderhuidse conflicten/ onenigheden binnen je squad? *(Kan je dit toelichten?)*

Job control

- (1): Kan je zelf meer of minder beslissen op het werk nu dat er in squads wordt gewerkt? *(Kan je dit toelichten?)*

  - (1.1): Hoe ervaar je de zelfstandigheid nu dat je in squads werkt? *(Kan je dit toelichten?)*

- (2): Wat is jouw rol als er zich fouten en/of problemen voordoen binnen het werk van jouw squad?

  - (2.1): Is dit nu anders of hetzelfde dan hoe het voorheen was? *(Toen er nog niet gewerkt werd in squads)*

- (3): Hoe verloopt de taakverdeling binnen de squad (wie welk werk moet gaan doen)? *(Kan je dit toelichten?)*

- (4): Krijg je vanuit de organisatie voldoende informatie over de werking van de squads en het doel van de squad formatie (wat is het doel?)?

  - (4.1): Hoe voorzien ze die informatie?

Vraag 5 is alleen voor de bediende. Vraag 6 is alleen voor de leidinggevende.

- (5): Word je al dan niet gesteund door je collega's (inclusief leidinggevende) bij het uitvoeren van je werk binnen de squad? *(Kan je dit toelichten?)*

- (6) Hoe ervaar je de steun vanuit het management over het werken in squads?

  - (6.1): Is vanuit het management en de collega's op de werkvloer wel of geen aandacht voor datgene wat jij zegt over de manier hoe het werk uitgevoerd moet worden binnen de squads? *(Kan je dit toelichten?)*

Koppelingsvraag voor kwantitatieve data

- (1): Denk je dat squads een invloed hebben op absentie (aantal ziektedagen/ bij ongeval thuis zitten) en/of personeelsverloop?

Performantie [+/- 20 minuten]

De volgende vragen zijn gebaseerd op het gebruik van QMS:

Algemene vraag

- (1): Hoe ervaar je de flow van de productie en aflevering naar de klant nu dat QMS gebruikt wordt? Is dit anders? En wat zijn je positieve- negatieve ervaringen hiermee? *(Praat zo lang als je wilt. Dit mag chronologisch zijn of niet. Ik zal je niet onderbreken. Je mag een verhaal vertellen. Hierna zal ik doorvragen op bepaalde zaken die u heeft benoemd)*

- (1.1): Hoe sta je hier tegenover? *(Wat vind je ervan?)*
- (1.2): Hoe is de situatie op gebied van de flow verbeterd ten opzichte van voorheen (toen QMS nog niet gebruikt werd) en wat is er minder goed gegaan? *(Dit ook bij elke andere vraag hieronder laten terugkomen)*

Aantal fouten

- (1): Hoe ervaar je de hoeveelheid errors/ fouten die de laatste tijd voorkomen in jouw expertise gebied (voor bediende), het productieproces (voor werknemers) of beide (voor leidinggevende)?
  - (1.1): Op welke plaats of in welke activiteit gebeuren nog de meesten fouten en hoe komt dat?
  - (1.1a): Kan QMS effectief gebruikt worden om deze errors/ fouten te verhelpen? Of niet? En waar wordt QMS nog meer voor gebruikt (en is dit ook effectief of kan dit beter)?
- (2): Hoe vind je dat het identificeren en communiceren van errors/ fouten verloopt nu dat QMS gebruikt wordt?
- (3): Als er zich een fout voordoet in het productieproces, kan er dan gelijk gebruik gemaakt worden van QMS? *(Kan je ook kort toelichten hoe dit in zijn werking gaat?)*
  - (3.1): Heb je nog bepaalde op- en/of aanmerkingen over de manier hoe het vaststellen en communiceren van productiefouten via QMS op dit moment verloopt?

QRM (Quick Response Manufacturing) facetten

Deze vragen zijn alleen voor de leidinggevende.

- (1): Wat verstaat u onder QRM?
  - (1.1): Wat is er verandert door het gebruik van QMS? En wat betekent dit voor de effectiviteit en efficiency van het werk?
- (2): Kunt u iets vertellen over de bijdrage (kan zowel positief als negatief zijn) van QMS aan de doorstroming van de werktaken?

Verbeteringen in het proces

- (1): Ondervind jij problemen/ onduidelijkheden over de werking/ het gebruik van QMS? Of niet? *(Kan je dit toelichten?)*
- (2): Bespreek jij de resultaten die behaald worden met QMS binnen de squad en/of met de leidinggevende? Of niet? *(Kan je dit toelichten?)*
  - (2.1): Zijn er (kwaliteit)verbeteringen en/of verslechteringen zichtbaar ten opzichte van voor het gebruik van QMS? *(Kan je dit toelichten?)*
- (3): Stelt het gebruik van QMS jou in staat om verbeteringen en/of vernieuwingen aan te dragen in het werkproces of in je eigen werkveld? Of niet? *(Kan je dit toelichten?)*

Koppelingsvraag kwantitatieve data

- (1): Denk je dat QMS een invloed heeft op de doorlooptijd/ het aantal trailers dat geproduceerd wordt? *(Kan je dit toelichten)*

De volgende vragen zijn gebaseerd op het werken in squads:

Algemene vraag

- (1): Hoe ervaar je de flow van de productie en aflevering naar de klant door het werken in squads? Is dit anders? En wat zijn je positieve- negatieve ervaringen hiermee? *(Praat zo lang als je wilt. Dit mag chronologisch zijn of niet. Ik zal je niet onderbreken. Je mag een verhaal vertellen. Hierna zal ik doorvragen op bepaalde zaken die u heeft benoemd)*
    - (1.1): Hoe sta je hier tegenover? *(Wat vind je ervan?)*
    - (1.2): Hoe is de situatie op gebied van de flow verbeterd ten opzichte van voorheen (toen er nog niet in squads gewerkt werd) en wat is er minder goed gegaan? *(Dit ook bij elke andere vraag hieronder laten terugkomen)*

Aantal fouten

- (1): Hoe verloopt het identificeren en communiceren van fouten nu dat jij in squads werkt?

QRM (Quick Response Manufacturing) facetten

Deze vragen zijn alleen voor de leidinggevende.

- (1): Wat is er verandert door te werken in squads? En wat betekent dit voor de effectiviteit en efficiency van het werk?
- (2): Hoe ervaar je de bezetting op dit moment in de squad/ de squads?
- (3): Zijn er verschillende batches (samengevoegde productieorders) toegewezen aan de squad?
    - (3.1): Is de batch-productie small of breed? En waaruit blijkt dit?
    - (3.2): Waarop worden deze gegroepeerd? *(Bv. op materiaal, einddatum, klant)*
    - (3.3): Welk voordeel en/of nadeel zie je hierin met betrekking tot squad-gericht werken?
- (4): Kunt u iets vertellen over de bijdrage (kan zowel positief als negatief zijn) van het werken in squads aan de doorstroming van de werktaken?

Verbeteringen in het proces

- (1): Ondervind jij problemen/ onduidelijkheden bij het werken in squads? Of niet? *(Kan je dit toelichten?)*
- (2): Bespreek jij de werkresultaten die behaald worden, binnen de squad en/of met de leidinggevende? Of niet? *(Kan je dit toelichten?)*
    - (2.1): Zijn er verbeteringen en/of verslechteringen zichtbaar ten opzichte van voor het werken in squads? *(Kan je dit toelichten?)*

- (3): Stelt het werken in squads jou in staat om verbeteringen en/of vernieuwingen aan te dragen in het werkproces of in je eigen werkveld? *(Kan je dit toelichten?)*

Koppelingsvraag kwantitatieve data

- (1): Denk je dat squads een invloed hebben op de doorlooptijd/ het aantal trailers dat geproduceerd wordt? *(Kan je dit toelichten)*

Afsluitende vraag: In de voorbije vragen heb ik aparte vragen gesteld over QMS en squads, maar hoe vind jij de samenhang tussen beide? Vind jij dat ze wel of niet samenhangen? Zijn er zaken die soms mis lopen of beter lopen door de koppeling van de twee? Is er een van de twee belangrijker dan de ander? …

Afsluitende vraag (alleen als er nog tijd over is!): Heb jij bepaalde ideeën over hoe het werk beter uitgevoerd zou kunnen worden met betrekking tot QMS en/of het werken in squads?

Afsluiting [+/- 2 minuten]

- Vragen of de respondent het eindresultaat wil ontvangen (resultaten of samenvatting)
- De mogelijkheid bieden aan de respondent om nog vragen te stellen
- De respondent bedanken voor het interview

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[1] Bij de interviews op locatie wordt het informed consent formulier handmatig ondertekend alvorens het gesprek plaatsvindt. Bij de online interviews wordt het informed consent formulier toegezonden via de mail en gevraagd of ze het ondertekend willen terugsturen.

Appendix 2: Interview guide blue-collar workers

Introductie [+/- 3 minuten]

- De respondent bedanken voor het interview
- Jezelf voorstellen en uitleggen waarom je dit interview gaat afnemen met daarbij een korte toelichting waar de vragen over gaan
- Anonimiteit benadrukken
- Kenbaar maken dat het gesprek vanaf nu opgenomen gaat worden[1]

Kwaliteit van arbeid [+/- 40 minuten]

De volgende vragen zijn gebaseerd op het <u>gebruik van QMS</u>:

<u>Algemene vraag</u>

- (1): In jouw organisatie wordt gewerkt met QMS, ken je dit kwaliteitssysteem? Wat is QMS precies? En wat zijn je positieve- negatieve ervaringen hiermee? *(Praat zo lang als je wilt. Dit mag chronologisch zijn of niet. Ik zal je niet onderbreken. Je mag een verhaal vertellen. Hierna zal ik doorvragen op bepaalde zaken die u heeft benoemd)*
    - (1.1): Hoe sta je hier tegenover? *(Wat vind je ervan?)*
    - (1.2): Hoe is de situatie verbeterd ten opzichte van voorheen (toen QMS nog niet gebruikt werd) en wat is er minder goed gegaan? *(Dit ook bij elke andere vraag hieronder laten terugkomen)*
    - (1.3): Wat betekent QMS in jouw werk situatie en wat zijn de gevolgen voor jouw job (zowel positieve punten als knelpunten)?

<u>Job demand</u>

- (1): Hoe ervaar je de werk- tijdsdruk nu dat QMS gebruikt wordt?
    - (1.1): Kunnen jullie door QMS het werk beter of slechter uitvoeren? *(Kan je dit toelichten?)*
- (2): Hoe is de dynamiek (beweging) in jullie werk nu dat de organisatie gebruik maakt van QMS? *(Kan je dit toelichten?)*
- (3): Ontstaan er onderhuidse conflicten/ onenigheden wanneer jullie meldingen van QMS oplossen/ communiceren/ verwerken of andere zaken met betrekking tot QMS? *(Kan je dit toelichten?)*

<u>Job control</u>

- (1): Kan jij zelf meer of minder beslissen binnen jouw werk nu dat er met QMS wordt gewerkt? *(Kan je dit toelichten?)*
    - (1.1): Hoe ervaar je de zelfstandigheid nu dat QMS gebruikt wordt in de organisatie? *(Kan je dit toelichten?)*

- (2): Wat is jouw rol als er zich een error/fout voordoet in het productieproces? *(Kan je dit toelichten?)*
    - (2.1): Is dit nu anders dan voordat er gewerkt werd met QMS?
- (3): Krijg je vanuit de organisatie voldoende informatie over de werking van QMS en het doel van QMS (wat is het doel?)?
    - (3.1): Hoe voorzien ze die informatie?
- (4): Word je al dan niet gesteund door je collega's (inclusief leidinggevende) voor de eventuele hulp die nodig is bij het snappen/ gebruik van QMS? *(Kan je dit toelichten?)*

Koppelingsvraag kwantitatieve data

- (1): Denk je dat QMS een invloed heeft op absentie (aantal ziektedagen/ bij ongeval thuis zitten) en/of personeelsverloop? *(Kan je dit toelichten)*

De volgende vragen zijn gebaseerd op het werken in squads:

Algemene vraag

- (1): In jouw organisatie wordt gewerkt in squads, weet jij wat deze squads inhouden? Wat zijn deze squads precies? Wat zijn je positieve- negatieve ervaringen hiermee? *(Praat zo lang als je wilt. Dit mag chronologisch zijn of niet. Ik zal je niet onderbreken. Je mag een verhaal vertellen. Hierna zal ik doorvragen op bepaalde zaken die u heeft benoemd)*
    - (1.1): Hoe sta je hier tegenover? *(Wat vind je ervan?)*
    - (1.2): Hoe is de situatie verbeterd ten opzichte van voorheen (toen er nog niet in squads gewerkt werd) en wat is er minder goed gegaan? *(Dit ook bij elke andere vraag hieronder laten terugkomen)*
    - (1.3): Wat betekenen de squads in jouw werk situatie en wat zijn de gevolgen voor jouw job (zowel positieve punten als knelpunten)?

Job demand

- (1): Hoe ervaar je de werk- tijdsdruk nu dat er op een hoger niveau in squads gewerkt wordt? *(Kan je dit toelichten?)*
    - (1.1): Kunnen jullie door de introductie van de squads het werk beter of slechter uitvoeren? *(Kan je dit toelichten?)*
- (2) Ontstaan er onderhuidse conflicten/ onenigheden binnen je werk nu dat er op een hoger niveau in squads gewerkt wordt? *(Kan je dit toelichten?)*

Job control

- (1): Vind jij dat je nu meer of minder kan beslissen op het werk nu dat ze op een hoger niveau in squads werken? *(Kan je dit toelichten? / Voorbeeld geven?)*
    - (1.1): Merk je verschil in je eigen zelfstandigheid/ autonomie op het werk nu dat ze op een hoger niveau in squads werken? *(Kan je dit toelichten?)*

- (2): Is het oplossen van (werk/productie)fouten bij jou nu anders of hetzelfde, nu dat er gebruikt gemaakt wordt van squads op een hoger niveau?
- (3): Krijg je vanuit de organisatie voldoende informatie over het doel van de squad formatie (wat is het doel?)?
    - (3.1): Hoe voorzien ze die informatie?
- (4): Word je al dan niet gesteund door je collega's (inclusief leidinggevende) bij vragen die je hebt gericht tot de squads zelf of squad taken? *(Kan je dit toelichten?)*

Koppelingsvraag kwantitatieve data

- (1): Denk je dat squads een invloed hebben op absentie (aantal ziektedagen/ bij ongeval thuis zitten) en/of personeelsverloop? *(Kan je dit toelichten)*

Performantie [+/- 15 minuten]

De volgende vragen zijn gebaseerd op het gebruik van QMS:

Algemene vraag

- (1): Hoe ervaar je de flow van de productie en aflevering naar de klant nu dat QMS gebruikt wordt in de organisatie? Is dit anders? En wat zijn je positieve- negatieve ervaringen hiermee? *(Praat zo lang als je wilt. Dit mag chronologisch zijn of niet. Ik zal je niet onderbreken. Je mag een verhaal vertellen. Hierna zal ik doorvragen op bepaalde zaken die u heeft benoemd)*
    - (1.1): Hoe sta je hier tegenover? *(Wat vind je ervan?)*
    - (1.2): Hoe is de situatie op gebied van de flow verbeterd ten opzichte van voorheen (toen QMS nog niet gebruikt werd) en wat is er minder goed gegaan? *(Dit ook bij elke andere vraag hieronder laten terugkomen)*

Aantal fouten

- (1): Hoe ervaar je de hoeveelheid errors/ fouten die de laatste tijd voorkomen in het productieproces? Gaat door alle vragen en kijk of je niet te veel stuurt!
    - (1.1): Op welke plaats of in welke activiteit gebeuren nog de meesten fouten en hoe komt dat?
    - (1.1a): Wordt QMS effectief gebruikt om deze errors/ fouten te verhelpen? Of niet? En waar wordt QMS nog meer voor gebruikt (en is dit ook effectief of kan dit beter)?
- (2): Hoe vind je dat het identificeren en communiceren van errors/ fouten verloopt nu dat QMS gebruikt wordt?
- (3): Als er zich een fout voordoet in het productieproces, kan er dan gelijk gebruik gemaakt worden van QMS? *(Kan je ook kort toelichten hoe dit in zijn werking gaat?)*
    - (3.1): Heb je nog bepaalde op- en/of aanmerkingen over de manier hoe het vaststellen en communiceren van productiefouten via QMS op dit moment verloopt?

Verbeteringen in het proces

- (1): Ondervind jij problemen/ onduidelijkheden over de werking van QMS? Of niet? *(Kan je dit toelichten?)*
- (2): Worden de resultaten besproken die behaald worden met QMS binnen de werkgroep en/of met de leidinggevende? Of niet? *(Kan je dit toelichten?)*
    - (2.1): Merk je dat er bepaalde (kwaliteit)verbeteringen en/of verslechteringen zichtbaar zijn ten opzichte van voor het gebruik van QMS binnen de organisatie? *(Kan je dit toelichten?)*
- (3): Kan jij verbeteringen en/of vernieuwingen aandragen in het werkproces nu dat QMS gebruikt wordt binnen de organisatie? Of niet? *(Kan je dit toelichten?)*

Koppelingsvraag kwantitatieve data

- (1): Denk je dat QMS een invloed heeft op de doorlooptijd/ het aantal trailers dat geproduceerd wordt? *(Kan je dit toelichten)*

De volgende vragen zijn gebaseerd op het werken in squads:

Algemene vraag

- (1): Hoe ervaar je de flow van de productie en aflevering naar de klant nu dat er op een hoger niveau in squads gewerkt wordt? Is dit anders? En wat zijn je positieve- negatieve ervaringen hiermee? *(Praat zo lang als je wilt. Dit mag chronologisch zijn of niet. Ik zal je niet onderbreken. Je mag een verhaal vertellen. Hierna zal ik doorvragen op bepaalde zaken die u heeft benoemd)*
    - (1.1): Hoe sta je hier tegenover? *(Wat vind je ervan?)*
    - (1.2): Hoe is de situatie op gebied van de flow verbeterd ten opzichte van voorheen (toen er nog niet in squads gewerkt werd) en wat is er minder goed gegaan? *(Dit ook bij elke andere vraag hieronder laten terugkomen)*

Aantal fouten

- (1): Hoe vind jij dat het identificeren en communiceren van (werk/productie)fouten verloopt nu dat ze op een hoger niveau in squads werken?

Verbeteringen in het proces

- (1): Ondervind jij problemen/ onduidelijkheden in het werk nu dat ze op een hoger niveau in squads werken? Of niet? *(Kan je dit toelichten?)*
- (2): Bespreek jij de werkresultaten die behaald worden binnen de werkgroep en/of met de leidinggevende? Of niet? *(Kan je dit toelichten?)*
    - (2.1): Zijn er verbeteringen en/of verslechteringen zichtbaar die gelinkt kunnen worden aan het feit dat ze nu op een hoger niveau in squads werken? *(Kan je dit toelichten?)*

- (3): Merk je nu dat je beter/ makkelijker verbeteringen en/of vernieuwingen kan aandragen in het werkproces nu dat de organisatie met squads werkt? *(Kan je dit toelichten?)*

Koppelingsvraag kwantitatieve data

- (1): Denk je dat squads een invloed hebben op de doorlooptijd/ het aantal trailers dat geproduceerd wordt? *(Kan je dit toelichten)*

Afsluitende vraag: In de voorbije vragen heb ik aparte vragen gesteld over QMS en squads, maar hoe vind jij de samenhang tussen beide? Vind jij dat ze wel of niet samenhangen? Zijn er zaken die soms mis lopen of beter lopen door de koppeling van de twee? Is er een van de twee belangrijker dan de ander? …

Afsluitende vraag (alleen als er nog tijd over is!): Heb jij bepaalde ideeën over hoe het werk beter uitgevoerd zou kunnen worden met betrekking tot QMS en/of de squad formatie die is doorgevoerd?

Afsluiting [+/- 2 minuten]

- Vragen of de respondent het eindresultaat wil ontvangen (resultaten of samenvatting)
- De mogelijkheid bieden aan de respondent om nog vragen te stellen
- De respondent bedanken voor het interview

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[1] Bij de interviews op locatie wordt het informed consent formulier handmatig ondertekend alvorens het gesprek plaatsvindt. Bij de online interviews wordt het informed consent formulier toegezonden via de mail en gevraagd of ze het ondertekend willen terugsturen.

Appendix 3: Topic list

Topic (1): Quality of work	Indicators	Based on OS & QMS
1	Absenteeism/Personnel turnover	Job demands = workload and conflicts
2		Job control = decision latitude, work autonomy, involvement, and social support
Topic (2): Performance	**Indicator**	**Based on OS & QMS**
1	Lead times	The number of errors
2		QRM facets*
3		Continuous improvements

Meaning of the abbreviation
OS = Organisational structure
QMS = Quality management system

***** This topic will only be asked to the three team leaders.

Appendix 4: 3rd level coding (To aggregate dimensions)

The second-order themes, which can be seen below, arise from the analysis performed with the NVivo software. These themes are composed of first-order concepts that were very similar. Eventually, the themes are subdivided into seven parts shown below, with each an identical colour. Because the 3rd level coding was not possible in NVivo, the table below shows the last level of coding, which was made on Microsoft Word. In this last level of coding, the second-order themes are further classified into aggregate dimensions.

Part	Second-order themes	Aggregate dimensions
QMS	Functionalities of QMS	The use of QMS within the organisation
	Crucial elements for using QMS	
	QMS is production-oriented	
	Reasons to use QMS	
	Routine of checking QMS items	
	QMS is convenient to use	
	QMS is more used now than before	
	Production and automatization department don't use QMS that much	
	Employees don't have any experience with QMS	
	Behaviour of employees to use QMS	
QMS impact quality of work	Change in work situation due to QMS	Changes in quality of work due to QMS in the organisation
	Conflicts are reduced through QMS	
	Greater involvement through QMS	
	More decision latitude and responsibilities for team leader through QMS	
	Not more decision latitude and responsibilities through QMS	
	No higher workload due to the use of QMS	
	Several barriers are reduced through QMS	
	Work can better be performed through QMS	
	Social support for blue-collar workers with regards to QMS is lacking	

	Social support offered to QMS and by using QMS	
	Work autonomy for team leader has increased by using QMS	
	Work autonomy has not changed due to QMS	
	Telephone conversations are not completely eliminated through QMS	
	No clear link between QMS and regulation autonomy	
	Positive perception towards working with QMS	
	Too many QMS notifications are counterproductive	Stumbling points when using QMS
	Tensions that arise when using QMS	
	Too little information is given about QMS	
	No link between personnel turnover and QMS	Effect of QMS on number of accidents
	QMS only influence absence in terms of accidents	
QMS impact performance	Better communication lines through QMS	Changes in performance due to QMS in the organisation
	Better tackling problems through QMS	
	Continuous improvements through QMS	
	Suggestions for improvements in QMS	
	Positive contribution of QMS to the production flow	
	Faster working through QMS	
	Feedback on QMS items in meetings	
	Improvements in quality through QMS	
	QRM with QMS	
	Preventively avoiding errors	
	QMS not main reason to reduce lead times	
	QMS is used more on a reactive basis	Impeding factors for performance due to the use of QMS
	Errors that are happening often	
	Data analysis in QMS is difficult	
	Problems by input in QMS	
	Regular problems that arise related to QMS	

Squads	Squad formation	Squad use within the organisation
	Reasons to introduce squads	
	Lack of knowledge from blue-collar workers about squads	
Squads impact quality of work	Better relationship with fellow colleagues through the squads	Changes in quality of work due to squads in the organisation
	Broadener overview of the production process by working in squads	
	Conflicts are reduced through the squad formation	
	Declined relationship with colleagues outside the squad	
	Different perceptions with regards to workload within the squads	
	Greater involvement by working in squads	
	Meeting added in the work due to squads	
	More decision latitude and responsibilities through working in squads	
	Another way of communicating through the squad	
	Positive contribution of squads to carry out work	
	Social support offered to the squad	
	Squads has made work more enjoyable	
	Work autonomy is increased through squads	
	Work is still done quite functionally within the squad	
	Distance between squads creates difficulties	Stumbling points when working in squads
	Short communication lines were disturbing in the beginning	
	Difficulties by working in squads with other people	
	Determining prioritization with the squad is hard	
	Difference in perception of absence related to squads	Effect of squads on absence is diverge
Squads impact performance	Better communication lines through the squad	
	Better tackling problems through the squad	

	Continuous improvements through squads	Changes in performance due to working in squads
	Feedback actions during squad meeting	
	Positive contribution of squads to the production flow	
Link between QMS and squads	Difference in importance perception of QMS and squads	Different thoughts about the link between QMS and squads
	No direct connection between QMS and squads	
	QMS and squads complement each other	
	QMS as part in the squad meeting	

Appendix 5: Coding process

Coding table 1: The use of QMS (see below)

First-order concepts	Second-order themes	Aggregate dimensions
▪ QMS is used as a communication tool ▪ QMS shows a deepening in work centers what is going well and what is not going well ▪ Reporting problems in the workplace in an accessible way ▪ Information is much more centralized by QMS ▪ Quality controls is also a part of QMS ▪ Contact information about colleagues can also be found on QMS ▪ The client can follow his vehicle in QMS ▪ Data facts are brought up ▪ Dangerous situations, quality controls, reporting errors and proposals for improvements are the four parts in QMS ▪ Dangerous situations are registered in QMS ▪ Several risk levels of dangerous situations are registered in QMS ▪ Problems and errors are logged in QMS ▪ Various messages can be passed on in QMS ▪ QMS serves as a notification system ▪ QMS is a reporting platform to make everything run as quickly and good as possible ▪ QMS provides stability and correctness of data	Functionalities of QMS	The use of QMS within the organisation
▪ Mindset is very important at QMS that people know that things are going to be picked up and resolved ▪ People must strictly adhere to the agreed rules for QMS to work effective with it	Crucial elements for using QMS	
▪ Team leader must carefully follow the work card when entering reports in QMS ▪ Employee notified team leader for problems that need to be put in QMS ▪ QMS plays a major role in the warehouse ▪ The final inspector also works with QMS ▪ QMS is purely production oriented and not at other departments ▪ Input in QMS is done from production ▪ Team leader puts the errors in QMS	QMS is production-oriented	
▪ QMS's objective is to better report production errors ▪ The purpose of QMS is to see how things are done and what the bottlenecks are ▪ QMS transcends other means of communication, the current modules and presence in the workplace ▪ Need to ensure proper communication flow ▪ QMS is used to allow direct communication between team leaders and support service ▪ QMS is ideal solution to involve support service in production	Reasons to use QMS	
▪ Not all colleagues check QMS on a daily basis ▪ The routine to check QMS twice a day was a habit in the beginning ▪ QMS is followed up by consulting it twice	Routine of checking QMS items	

every day ▪ QMS is checked a minimum of two times a day		
▪ Everything runs smoothly on QMS ▪ The use of QMS is clear ▪ QMS works effectively and is user-friendly ▪ Manual to use QMS has been created for the team leaders ▪ The error reporting process is super simple ▪ QMS is easy to use	QMS is convenient to use	
▪ Previously, QMS was never followed up intensively ▪ QMS is being monitored more closely this time than before	QMS is more used now than before	
▪ QMS is not much used within the automatisation department ▪ Too little attention is paid to the QMS system from the product department ▪ Too little effort within the product department to log problems effectively in QMS ▪ Communication about interventions to tackle problems within the automation department often take place via Whatsapp because it is so accessible on your phone ▪ Within the automation department, the team leader puts errors on WhatsApp faster ▪ Within the automation department, Whatsapp is still often used to communicate errors	Production and automatization department don't use QMS that much	
▪ Employees do not often use QMS yet ▪ QMS is invisible to the people on the work floor ▪ The blue-collar worker does not have access to QMS ▪ Employee does not know how QMS works ▪ Employees do not work with QMS	Employees don't have any experience with QMS	
▪ Employee expectations regarding QMS are not entirely clear ▪ Sometimes it is easier to know a little more about QMS as a blue-collar worker ▪ There is initiative from the employee to start reporting certain things in QMS ▪ Employees are not allowed to take the initiative to solve problems themselves ▪ Employee wants to know how to work more smoothly with QMS ▪ Employee wants to be more informed about QMS	Behaviour of employees to use QMS	

Coding table 2: The use of squads (see below)

First-order concepts	Second-order themes	Aggregate dimensions
▪ Blue-collar workers are not in a squad ▪ In the squad of the team leader there are 9 people, including 1 team leader per division ▪ The squads are a multidisciplinary team with colleagues from all departments ▪ The sales department and dealer managers do not explicitly belong to only one squad ▪ All purchasers are in a squad together ▪ Colleagues from different expertise groups are in a squad ▪ In a squad people from all kinds of	Squad formation	Squad use within the organisation

departments are brought together ▪ The squad organization implies a cross-functional organization where everyone sits together		
▪ Squads is used to improve communication and reduce classic box thinking ▪ Squads were introduced to avoid the so called 'box thinking' ▪ The goal of squads is to work in a streamlined way ▪ The advantages that the squads offer is at all to be able to serve the customer well ▪ Facilitating process, structure and cooperation by working in squads ▪ Functional thinking has been demolished by working in squads	Reasons to introduce squads	
▪ Employee knows that the squad system exists ▪ Blue-collar workers notices very little of the squad formation in his own work ▪ It is not clear to the employees what squads entails	Lack of knowledge from blue-collar workers about squads	

Coding table 3: Impact QMS on quality of work (see below)

First-order concepts	Second-order themes	Aggregate dimensions
▪ Evaluation of work has changed due to QMS ▪ White-collar worker of the automation department is held more liable for accidents or dangerous situations ▪ More responsibility for intervention for white-collar worker of the automation department through QMS ▪ Not much has changed in the work of a blue-collar worker through the use of QMS ▪ The work is not made more difficult by the use of QMS	Change in work situation due to QMS	Changes in quality of work due to QMS in the organisation
▪ QMS avoids the number of conflicts ▪ QMS can help to set priorities	Conflicts are reduced through QMS	
▪ QMS ensures more involvement because people are better informed ▪ The employees are more involved in their work through a better overview	Greater involvement through QMS	
▪ QMS gives the team leader more authority ▪ Team leader is now more likely to take the initiative for the problems that arise in production ▪ QMS gives team leader more decision-making space through the overview it creates in problems ▪ The responsibility of the person who logged problems in QMS has been increased	More decision latitude and responsibilities for team leader through QMS	
▪ Authority and responsibilities remained the same despite QMS ▪ Responsibilities are not increased through the use of QMS ▪ Room for decision has not increased by the use of QMS ▪ QMS does not provide more decision-making power for people in the workplace ▪ Employees have not more authority and responsibilities through QMS	Not more decision latitude and responsibilities through QMS	

▪ Purchaser is already authorized to handle matters		
▪ Time pressure stays the same ▪ Workload for employees has not changed with the use of QMS ▪ Workload was high in the beginning through QMS, but now it is minimal ▪ Blue-collar workers workload has been reduced because problems arise less quickly due to QMS ▪ Before QMS was used, there was often double work that had to be done by the blue-collar workers ▪ Low efford required to use QMS ▪ Workload stays the same despite QMS ▪ Using QMS saves work time to focus more on the quality of the product ▪ External pressure on people by using QMS	No higher workload due to the use of QMS	
▪ Language barrier has been reduced by working with QMS ▪ The barrier for a blue-collar worker to report something is now much less due to QMS ▪ Communication between blue-collar worker and team leader is sometimes difficult due to the language barrier that exists	Several barriers are reduced through QMS	
▪ It is much more accessible for team leaders to report problems from production through QMS ▪ Not much problems are currently experienced with QMS anymore ▪ Using QMS is a quick win because you have to search less and have more certainty ▪ Working with QMS is more visual and clearer for the team ▪ Sometimes hardly any notifications come your way ▪ QMS allows the blue-collar worker to work much better and to wait less long for certain parts ▪ Employees can work faster and better now that QMS is used ▪ Employee knows enough about QMS to properly execute their task ▪ The work can be better performed through QMS ▪ Work can be performed better by QMS because white-collar worker has more insight into errors and their handling ▪ People are better informed about problems by using QMS ▪ Work can be done more effectively and efficient ▪ Work can be done better because they are less disturbed through QMS	Work can better be performed through QMS	
▪ The arrival of new systems such as QMS is not yet well enough supported towards the blue-collar workers ▪ Blue-collar workers have received little information from the organization about QMS, beyond what the team leader tells them	Social support for blue-collar workers with regards to QMS is lacking	
▪ QMS encourages people to provide effective support ▪ There is sufficient support from the organization when using QMS ▪ There is support from colleagues with questions they have about QMS	Social support offered to QMS and by using QMS	

▪ Other people can give support to problems through QMS because problems are better visualed ▪ The support within the work can be distributed more efficiently through QMS ▪ If you need support for QMS, people can always raise the alarm at higher levels in the organization ▪ Everyone helps each other with questions about QMS and other issues that affect them ▪ Colleagues are supported with questions about QMS ▪ People feel more supported in their work through QMS ▪ Decisions can be supported through the use of QMS ▪ QMS helps you choose whether to invest in something or not and to substantiate your choice by the management ▪ What the team leader says about QMS is listened to ▪ Knowledge sharing about QMS is done by letting new people work with it ▪ If there is something new on QMS, the team leader will get a training ▪ Colleagues keep each other on their toes and provide support to keep an eye on the QMS items ▪ Manager often does not come into play when problems are experienced by QMS		
▪ Team leader can now independently make decisions about errors ▪ By using the QMS application, people take the initiative independently more quickly	Work autonomy for team leader has increased by using QMS	
▪ Work autonomy remains the same regardless of QMS ▪ Work autonomy among employees has not been increased through QMS	Work autonomy has not changed due to QMS	
▪ For urgent matters, telephone conversations still exist ▪ Before QMS, a lot of phonecalls were made to the team leaders resulting in forgetfulness	Telephone conversations are not completely eliminated through QMS	
▪ The link between being able to regulate more and using QMS is not clear ▪ The link is not clear how QMS can help to work more autonomously	No clear link between QMS and regulation autonomy	
▪ QMS is a pleasure to work with ▪ The feeling of being able to solve something quickly is fantastic (QMS) ▪ Positive perception towards the use of QMS by bringing different departments together ▪ Using QMS gives a certain pride when people see that something has been resolved quickly ▪ Positive perception towards the use of QMS by tackling problems and dangerous situations quickly ▪ Positive perception towards the use of QMS by working fast and in real-time ▪ Positive perception towards the use of QMS ▪ The employees realize that QMS is introduced to help them ▪ Order picking system adjusted by QMS in a positive way ▪ The structure can be reviewed better	Positive perception towards working with QMS	

through the overview in the proces that QMS creates		
▪ If you get a lot of notifications in QMS, it can be demotivating ▪ If there are too many notifications in QMS, you may lose the overview ▪ If a lot of QMSs are open for production, it is not possible to tackle and follow them all	Too many QMS reports are counterproductive	Stumbling points when using QMS
▪ Sometimes there is disagreement among the employees about what should and should not be in QMS ▪ There remains emotional tensions in the identification of errors which repetitively occurs ▪ Reporting of problems in QMS are not always fair ▪ people do not always agree on the cause of errors that are put in QMS ▪ Conflict between team leader on the one hand and employee on the other due to difference in cadence of time lost ▪ QMS is sometimes still seen as a means of punishment unless it is positively intended	Tensions that arise when using QMS	
▪ More information may be provided about the functionalities of QMS to use it more widely ▪ The team leader is the only one in the warehouse who receives the information from QMS ▪ The organization did not clearly communicate what they wanted to achieve with QMS ▪ It is not entirely clear to employees what QMS entails	Too little information is given about QMS	
▪ Employee turnover does not play a role in QMS ▪ It is unknown whether QMS has an impact on staff turnover	No link between personnel turnover and QMS	Effect of QMS on number of accidents
▪ QMS can affect absence due to the dangers and accidents that occur ▪ QMS can influence absenteeism in terms of accidents, but not illness ▪ QMS has nothing to do with illness ▪ By making dangerous situations transparent in QMS, abscence in the area of accidents can be reduced ▪ Reporting dangerous situations in QMS can prevent accidents ▪ Dangerous situations are made visible in QMS ▪ Because dangerous situations are now registered in QMS, it is much more difficult to forget them ▪ Sharing problems within the organisation through QMS could reduce accidents in dangerous situations ▪ Link between absence and QMS is difficult to establish	QMS only influence absence in terms of accidents	

Coding table 4: Impact squads on quality of work (see below)

First-order concepts	Second-order themes	Aggregate dimensions
▪ There is more contact between expertise groups through squads ▪ You get to know your colleagues better through the squads ▪ Direct contact with other expertise	Better relationship with fellow colleagues through the squads	Changes in quality of work due to squads in the organisation

groups can be made within the squad ▪ Before the squads, people blamed each other when errors occurred ▪ The barrier between people is broken within the squad, because you get to know your colleague much better ▪ Because of the squads, there is now more coordination between the departments and they help each other where necessary		
▪ Production flow is much clearer now that people work in squads ▪ The squads make it clearer to people how the production process works ▪ The work in the production can be carried out more purposefully through the squads ▪ Working in squads creates a better overview in the entire production process ▪ Working in squads creates a better overview of where the pain points lie in the organization ▪ Everything is more structured and clearer now that the squads are operating ▪ By working in squads you will be broadened on a personal level ▪ Due to the squad formation, you can also give better tips to people outside your work field ▪ Because of the squads everyone has more visibility and everyone is better informed about the total picture	Broadener overview of the production process by working in squads	
▪ Priorities are set within the squad to avoid conflicts ▪ Before the squads were implemented, each division acted in its own interest ▪ The squad creates more group feeling and prevents future conflicts ▪ There is more understanding for each other because problems are mentioned in the squad meetings ▪ Less conflicts within the squad through mutual understanding ▪ In order to maintain a positive squad atmosphere, subcutaneous conflicts are tackled immediately ▪ The emotional tension that occurred when the squads just arrived is now completely gone	Conflicts are reduced through the squad formation	
▪ Contact with colleagues outside the squad is reduced ▪ The 'walls' that existed between departments are now between squads ▪ Communication between the squads could be improved	Declined relationship with colleagues outside the squad	
▪ Higher workload through the squads ▪ The activities run more smoothly through the squads, which has positive consequences for the workload ▪ The squad does not increase the workload for a team leader ▪ The workload remains the same regardless of squads ▪ The effort or participation in the squad is not the same for each department ▪ Extra effort to keep communications running within a squad ▪ Squads helps to ease work time	Different perceptions with regards to workload within the squads	
▪ Greater involvement within the product department by working in squads ▪ Involvement between all departments is	Greater involvement by working in squads	

increased through better knowledge sharing in the squad ▪ Faster involvement for problems in the squad but no changes to the job description ▪ Greater involvement within the automatisation department by working in squads		
▪ The KPI meeting is a meeting that is held with the squad itself ▪ By introducing the squads, only the daily meeting has been added in the work	Meeting added in the work due to squads	
▪ More decisions can be made regarding the time distribution of work within the squad ▪ Working in squads has given more responsibilities ▪ More decisions are made within the squad and they are allowed to arrange more ▪ Squads has given the opportunity to decide more ▪ Room for decision making is improved through the joint responsibility within the squads ▪ The positive thing about squads is that you are wider informed and have more right of say ▪ The decision-making space has been slightly increased by working in squads ▪ More can be arranged through the squads and sitting together makes this much easier ▪ Decision-making is increased in some areas within the squad but not in others ▪ More decisions can be made through the squad formation by the greater picture that this creates ▪ The responsibility of the team leader has increased a lot more now that he works in squads ▪ Shared responsibility within the squad ▪ Squad gives you more ownership as a person	More decision latitude and responsibilities through working in squads	
▪ Way of communicating and technology has changed for white-collar worker from automation because he is in a squad ▪ Way of communicating has changed due to the squad work	Another way of communicating through the squad	
▪ Working with squads is a positive evolution ▪ Positive perception towards working in squads ▪ A new way of collaboration is created through the squad formation ▪ The squads make it easier to respond to illness and pain complaints ▪ Problems are more visible which increases the efficiency of work due to squads ▪ By tackling things together you will work better together within the squad ▪ The effectiveness and efficiency of the work is increasing through the squads ▪ Squads encourage cross-functional thinking ▪ Collaboration has been greatly improved by the squads ▪ Due to the good cooperation between departments, the quota can still be achieved despite a lot of absenteeism	Positive contribution of squads to carry out work	

▪ People support and help each other within the squad ▪ The management provides full support for the squad story ▪ There is really a lot of support from the management for the squad work ▪ What the team leader says about squads is listened to ▪ Colleagues treat each other with respect ▪ There is respect for each other within the squad when they consult each other ▪ Management is not much involved in squad decisions	Social support offered to the squad	
▪ Work can be done better through the squads because people are more informed ▪ Working in squads has relieved the operational tasks ▪ Everyone has an equal say in the squad ▪ You can always express your idea in the squad, even for matters that are not directly linked to you ▪ The more that is known in advance, the more pleasant the work (squads) ▪ The division of tasks within the squad at automatisation is divided according to interest ▪ In the new organizational structure, there is more team spirit to achieve the objectives together ▪ Tasks are going well within the squad ▪ Everything runs smoothly in the squad of the team leader ▪ Working in squads sometimes requires getting out of your comfort zone	Squads has made work more enjoyable	
▪ Squads lower the threshold to work more independently ▪ The work autonomy has been increased by the squad formation due to the bigger picture that this creates ▪ The work autonomy has been increased within the squads, but this could be even greater ▪ Working autonomy has improved positively by working in squads ▪ Independence has certainly not decreased by working in squads ▪ The work autonomy has been slightly increased due to the squads ▪ The increase in knowledge makes it possible to work more autonomously in the squads	Work autonomy is increased through squads	
▪ Now, too few tasks are taken over from each other within the squad ▪ The squad helps to leave the 'box' thinking, but they are still partly in it ▪ Classic box thinking must be reduced even more by supporting each other more and more ▪ People from other departments are not yet taking over each other's tasks to complete it ▪ Everyone takes on their own expertise tasks within the squad ▪ Work in self-managing teams is still quite functional ▪ There is no exchange between the work tasks of the different departments in a squad ▪ There is no interference from work duties of other colleagues within the squad	Work is still done quite functionally within the squad	

▪ You cannot take over the work of another department within the squad		
▪ A distance is created between people because the squad of automation is located in both Doornik and Waregem ▪ Contact within the squad automatisation between Waregem and Doornik is not always beneficial for the work ▪ White-collar worker does not get to know the people in his squad very well due to the spread between two branches (Waregem and Doornik) ▪ Less involvement due to the split of squads between two branches (Doornik and Waregem) ▪ Not everyone in the squad is aware of the work system in the department automation ▪ Due to the split between the Doornik and Waregem squads, the knowledge of one location is decreasing	Distance between squads creates difficulties	Stumbling points when working in squads
▪ In the beginning, short communication is experienced as rather disturbing ▪ In the beginning it was difficult to keep the focus on one's own work due to the short communication with other departments	Short communication lines were disturbing in the beginning	
▪ Sometimes language barriers arise in the squad of the team leader (French and Dutch) ▪ It is sometimes difficult to work properly in a squad due to the dynamics in characters	Difficulties by working in squads with other people	
▪ Some people pay less attention to operational work then project work leading to conflicts ▪ The maturity of the squad in terms of priorities can still be improved ▪ There is not the same understanding for the prioritization of matters within the squad ▪ Determining the priority for projects within the squad is very difficult ▪ Insight into the project priorities of other departments is still minimal ▪ Determining the priorities within the squad is very difficult	Determining prioritization with the squad is hard	
▪ Less abscence because everyone feels good in their job because of the squads ▪ No link between squad formation and absence ▪ Squads has a positive effect on abscence and staff turnover through the social contact and social control that exists within the squad ▪ Because of a better relationship you have with colleagues in the squad, people stay longer within the organization	Difference in perception of absence related to squads	Effect of squads on absence is diverge

Coding table 5: Impact QMS on performance (see below)

First-order concepts	Second-order themes	Aggregate dimensions
▪ Number of emails are reduced through QMS ▪ QMS is used to allow direct communication ▪ Before QMS, there was a large communication chain ▪ Number of emails are reduced	Better communication lines through QMS	Changes in performance due to QMS in the organisation

▪ Communication on the work floor has been improved by QMS ▪ Communication gap as good as reduced by introducing QMS ▪ By using QMS you can quickly communicate with the supplier ▪ The communication runs smoothly on QMS ▪ Due to QMS, communication for errors is limited to a minimum number of people causing that the problem is often resolved quickly ▪ QMS reduces communication flows		
▪ People in the workplace are now more alert to production errors ▪ QMS always offers a solution to the problems that arise ▪ QMS provides an overview of all errors that exist ▪ Urgent and common problems are closed up front in QMS ▪ Repetitive errors are solved in a structural way ▪ The introduction of QMS is a major change because more control can be given to errors ▪ Problems can be addressed by QMS in an insightful way ▪ Due to QMS, the blue-collar workers have to make fewer journeys in the production hall to report or resolve errors ▪ Complex errors and errors that happen repeatedly are put in QMS ▪ The number of errors in team leader's work has decreased by using QMS ▪ QMS can be used for almost all production errors ▪ An error can be immediately resolved by QMS ▪ Before QMS was used, certain problems remained for a long time ▪ QMS makes problems more visible ▪ Problems are solved faster than before ▪ QMS shows errors in an insightful way ▪ The cause of the errors is now clear through QMS ▪ Errors can be found more easily through QMS ▪ Problems are dealt with more quickly through QMS ▪ When someone receives a report from QMS, action is taken immediately and the team leader lets you know if it has been resolved in QMS ▪ QMS makes it easier to listen to the actions that needs to be done ▪ There is insight into the mistakes that come back in QMS, but to avoid them in the future is still low ▪ In a particular department, errors have been cut in half by only addressing the biggest issues which were reported in QMS ▪ Issues emerge faster and are dealt with better ▪ Problems cannot forgotten because they are registered in QMS ▪ By reducing manual tasks in QMS through automatisation, errors will be tackled as much as possible ▪ The use of photos in QMS makes mistakes	Better tackling problems through QMS	

more likely to stick in the mind of the blue-collar workers ▪ A solution is sought in consultation with the team leader ▪ QMS helps to base the problems communicated by team leaders more on facts rather than opinions ▪ The department who made the mistake is now exposed in QMS ▪ Before using QMS, problems were ignored ▪ In the past, mistakes keep roaming around ▪ In the past there was a lack of clarity in email traffic for QMS items ▪ Previously, there was no central point of contact for errors ▪ Before the use of QMS, problems were forgotten ▪ When a problem arises, QMS is used immediately		
▪ QMS has improved the quality of the product ▪ QMS provides insight into the departments and shows opportunities for improvement ▪ Delivery of materials has been improved a lot through the insight that QMS provides ▪ QMS serves to continuously improve everything ▪ QMS can reveal the weight of the problem, resulting in better communication to external suppliers ▪ Better improvements can be brought forward through the broader view that QMS creates ▪ The input from QMS is used to estimate the problems and improve them ▪ Better improvements can be brought forward through the insight that QMS creates ▪ Order picking is being looked at more carefully due to intensive follow-up of QMS ▪ The blue-collar worker sometimes looks in QMS together with team leader when there is a QMS report on his workstation	Continuous improvements through QMS	
▪ A lot of time can be saved just by adding photos in QMS ▪ Certain parts could still be added in QMS ▪ Perhaps a screen could be installed in which the QMSs are clearly visible for everyone ▪ Push notifications are not yet possible in QMS ▪ Proposals for improvements is not used yet in QMS ▪ QMS can be used for more things than what it is used for now ▪ QMS can still be optimized ▪ Select parts from bill of materials must be added in QMS ▪ Use data to improve relationship with suppliers	Suggestions for improvements in QMS	
▪ Production is smoother and more efficient for employees through QMS ▪ QMS improves production flow through improved communication between departments ▪ QMS influences lead times in a positive way, but the employee still puts quality	Positive contribution of QMS to the production flow	

above quantity ▪ Continuity of work is now better through the use of QMS ▪ Production flow is smoother through QMS because the blue-collar worker no longer have to wait long for certain parts ▪ QMS makes it easier to verify in production whether certain parts are missing or not ▪ Because problems are now solved faster by QMS, the time that passes through the line has been shortened ▪ QMS has an indirect effect on the increase of the production flow ▪ By reducing the problems in QMS, production runs more smoothly, resulting in a positive effect on turnaround time ▪ QMS provides more information and more correct information, so you don't have to search for that information yourself ▪ Due to the smoother communication, time is gained between the lines, so that the production flow runs more smoothly through QMS ▪ Lead times can be shortened by QMS because problems are tackled more quickly ▪ Production flow has been improved because issues are resolved faster by QMS ▪ By avoiding problems in the future through QMS, the flow will only improve ▪ The end product will be ready faster by using QMS ▪ QMS provides insight into when certain parts can only be delivered later, which will increase the production flow in the longer term ▪ By using QMS, deliveries can be made on time ▪ Production flow has been improved by both QMS ▪ Delays are limited and matters can be dealt with immediately by QMS ▪ QMS is used to create as little delays as possible and to reduce errors		
▪ Now you are much more concerned with reporting things in QMS during work ▪ Team leader has to make less movement in the work to report errors due to QMS ▪ Everything is now more interrelated with each other through QMS ▪ The time-base of problems is now better known by QMS ▪ QMS makes the errors per department more visual that ensures that you take more speed and pay more attention to it ▪ The support service can respond more appropriately to problems through the information provided by QMS	Faster working through QMS	
▪ The number of QMS items are discussed in the KPI meetings every week ▪ QMS is used weekly within the automation department as input for the KPI meeting ▪ Errors are fed back in the KPI meeting and feedback is provided ▪ Morning meetings has already reduced errors by 15% ▪ In the morning meetings, the production	Feedback on QMS items in meetings	

is reviewed with the blue-collar worker including the QMS reports ▪ Results of QMS are reported every week ▪ The number of QMS items are discussed in the KPI meetings ▪ Problems are evenly resolved during morning meetings with employees ▪ Afterwards, a lot of feedback is given about the error in QMS and knowledge is shared with others ▪ The QMS notifications are visually displayed on a board in different colors during the morning meetings with the blue-collar workers		
▪ Quality counts and mistakes are no longer ignored by employees ▪ QMS improves the quality of the product, but lead time improvement is difficult to quantify ▪ Quality controls are now more streamlined through QMS	Improvements in quality through QMS	
▪ QRM is classified as the response time when creating and sending errors in QMS ▪ QMS ensures a smoother flow of work tasks ▪ QMS has increased responsiveness to errors	QRM with QMS	
▪ QMS can report and identify problems, to reduce them in the future ▪ Through QMS, errors are tackled from the basis ▪ QMS does not reduce the errors, but makes them visible ▪ Repeated minor errors are put in QMS ▪ Repeated problems become visible in QMS ▪ Feedback is provided in the morning meeting for the errors that arise in order to avoid them in the future ▪ There is more anticipated to avoid stock breaks, resulting that fewer issues arise ▪ QMS exposes the basis of the problems to reduce them in the future ▪ By knowing the basis of the problem, errors have dropped enormously ▪ QMS creates a better awareness of mistakes for the blue-collar workers in order to prevent them in the future ▪ Repeated errors are preventively avoided by QMS ▪ Errors can be handled preventively through QMS	Preventively avoiding errors	
▪ QMS cannot be seen as the main reason for shortening lead times	QMS not main reason to reduce lead times	
▪ There is little to be gained proactively with QMS ▪ QMS is more retrospective than prospective for white-collar worker ▪ The reactivity of the self-managing teams will be better because of QMS ▪ A lot is done reactively by QMS, but not proactively ▪ It is difficult to do something proactive in QMS, but reactive is very good ▪ Response time is improved through QMS ▪ By responding better to matters, the efficiency of the work has been increased through QMS ▪ Notifications in QMS are used more reactively and not proactively, so certain	QMS is used more on a reactive basis	Impeding factors for performance due to the use of QMS

data cannot be used		
▪ Problems with purchasing increases the number of QMS items ▪ At the warehouse, the most common errors still occur during order picking due to wrong input from engineering ▪ Increase in QMS reports due to late delivery from suppliers ▪ Mistakes regarding the bill of materials are easily made	Errors that are happening often	
▪ Data analysis in QMS can be rolled out even more smoothly ▪ A better data analysis in QMS would make it easier to propose improvements ▪ Processing data in QMS should be easier ▪ The data analysis in QMS is very difficult ▪ The data analysis in QMS of quality problems is very time-consuming ▪ Even more data can be retrieved from QMS than is currently being done	Data analysis in QMS is difficult	
▪ Article numbers are sometimes not properly communicated by team leaders ▪ Input in QMS in terms of information sometimes falls short and is not clear ▪ No minimum input is required in QMS, so information is sometimes missing ▪ Not all errors are registered in QMS ▪ Passing on the article number in QMS by team leaders is sometimes forgotten ▪ Sometimes a wrong person is appointed for QMS item ▪ Sometimes problems can be assigned to the wrong departments on QMS ▪ Team leader sometimes puts too little information in QMS ▪ The data in QMS is not yet actively communicated ▪ The duration of time lost due to problems is not always correctly entered in QMS ▪ Answers with a photo are not possible in QMS ▪ Amount of time lost due to production is not yet clear in QMS ▪ Errors of drawings are not yet reported in QMS ▪ Good use of QMS depends on the quality of the input ▪ Problems that can be solved by the blue-collar workers themselves do not go into QMS ▪ The person responsible for the problem is not always reported in QMS ▪ Usually 1 photo is added by the team leader in QMS and that is the most dramatic image ▪ You cannot take photos yourself and add them in QMS ▪ Things that happen under the radar are not classified as errors and will not be putted in QMS	Problems by input in QMS	
▪ QMS has not offered the solution to respond immediately to errors ▪ QMS is not linked with the current modules, resulting in a duplication of work ▪ QMS items are not discussed in meetings with employees ▪ QMS items should be linked to the existing ERP modules ▪ Some reports take extra time via QMS unless you don't have to	Regular problems that arise related to QMS	

▪ Team leader is not always accesible when errors occur ▪ The creator will not receive a pop-up message for changes that are made in QMS items ▪ The current circular modules in QMS should be a bit more compact ▪ The speed of resolving errors is not considered during meetings ▪ Vehicle visualisations are sometimes unclear in QMS ▪ Too little feedback is given about the problems that arise and that can be made transparent by QMS ▪ There is not always complete feedback to employees for matters they bring up regarding errors ▪ There is a lack of communication between employees on the work floor and the drawing office about errors		

Coding table 6: Impact squads on performance (see below)

First-order concepts	Second-order themes	Aggregate dimensions
▪ Increased efficiency of conversations and meetings by sitting together with the different groups as a squad ▪ Poor communication between squads can slow down the process ▪ Information is easily shared within the squad ▪ Easier communication within squads ▪ Effective communication within the squads is increasing ▪ Because of the closer contact, things are now more quickly known to the people ▪ Communication has improved through the introduction of squad meetings ▪ Better communication through the squads than before ▪ The communication within the squad runs smoothly ▪ Before the squads, communication was not really streamlined	Better communication lines through the squad	Changes in performance due to working in squads
▪ Due to the shortened communication lines within the squad, errors can be avoided ▪ Solving errors is discussed in the squad ▪ A short meeting is scheduled to solve problems with the squad on the spot ▪ Problems are reported in morning meetings with the squad and can be responded to more quickly ▪ Through squads there can be better responded to the product and problems ▪ If something goes wrong in production, it will be resolved with the entire squad ▪ Before the squads, there was no support from other departments towards each other for problems ▪ The squad makes matters a bit more tangible and a bit more visual ▪ It is easier to respond to problems that arise in other departments due to the daily squad meeting	Better tackling problems through the squad	
▪ Better improvements can be brought forward through the squad formation ▪ Problems are solved faster than before through the introduction of squads	Continuous improvements through squads	

▪ Better decisions can be made in the squads because the input that is provided is discussed ▪ The correct deliveries have been improved due to the squads because information is much earlier known and known to the customer ▪ Better decisions can be made because people in the squads are better informed about matters ▪ Now that squads are operating, problems are openly discussed ▪ Themes such as ETO have been added to the squad meetings to create more structure and to deal with matters as broadly as possible ▪ Gradually more structure was added to the squad meetings		
▪ Squad meetings very efficient by separating the Doornik squad and the Waregem squad ▪ All kinds of results are discussed in KPI meetings and also sometimes with the management ▪ The daily stand-ups ensure that all matters are discussed ▪ The KPI points are evaluated every week ▪ KPI meetings where matters about QMS and the team are discussed ▪ The results are discussed every two weeks in KPI meetings ▪ Discussion of squad matters in meetings should be more often ▪ Everything is discussed with the team leader, but only the major improvements are discussed in the squad	Feedback actions during squad meeting	
▪ Shorter communication lines through squads have improved the flow ▪ Through squads, parts with a longer delivery time can be ordered faster so that the customer receives the trailer much faster ▪ The production runs much clearer and faster by working in the squads ▪ Problems are solved more quickly through the squads, resulting in faster production ▪ By working in squads it is possible to switch much better and faster ▪ Customers can be delivered more on time through the squads ▪ Number of delayed vehicles has decreased ▪ Number of emails are reduced through squads ▪ Parts can be ordered immediately, and production can be properly planned by working in squads ▪ The production flow has improved due to the more rapid communication and error resolution by the squads ▪ Positive perception towards the production flow by having squads operating ▪ Squad influences lead times in a positive way ▪ Administrative turnaround time and communication lines shortened by working in squads ▪ Production problems are solved through squad meeting	Positive contribution of squads to the production flow	

▪ Buffers are virtually reduced through the implementation of squads ▪ Faster insight into the forecast of the materials due to the reduction of buffers by squads ▪ There is close control by working in squads		

Coding table 7: Link between QMS and squads (see below)

First-order concepts	Second-order themes	Aggregate dimensions
▪ The squad is more core than QMS ▪ QMS and squads are equally important	Difference in importance perception of QMS and squads	Different thoughts about the link between QMS and squads
▪ QMS and squad formation run parallel to each other ▪ QMS and squads are next to each other, comparison is difficult ▪ QMS and squads run next to each other ▪ QMS and squads don't work very much together ▪ There is no major direct link between QMS and squads ▪ No direct link is visible between QMS and the squad formation ▪ QMS is not so much related to the formation of the squad ▪ Squads has no influence on QMS	No direct connection between QMS and squads	
▪ QMS and squads cannot exist without each other ▪ QMS and the squad formation undeniably go together ▪ QMS and the squad formation complement each other well ▪ QMS application without squads will not work ▪ QMS supports the squad process ▪ Squad structure without QMS application will not work ▪ Squad supports the QMS process ▪ QMS and squads have a very strong link with each other ▪ There is a link between QMS and squad by the numbers you can see about the squads in QMS ▪ During the KPI meetings of the squad, the purchasing department talks to resolve QMS items ▪ Combination between QMS and squads ensures that problems can be tackled quickly, and the customer can be properly served	QMS and squads complement each other	
▪ QMS should be included in the daily squad meetings ▪ QMS is not a central part of team meetings, which it should be ▪ QMS items are not discussed in squad meetings	QMS as part in the squad meeting	