Master Degree Project in Management

How Susceptible are Repetitive Organizational Routines to a Technology Takeover?

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Introduction

To stay competitive and simultaneously meet customer demands, requires organizations to incorporate an efficient supply chain throughout the organization and to its external stakeholders (Wann-Yih et al., 2004). The interconnection between the different interdependent actors in a supply chain makes it fundamental to ensure that every micro process in it, meet its specific requirements due the effect it has on the later stages of the supply chain (Harrison & van Hoek, 2008; Lumsden 2012). For this to be possible, organizations need to ensure clear and systematic routines within the various parts of the supply chain to successfully deliver the end-product or service (Srinivasan, 2011). Organizational routines are conceptualized as a mechanism describing how work is achieved in organizations bringing stability and knowledge sharing between various parts of the organization (Feldman and Pentland, 2003; Kozica et al., 2014).

Researchers agree that routines are a vital aspect of organizational life and are regarded as the main instrument by which organizations achieve results. While being accepted as a vital part of organizational work, traditional understanding of organizational routines also come with a sense of creating inertia and inflexibility within organizations (Adler et al., 1999; Hodgson, 2003). Organizational inertia is described as company´s inability to achieve internal change to meet significant external changes (Gilbert, 2005). This understanding comes from the view of organizational routines as a source of stability.

Contemporary views of organizational routines draw a distinction between two aspects of a routine, namely, performative and ostensive. This is done to enable an understanding of routines as something that may indicate change (Feldman and Pentland, 2003). The performative aspect of a routine refers to the specific activities, by specific actors, at specific times and places, namely what brings the routines to life. The ostensive aspect refers to the structural nature of routine (Giddens, 1994). The interplay between the two aspects of organizational routines creates opportunities for routines to generate a wider range of outcomes as well as a variation and retention of new practices (Feldman and Pentland, 2003).

However, the view of organizational routines as something that can generate change is not shared by traditional scholars within the field. Unlike the contemporary views of Feldman and Pentland (2003), Giddens (1994); Orlikowski (2000); Adler et al., (1999) and Hodgson (2003) among others highlight the problem-avoiding, mindless and repetitive aspects of organizational routines. This case study has dominantly showed instances of the traditional aspects of organizational routines. Some of the routines in the studied setting seem to be of such a simplistic and repetitive nature that they bring about a mindless and problem avoiding behaviour in the operator. It appears that it could be beneficial to replace some of the routines carried out by humans with an automatized system to avoid dullness, mistakes and problem avoiding behaviour. Frey and Osborne (2013) argues that 47% of US jobs are in the risk zone of becoming automated and replaced by technology. The reasoning behind their argument is that technology can carry out many of the simple work tasks performed by humans today in a more effective way in terms of speed and mistake avoidance.

The replacement of simple and standardized work tasks is becoming more common due to industrial modernization and emerging development of information technology and machinery. In this case study, it appears as if it is the stimulating and time consuming work tasks in the organizations are replaced by technology while the simpler functions have been left to the human operators. The case study revealed instances of simple and monotonic routines leaving the researcher to ask why those functions has not been replaced with an automatic system as well. However, when analysing the evidently simple and standardized routines carried out by human operators more closely, one can see that technology cannot cover the job task completely without human action. The reason to this is the requirements of coordination between different systems of technology; and between technology and physical work flows (Arntz et al., 2016; Autor, 2015)

Further, technology is created and changed by human action while simultaneously being used by humans to accomplish action. The degree to which humans are involved in the construct and use of technology can ultimately determine the effect it will have on organizational processes (Orlikowski, 1992). It is according to Orlikowski (1992) rare that the operator that use the technology have been involved in its construction. The author argues that technology functions better if the end user is involved in the construction and implementation process enabling the technology to better fit the purpose of different organizations. Drawing on this notion, Frey and Osborne (2013) alerts that humans are responsible for the decline of employment in routine intensive occupations through the construction of technology.

The fact that it is common that technology leaves the more monotonic and simple functions of a job to the human operator means that it alongside repetitive organizational routines can even further contribute to non-thinking job activities thus leading to organizational inertia, inactivity and problem avoidance (Gilbert, 2005). What we see in many cases is that functions of a job that require e.g. analytical thinking or mathematical skills are replaced by technology while leaving the less stimulating aspect to human operators. While Frey and Osborne (2013) argues that this leads to better effectiveness in terms of time and accuracy, Gilbert (2005) warns that it opens for mistakes and problem avoiding behaviour by the human operator. One might therefore ask why these simple and repetitive routines are not replaced entirely by technology. This case study has revealed aspects of organizational routines that arguably should be replaced by technology, but evidently cannot due to several reasons. Autor (2015) argues that while some jobs are susceptible to automation where technology fully replaces human labour, many of the previous occupations believed to be in the risk zone of employment polarization have kept the human operator as technology have required mastery of middle skills such as mathematics, analytical reasoning etc. It seems as if the coordination and decision-making aspects of simple job tasks has been underestimated as the overtaking of human jobs by machinery has not taken the rapid development that was predicted previously. The findings in this paper challenges the contemporary view of Frey and Osborne (2013) with their main argument of technology replacing many of the human jobs entirely. The case study also revealed minimum alignment with the contemporary views of organizational routines as a source of flexibility and change.

Problem Description and Purpose

The many interdependent processes and parts of modern organizations forces them to incorporate standardized organizational routines for daily work to run smoothly (Srinivasan, 2011; de Boer and Zandberg, 2012). Further, routines also tend to create inertia in organizations leading to slower development and adjustment to the rapid changes in the business environment (Hodgson, 2003). Research also shows that the repetitive and monotonic aspect of routines is tightly coupled to minimal stimulation and passivity leading to lower levels of concentration and engagement of the operator who carries out the routine (Orlikowski, 2000). The monotonic and often simple aspects of repetitive routines should arguably be automated with the help of technology to avoid job functions that leads to lack of concentration and organizational inertia (Frey and Osborne, 2013).

It seems that modern organisations tend to tie their organisational routines tightly to technology where various ERP systems and information technology often automatically carries out the challenging aspects of the routine such as calculations and forecasting thus leaving the simple and monotonic aspect of the routine to the human operator. As these types of routines often lead the human operator to lack of concentration and problem avoiding behaviour (Hodgson, 2003; Adler et al., 1999), they leave a desire of technological automation solutions to simple and monotonic job tasks. However, these seemingly simple tasks are not so easily replaced with technology as argued by Frey and Osborner (2003). What we rather see, is that there is a gap in technology where it is unable to fully replace or carry out certain functions of a job thus requiring human assistance to function properly.

The purpose of this study is therefore, to investigate how organizational routines affect the operators and organization itself, and to draw connections and distinctions with previously conducted studies within the field. The aim is also to find out if evidently simple routines can be entirely replaced by technology.

In accordance with the purpose and problem description the following research question will be examined:

RQ: What type of organizational routines are evident and how susceptible are they to computerisation?

Theoretical Framework

The analysis of established theoretical implications showed that there are ambiguous views on the effects of organizational routines. While some scholars argue that organizational routines can be a source of change and flexibility, others withhold an opposite view arguing that they are e.g. a source of organizational inertia and mindlessness. Further, automation of mindless and inertial organizational routines with the help of technology is highlighted as a possible solution. However, it seems to be complex to entirely unbundle the technology from human action.

Organizational Routines

Routines have a significant role in coordination and control of operational activities by guiding new employees, ensuring consistent levels of desired quality and simplifying decision making (de Boer and Zandberg, 2012; Nelson and Winter, 1982). Feldman and Pentland (2003) and Kozica et al., (2014) suggest that routines can be a source of both flexibility and change. Especially interesting is the performance of routines as adapting to specific context that require ongoing changes and reflection of future consequences of current actions. Understanding of contexts and consequence of actions enables actors to continuously adapt and adjust current routines (Feldman and Pentland, 2003). While organizational routines still are defined as repetitive-, recognizable-, interdependent actions, Kozica et al., (2014) argue that they cannot be understood as static. Routines entail self-reflective behaviour thus consists of results and the understanding of performances. However, the dominating belief among traditional scholars such as Giddens (1994); Orlikowski (2000); Adler et al., (1999) and Hodgson (2003) is that organizational routines are commonly causing organizations difficulties in change and adaption. The different views on organizational routines is deriving from opposing research interests and fundamental assumptions (Radawan and Kinder, 2012). There is according to Radawan and Kinder (2012) a difference in the use of evolutionary metaphors among researcher in their attempts to explain change and stability in organizations e.g. Feldman and Pentland understand selection as selective retention and variation based on deliberate actions while Hodgson (2006) utilize the term "selection" to refer to changes of units to environmental conditions. Further Radawan and Kinder (2012) highlight differences in the view on characteristics of actors where habits are driving forces in a "black box"-perspective while actors act deliberately in a practice-based perspective.

Further, organizational routines are made up of two related parts, namely, structure and agency where the latter is the actual performance of the routines by specific actors at specific times and the former refers to the abstract idea of the routine (Lannacci and Hatzaras, 2012); Feldman and Pentland, 2003). Both parts are necessary for an organizational routine to occur. Understanding the interaction between the two is vital for understanding the potential of organizational routines as an origin of continuous change (Leonardi, 2011). Researchers also tend to make a distinction between performative and ostensive aspects of a routine. The latter is something that shapes our perception of what the specific routine is. This aspect commonly involves screening, attracting and choosing operators for the routine (Feldman and Pentland, 2003; Pentland and Feldman, 2005). Further, the ostensive aspect does not thrive from a large common view of the routine

where every involved actor sees the routine in the same way. Rather, each participant´s view and understanding of the routine depends solely on his/her role in the routine (Pentland and Feldman, 2005). For example, the hiring routine of a company will not be viewed in the same way by the hiring manager as by the job aspirant (Cohen and Bacdayan, 1994). Although the views of different participants come into alignment quickly thus gaining apparent objectivity, the ostensive aspect is just a partial picture as the performances are excluded. It can therefore be said that the ostensive aspect of a routine is the "ideal form" of a routine, a generalized and abstract idea of the routine known as the core principle (Pentland and Feldman, 2005).

The specific actions that are taken by actors at specific times when they are a part of an organizational routine is referred to as the performative aspect of it. The performative aspect of a routine describes the mere performance of it. Lannacci and Hatzaras (2012) argues that the performative aspect of routines can be perceived as naturally improvisational thus needing to be adjusted oftentimes, despite being engaged in by the same actors. Improvisation involves dealing with the details of a specific situation and actions taken by other involved actors (Feldman and Pentland, 2003; Orlikowski, 2000; Lannacci and Hatzaras, 2012). Going back to the example of the hiring manager and job seeker, the performative aspect of a hiring routine is contextually sensitive and complex as for instance, certain arrangements (meetings, job descriptions, evaluations) need to be made to help the job aspirant and employer. Further, appointments between various departments such as Human Resources and Finance would be necessary to evaluate the job candidate. For this appointment to happen, the hiring routine and its specific arrangements might need to be adapted from time to time. This would then set a tone and establish expectations for what actions that will take place in future situations of hiring. Thus, the performative aspect of a routine is the enactment whilst the ostensive aspect is the idea of the routine (Lannacci and Hatzaras, 2012; Orlikowski, 2000).

The Origin and Effects of Organizational Routines

Reduction of complexity and constant urge for cognitive efficiency explains the commonness of organizational routines (Becker, 2008; Cohen et al., 1996). Becker (2008) also argues that routines may emerge from managerial goals or external pressure e.g. environmental thus being an entity of organizational learning as it promotes standardization, failure avoidance and reduced variability. Functionality, cost minimization, increased managerial control and strengthening of legitimacy are valid explanations to why organizational routines have emerged over time. It also partly provides an explanation of why organizations seem to avoid reinvention of organizational routines (Feldman and Pentland, 2003). Orlikowski (2000) argues that repetitive patterns of action such as routines tend to emerge when humans choose to act on easier actions and avoid the harder ones. Routinization of daily activities can help to develop a sense of ontological security meaning that the actors will obtain a stable mental state with a sense of order and continuity (Giddens, 1994; Becker, 2008). Loss of security and enhanced sense of anxiety can be caused by novelty; therefore, structuration accounts of organizational routines do not indicate that certain patterns of actions are neither legitimate or efficient, routines are from a structuration perspective simply patterns of action chosen by actors to avoid novelty (Hodgson, 2003).

Researchers agree on the effects of organizational routines as bringing of stability with some implicating they also can be a source of inertia, mindlessness and demotivation (Howard-Greenville, 2005; Adler et al., 1999). Through the analogy of habit, organizational routines are conceptualized as the reversal of change and flexibility. At the same time, functionalist theories emphasize that routines are withholding a potential for legitimacy and efficiency (Feldman and Pentland, 2003). Further, routines withhold organizational knowledge and capabilities which makes them a key component in organizational learning and are at times the result of external pressure (e.g. management issues, society). However, it is still argued that while organizational routines are emphasized as a vital part of organizational learning, it is the repetitive and structural aspect that is at the centre of attention (Howard-Greenville, 2005; Adler et al., 1999).

Baum and Singh (1994) explain that routines are genealogical entities and that they in a successive manner pass on their information which is why they are carried out in a repetitive manner. This view suggests that routines are a maintained product of historical events which fulfil the need of stability and that they for this reason, are not questioned (Howard-Greenville, 2005). The problem with this view is that one might miss opportunities for change and improvements thus further leading to organizational inertia (Feldman and Pentland, 2003; Kozica et al., 2014).

As evident, literature on organizational routines varies quite a lot. There is a clear ambiguity in the repetitive and passive aspects of organizational routines argued by traditional scholars such as Giddens (1994); Orlikowski (2000); Adler et al., (1999) and Hodgson (2003) versus the more contemporary views of Feldman and Pentland (2003); Radawan and Kinder (2012) and Kozica et al., (2014) who emphasizes the change aspect of organizational routines as well.

Can Technology Replace Dull Routines?

The debate on human jobs susceptibility to computerisation has recently grounded itself seriously in scientific studies. The present low rates of employment in manufacturing organizations and disappearance of other routine jobs is partly caused by computerisation. Simple and repetitive work task in manufacturing are in many cases worth replacing with machinery from a financial point of view (Charles et al., 2013). Brynjolfsson and McAfee (2011) argues that we are entering a time in human history where less and less human workers will be needed to produce goods and services. The authors go on to state that the importance of the human role in production of goods and services is set to diminish with technological automation.

There is already an evident shift of human workers from from manufacturing jobs to service occupations as the service sector is less vulnerable to computerisation as it often necessitates physical adaptability and flexibility thus being more difficult to automate (Autor, 2015). However, simple and repetitive work tasks also seem to be more complex to replace entirely with technology than what has been reported earlier. Acemoglu (2002) and Autor (2015) explains that seemingly simple jobs tasks, often involves cognitive ability. Jobs that require cognitive ability such as analytical thinking and labour where expert skills are required has a comparative advantage and are not as prone to machine automation. Autor (2015) expects that

these job tasks as they require numeracy, common-sense, adaptability and problem solving will persist in the future as well.

It is not yet quantified what contemporary progress in technology will mean for future employment. Autor et al., (2003) draws a distinction between manual and cognitive tasks, and routine and non-routine tasks arguing that while machine substitution for human labour is evident in manual and cognitive routine tasks, non-routine tasks are more complex to substitute as this category involves everything from truck driving, legal writing, selling, medical diagnoses etc. The commonality between these tasks seem to be the interplay between humans and technology. To complete the job, the technology is dependent on human interference while the human operator at the same time need the technology to complete the task. These occupations although referred to as non-routine tasks, involve repetitive routines in certain aspects (Autor et al., 2003) An operator might have a routinized way of performing certain parts of a job task while other parts can be performed differently from time to time.

Duality of Technology

Drawing on the notion of dependent interplay between humans and technology argued by Autor et., al (2003), similarities are evident with Orlikowski´s (1992) study on the concept of technology in organizations. Orlikowski (1992) concludes that technology is created and changed by human action while at the same time being used by humans to accomplish action. This recursive notion is called the duality of technology. Further it is also the case that once developed and deployed, technology tends to become institutionalized and looses its connection with the human agents that constructed it. The fact that the end user is usually is not involved in the construction of the technology he/she is intended to use can be a problem according to Ang et al., (2005). Orlikowski (1992) calls the separation between construction and operation in technology design and use mode where the latter refers to the operator's usage of technology while the former refers to its construction. The process of development and use are often accomplished in separate organizations thus leading to a treatment of technology as a "black box" meaning that the user of technology does not understand the underlying factors of why he/she uses the technology the way they do (Orlikowski, 1992).

The Setting

This case study has been conducted at Solar Sweden AB (Solar) which is a part of the Solar Group, a leading Sourcing and Service business in Europe. Solar mainly operates within the areas of electricity, plumbing, heating and ventilation technology and offers a wide range of products. Solar does not produce any products themselves, but act as a service organization where they tie together and cooperate with different actors in a supply chain to deliver required products to their customers. These actors are mainly suppliers of goods, transportation companies and sellers/retailers. Based on customer demand, Solar purchases products from suppliers who delivers them to Solar's central warehouses. The products are then sorted and repacked before being shipped directly to customer or to Solar's own department stores. The transportation is done by hired external transportation companies.

Company Profile

Solar Group was founded back in 1919 in Vejen, Denmark and is currently listed on Nasdaq, Denmark and has a total of 11 billion DKK in revenues in 2016. The head office is in Vejen, Denmark and it has operations (offices and warehouses) in countries such as Denmark, Sweden, Belgium, Norway, Poland, Netherlands and Austria which in total employs ca 4000 people. With a vision of being "stronger together" the organization focuses on close collaboration with customers to offer appropriate solutions and increased efficiency and productivity (Solar, 2016).

The operations in Sweden began in 1989 and offers a wide range of products and services such as automation, lightning, communications, installation, ducting, cable, safety and plumbing and has a revenue of 3 billion SEK. The head office is located in Gothenburg, Sweden and employs 635 people (Allabolag, 2016). The organization serves their customers from 48 sales offices around the country. Solar has a total of three Central Warehouses in Sweden located in Örebro, Alvesta and Halmstad. The Central Warehouse in Örebro supplies customers that are located north of Jönköping while the other two supplies the customers located in the southern part of Sweden. The three warehouses combined contain around 40 000 products in stock which of are mainly electrical components and a smaller part which consists of HWS (water and waste products). The products are purchased from approximately 500 different suppliers. The organizational size of the supplier is of a large mix ranging from large international organizations to small privately owned local companies.

The organizational structure at Solar is a traditional hierarchical formation as illustrated in the figure below. This thesis will focus on investigating the Material Planning unit of the Supply Chain department. However, interviews have been conducted with other departments (highlighted in green) as well to investigate their role in the organization and provide a deeper understanding of how the organizational routines affect the company as an entity. The procurement department is a part of the Supply Chain department.
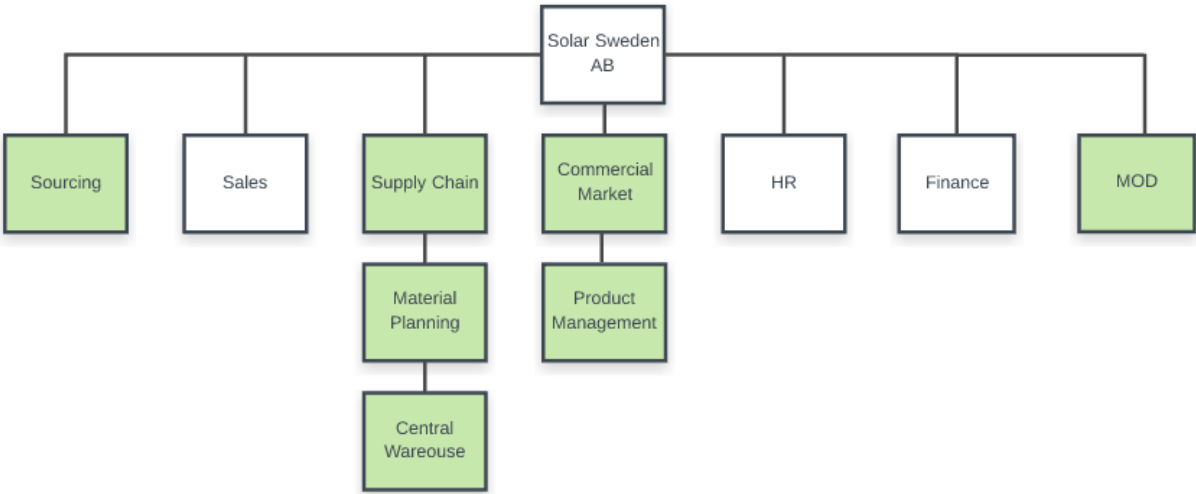

Figure 1. Organizational Structure, Solar Sweden AB.

What Makes This Setting Relevant for the Study?

The interconnection between the many actors in a supply chain makes it fundamental to ensure that every step in it meets its specific requirements as the effect it has on the later stages will determine the success of the entire chain. Clear and systematic routines are thus utterly important within the various parts of a supply chain to successfully deliver the end-product or service. The studied case company acts as an intermediary between suppliers and customers tying together different actors of a supply chain to deliver products to customers in an effective manner. The company does this by procuring electricity, plumbing and heating products from suppliers all over the world and distributing them to their customers in Sweden. There are many interactions and processes that takes place for this to be possible. The case company consolidates with other actors in the supply chain such as transportation companies, warehouses, retailers and customers. It is vital such a setting that every micro process in the supply chain runs smoothly as it is connected to upcoming parts in the supply chain thus affecting the outcome.

The setting therefore allows studying of organizational routines in a context that highly depends on them making it ideal from an organizational routine perspective. Below is an example illustration of the case company's role in the supply chain. As illustrated in figure 2, the case company consolidates different suppliers and distributors (the arrows represent transportation of products) to deliver what the customers demand. Central in the coordination of suppliers and products is the procurement department as it is responsible for coordinating procurement of goods from suppliers to the central warehouse and retailers. The routines and processes of the operators in the procurement department is analysed in the findings section. It is evident in the analysis that the procurement department also functions as a central aspect in the routine of handling purchasing related problems that occur. Therefore, this department falls as a natural selection to investigate regarding organizational routines and technology.
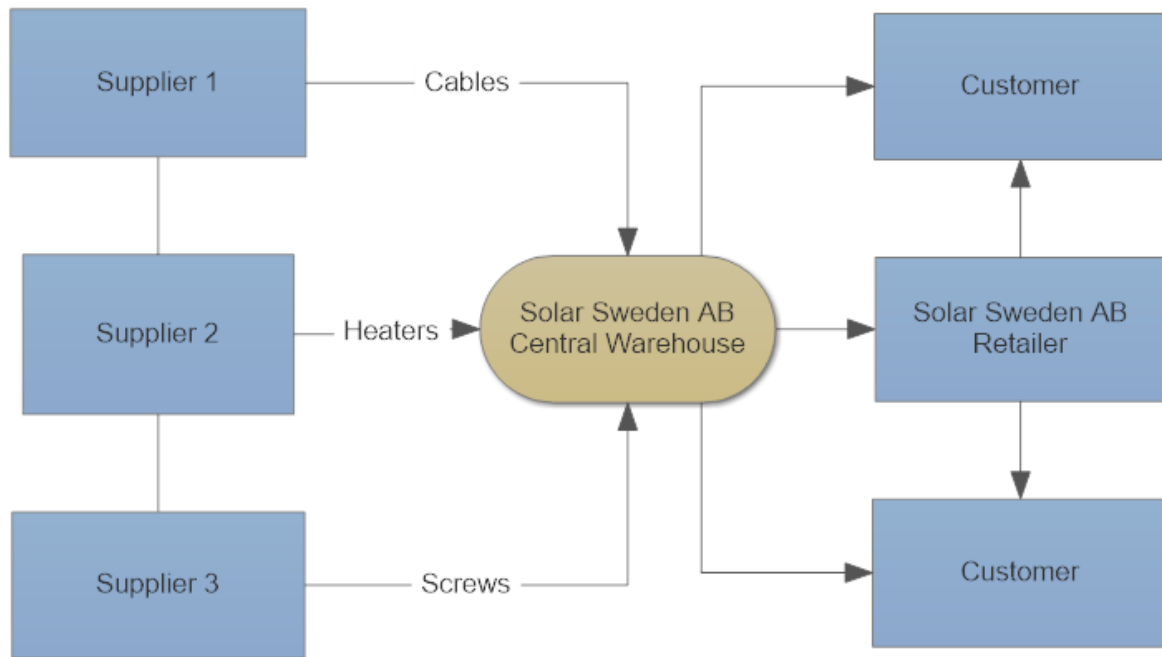
Figure 2. Consolidation between the actors in the supply chain.

Further, the studied setting has allowed analysis of interplay between two different systems of technology and human actors. This has enabled an investigation on the role of technology in organizational routines yielding evidence of complexities in replacing seemingly simple repetitive job tasks entirely with technology.

Methodology

To further develop and understand empirical research on the topics of organizational routines and technology, this study aims to showcase how the interplay between human actors and technology affect the organization, its routines and human actors in a logistics setting. Due to the inherent complexities in a supply chain and the organizational routines that binds it together and makes it run smoothly, the decision was taken to closely study the phenomena in an organization that plays a vital role in coordinating a supply chain between various actors. As evident in the theoretical framework, the perception of organizational routines varies a lot depending on various contextual factors. Due to this fact, studying organizational routines in real-life organizations may display unique findings in each case.

Therefore, due to the aim of finding out how organizational routines unfold in- and affect a supply-chain organization, a single case study was conducted in a real-life setting. The choice of a single case study was considered appropriate to deliver a context-dependent and detailed understanding of the phenomena (Yin, 2009). The main approach of investigation has been qualitative including interviews and observations in real-life settings to enable an in-depth analysis of the current organizational situation, and how people cope and thrive in it. The advantage of a qualitative approach is that it allows the researcher to profoundly understand the world of the studied object where behaviours and daily actions can be effectively understood (Silverman, 2013). Another advantage is that it allows the researcher to see things that are

beyond the formal description of the job task. Bryman and Bell (2011) argues that an analysis of qualitative design suits cases where data describes processes and practices embedded in a social setting. This argument aligns well with the studied setting in this case as daily organizational routines have been studied in a real-life context. Conducting a case study has allowed for a broad collection of data as it focuses on one case which has provided a great and detailed amount of data. The details are important as it enables development of a nuanced view of the reality as human behaviour can be more than the actions governed by rule which is commonly found in theory. The case study has also allowed concrete and context-based practical contact with the studied setting (Flyvberg, 2006).

Further, as the case study enabled investigation of real-life contexts, it strengthened the validity of the findings in this research (Yin, 2009). The gathered information from the case study was compiled and analysed against established research within the field of organizational routines and technological automation. The comparison between empirical findings and theoretical implications enabled the author to make sense of the data gathered data in the case study.

Data Analysis

First hand data in this study was collected via semi-structured in-depth interviews (Silverman, 2013). The choice of method was chosen as it seemed appropriate to conduct semi-structured interviews to enable an understating of how organizational routines and technology have unfolded in this specific context for comparison of data later in the process (Watson, 2011). Further, data was gathered in various phases in alliance with the ongoing aspects of grounded theory (Corbin and Strauss, 1990). Payne and Payne (2004) argues that grounded theory advances as the process evolves thus a comparative analysis of qualitative data was continually conducted throughout the process of this study.

The collection of empirical data was gathered at the head office in Gothenburg, Sweden. Information gathered from interviews and observations was compiled and analysed against secondary data i.e. theoretical findings to find differences and similarities between different management approaches towards the issue and to provide a foundation for answering the research question. The purpose of the secondary data was mainly to understand what empirical evidence have reviled itself so far in the process and how it could be related to the purpose and findings of this study (Silverman, 2013). The interviews have been recorded and all data has immediately after collection been structured and compiled to enable the author to analyse the material at further stages in the process. To ensure that the qualitative study does not depart from the abstract theories, the analysis of this study has been performed closely to the empirical gatherings along the process.

The analysis then proceeded through various stages where collected data from interviews was transcribed and coded to enable analysis and connection with relevant theories (Martin and Turner, 1986). The coding process started immediately after the interviews and was performed in three stages. The first stage was "open-coding" aiming at finding resemblances in the gathered data (Strauss and Corbin, 1998). The routine types that were identified early in the process are an outcome of the initial open-coding. Secondly, the initial coding was placed into broader categories that were identified such as the procurement routine, the support-box routine

and the order confirmation routine. This step of coding involved a higher level of classified abstraction in the coding process (Strauss and Corbin, 1998). Finally, a selective way of coding was conducted to improve and steer the analysis towards the chosen theoretical framework that was used to analyse the gathered data. This enabled the author to make sense of the situation and draw connection to established literature within the field of organizational routines and technology.

Interviews and Observations

The findings of this study are based on 12 in-person interviews aiming at collecting information about situations which are not possible to observe directly and to gather opinions and views of the actors involved (Silverman, 2013). Interviews are the main tool of the qualitative research for data collection (Denzin & Yvonna, 1998; Janesick, 2000). The interviews have been held with involved actors such as managers, employees and suppliers and has provided access to a large amount of information. An agreement regarding the anonymity with all respondents was withheld thus avoiding any ethical conflicts between involved interviewees and favoured the ethical aspect of the study (Silverman, 2013). The aim of the broad set of interviewees was to gather an understanding of all involved parties in the routines and compare their perception of them. Below is an illustration of each interviews duration and interviewee title.

Title	Duration
Material Planning Manager	60 min
Sourcing Manager 1	30 min
Sourcing Manager 2	30 min
Product Manager	45 min
Material Planner 1	60 min
Material Planner 2	30 min
Order Confirmer	60 min
Plant Manager, Central Warehouse	90 min
Head of MOD	60 min
MOD Programmer	20 min
Supply Chain Manager	60 min
Supplier	60 min

Figure 3. Interviewee title and Duration.

Further, ongoing talks via email, phone and unstructured interviews have also served as a supplement in addition to the semi-structured interviews. To keep the interviews semi-structured and ensure that vital information would not be bypassed, an interview guide was used with 5 to 10 open-end questions. Interview-guides eases the setting up of an interview by providing an overview of what needs to be discussed and help to stay on the desired track (Jacobsen, 2002). The aim of the open-ended questions was to allow the respondents to express their thoughts freely about the subject and to enable room for more and deeper interpretations on the subject (Silverman, 2013). Respondents were introduced to the topic of discussion prior

to the interviews to give the interviewee time to reflect on the subject and reduce risk of hover away from the topic.

In addition, observations of two of the operators have been done to further deepen the understanding of how the routines are carried out. The observation was carried out by standing by the operator for approximately 30 minutes each while they were performing their job tasks. The author has also performed the job routine of the order confirmer and material planner to get a personal sense of how it is to carry it out. This has enabled a deeper understanding of the routine and the effects it has on the operator performing it.

Findings and Analysis

The analysis of organizational routines in the procurement department of Solar yielded evidence of two different routine types. Firstly, there is a routine serving the purpose of purchasing goods to the central warehouse for further distribution to retailers and customers. The routine involves different actors in diverse ways along the supply chain thus opening for mistakes and problems along the way. The second type of routine aims at handling these purchase related problems that may occur in the procurement routine and is referred to as the "support box routine". Dullness and inertia was evident in several aspects of the procurement routine leading the operator into a mindless and problem avoiding work behaviour.

Both routine types seemed very simple and monotonic at first glance thus raising questions on possibilities to automate the routines entirely with technology. However, when further analysing the possibility of replacing the human interaction of the routine with technology, it was evident that there were complexities in the routine that didn't allow for this to happen. The case study also showed evidence of dependent interplay between technology and humans as the human actor worked as an intermediary between two systems of technology by combining them to complete the job task. The use mode between human operators and technology and an interdependency between the two, showed evidence in this case that one would not be able to carry out the required task without the other.

The Procurement Routine at Solar

Solar has a standardized way of procuring products to the central warehouses that involves one operator with the title material planner and one operator with the title order confirmer who are both a part of the Material Planning department. The routine is highly dependent on two systems of technology, namely, SO99 and SAP where the latter is the ERP system used to electronically confirm and send purchase information to suppliers while SO99 serves as a planning tool and decides when a specific product needs to be ordered and in what quantities. The suppliers of the products are involved in the routine in the sense that they need to confirm the order with Solar before sending the products.

The Stimulating Role of the Material Planner

The aim of the procurement routine is to make sure that the warehouse has the right stock levels i.e. to purchase products in quantities which keeps stock levels at minimum while at the same time ensuring that the Central Warehouse does not run out of stock. To manage this, the operator

(Material Planner) needs to consider the information that he/she receives from SO99 which is a Supply Chain Planning software in this case used to trigger a purchase. The programme calculates quantities and what products that should be purchased based on various algorithms which are secret.

The operator has two screens on the desk in front of him/her. On one screen (SO99), the operator sees the information on what products that needs to be purchased, and wanted quantities in a programme. Every material planner has his/her own supplier portfolio i.e. a given number of suppliers whom they purchase products from. On the other screen, the operator handles the ERP system (SAP). In SAP, the operator clicks on Purchasing > Purchase Quotation and enters a product ID-number that was collected from SO99. Once the operator enters the ID-number a window pops up with product information such as product name, supplier name, price, discount and empty columns with the title "wanted quantity" and "required date" (of delivery). In the next step, the operator is supposed to check if the desired products might be available in excess in any of the other three central warehouses. If there is, they should choose to transfer the products from one central warehouse to another instead of making a new purchase. However, this step is oftentimes neglected or forgotten because of what Material planner 2 calls lack of concentration due to repetitiveness. The operator states:

> We are supposed to check every time if the products which the system desires to purchase are available in any of the other central warehouses to transfer them from there instead of making a new purchase. But this doesn't always happen as the concentration levels drops sometimes when we have a lot of purchases to do. And most of them look similar in the sense that a new purchase needs to be done, so you assume that the next product should be bought in as well.

Above statement shows signs of avoiding parts of the routine. The reason to this according to the operator is concentration issues that comes along with the number of repetitive tasks in the routine. There is a sense of demotivation to perform the routine to its fullest every time which is a rather common effect of organizational routines according to Adler et al,. (1999). Further, the step of checking stock levels requires more effort and might therefore be avoided by the operators. Orlikowski (2000) conducted a study of technology in organizations through a practice lens. The researcher argues that routines, with their repetitive patterns of action seem to emerge when human actors choose to act on easier actions and avoid the more complex and difficult. In this case, it seems thus it has been routinized to neglect a part of the routine to avoid a more difficult course of action.

What I personally noticed while performing the purchasing routine is that while things run smoothly (i.e. a transfer of goods doesn't need to be made from one warehouse to another but rather just click on the purchase button) is that it feels like you get into a mental zone where you feel very concentrated on doing as many purchases as you can and it goes faster and faster each time once you get into it. However, when there was a need for a transfer, it felt like the concentration and process was cut off as you must check stock levels in the central warehouses in other parts of the ERP system. This could be another reason to why the operators at times

chooses to avoid this part of the routine. The routine is so repetitive that it almost becomes like a habit that you want to avoid breaking. However, avoiding this part of the routine means that stock levels in the central warehouse is higher than it should be thus tying up capital which can be used in other parts of the organization. The identification of required transferring of goods could perhaps be executed entirely by technology. The ERP system used in this case however, lacks this function thus requiring human action to complete the task.

Further, the role of the human actor in this routine is highly dependent on the two systems as he/she merely acts as an intermediary between them. It can also be argued that there is a gap between the two systems of technology that needs to be filled with the interaction of human action. If the human operator did not exist in this case, the system would not be able to purchase any of the required goods. The interdependency between technology and humans that is evident in this case is argued by Autor et al., (2003) to be one of the main reasons to why technology need human interaction thus will not take over human jobs entirely. It is also evident in this case how technology has lost its connection with the human agents that constructed it. The material planner who uses the technology i.e. SAP and SO99 to perform the job task has not been involved in the construction nor implementation of it. The operator is also unaware of what algorithms SO99 bases the purchasing triggers on. One can therefore argue that the interaction between the human operator and technology in this case is of a use mode thus treating the technology as a "black box" (Orlikowski, 2003).

Further, instances of analytical aspects can be seen in the job task of the material planner as he/she need to consider and analyse what information SO99 provides and stock levels in the warehouses to decide on purchasing quantities and transferring of goods between the warehouses. The operator needs to understand the consequences that his/her actions has on later stages of the process. It seems as the job task of the material planner is what Autor et al., (2003) calls a non-routine task. The connection lays in the interplay between human action and technology, the seemingly routine-like job task and the analytical aspects which makes the job difficult to replace entirely with technology. Therefore, the routine of the material planner aligns with contemporary views of routines as entailing self-reflective behaviour thus consists of results and the understanding of performances (Feldman and Pentland, 2003).

Once the operator has typed in the required information he/she presses "add" and the purchase order is sent off the supplier. Once the Purchase order is sent off, the operator goes back to SO99 and proceeds with the next product and repeats the process. Despite the outspoken analytical aspects of the job routine, the operator feels that more analytical stimulation is needed to avoid dullness and mindless work behaviour. Material Planner 2 states:

> The job can be slightly monotonous at times and luckily, we do different things in the afternoon, otherwise I think we would make more mistakes as it gets harder to focus the longer you do these repetitive tasks.

The mistakes referred to by the operator is e.g. choosing wrong quantities, not checking stock levels in other warehouses and choosing wrong delivery date. These mistakes can be connected to what Adler et. al., (1999) calls mindlessness i.e. you repeat a certain thing so many times that you stop seeing occasional changes which might lead to mistakes. The 12 operators currently

working as material planners make approximately 30-40 purchase orders each per day with ranging value from approximately 50 to 2 000 000 million euros. The purchasing routine is illustrated in the figure below.
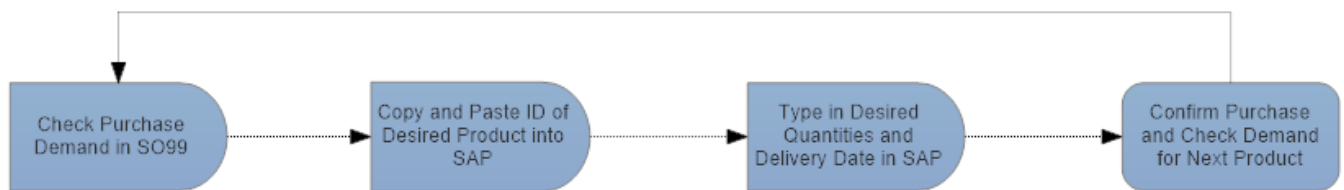

Figure 4. Routines of the Material Planner in the Purchasing Process.

How is the Supplier Involved in the Procurement Process?

Apart from being responsible of delivering required products as agreed, the supplier's role in the procurement process is to reply to Solar on the incoming order. The reply is done via email that contains information such as delivery date, product ID's, product names and quantities. Each supplier has a unique way of providing the required information. Some suppliers respond with a standardized template in a PDF-file whereas other just type in the information in the email. There is no standardized template for the suppliers to follow nor any technological solution that enables direct transaction of information to the ERP system. This email reaches the order confirmer who is responsible for control checking the incoming order confirmation from supplier and confirming it in SAP.

The Unflattering Role of the Order Confirmer

Once the purchase order has been sent off, the supplier will respond with an order confirmation via email. This confirmation reaches the order confirmer. The purpose of the role as an order confirmer is to control check the incoming order confirmation email and reply to the suppliers so that they can proceed with the delivery. The order confirmer operates with two screens, one for overviewing the order confirmation from the supplier and the other for SAP where the operator can see the order which the material planner sent off. The order confirmer needs to control check the received order confirmation by comparing it to the placed order in SAP.

When the operator receives, the confirmation email he/she opens a PDF-file that is usually attached to the email. This is the most common way for the suppliers to confirm the order. The operator can read information in this PDF-file such as product ID, product name, quantity, delivery date, price etc. This information is then compared to the information that the operator sees in SAP at the other screen in front of him/her. The most important thing to check according to the job-description is the quantity and delivery date. If the confirmation is in order, the operator press "OK" in SAP and a confirmation will be sent to the supplier that a delivery can take place. The order confirmation routine is seemingly simple. The reason to why the material planner does not also account for the confirmation part of each order is that the control checking would require too much of the material planners time thus bring reduced frequency of procurement.

If a deviation is found in the order confirmation e.g. wrong delivery date, the order confirmer should contact the material planner who placed the order. The order confirmer contacts the material planner via email or phone where after the responsibility of fixing the reason behind the deviation lays in the hands of the material planner. It is evident that the job task of the order confirmer is very simple and repetitive without any analytical requirements. I ask myself why this job even exists. It is evident that this role unlike the role of the material planner, can be replaced by technology. The job routine of the order confirmer is a perfect illustration of inertial routines highlighted by traditional scholars such as Hodgson (2003) and Adler et al., (1999) that leads to dullness and organizational inertia. Even the ostensive aspect of this job routine consists of a very simple and repetitive agency. Adler et al., (1999) further argues that routines of this nature oftentimes lead to demotivation and problem avoiding behaviour which is evident from what the order confirmer tells us next.

According to the order confirmer, the process of contacting the material planner and following up on deviations regarding delivery date, name and quantities is oftentimes neglected due to the same repetitive routines and large amount of order confirmations that are received every day (approximately 400). The interviewee states:

> There is a constant stress and pressure from the managers to confirm as many orders as possible so you just sit there and confirm order after order all day. That makes following up on problems a second priority as I am operating alone. Oftentimes, more than 3 times per week, when I receive an incomplete order confirmation with e.g. lacking information regarding delivery date, I just appreciates how long time it will take and confirm the order to be able to proceed with the next order confirmation.

Apart from the large amount of order confirmations, a major reason to why the order confirmer appreciates rather than follow up on the problem and contacting the supplier or material planner is because there are so many repetitive and oftentimes identical confirmations to do while there is little time to follow up on every deviation according to the operator. It is almost as appreciating rather than following up on a problem has become a routine in this case. The operator states:

> The job is simple and quite boring. I do the same thing all day and the concentration levels drop a lot after a couple of hours. It is easy then to miss or even ignore deviations in it (in the order confirmation).

This case can be connected to Orlikowski's (2000) argument that repetitive patterns of actions i.e. routines, often emerge when human actors choose to avoid harder actions and proceed with the easier ones. It also seems to be an improvisational behaviour in the performative aspect of the routine as the order confirmer occasionally chooses to follow through with the routine regarding errors in the order confirmation while at other times chooses to avoid it based on the various contextual factors. Orliowski's (2000) argues that performative aspects of routines oftentimes are linked to naturally improvisational behaviour and that they need to be adjusted, despite being engaged in by the same actors. This is especially evident in the work routine of the order confirmer as the same operator carries out the evidently simple routine each day, yet

still alter the way it is performed by following up on problems sometimes and at other times ignoring them completely.

Further, many order confirmations have more than one article, sometimes even up to 200 articles. When the order confirmer receives a confirmation with that many articles it becomes difficult and time consuming to analyse each one of them which is why the order confirmer often just skims through the conformation thus reducing the chance of identifying deviations. The interviewee states:

> We have been told by the management to do things a certain way and that is what we follow. It has happened on occasion that we have questioned parts of the routine, like why there is so much workload on one person and why there is no template or standardized way for all suppliers to respond to the orders in the same way. The response of the management has not been negative but they usually refer to lack of people, time or money to go through with the changes.

It can be argued in this case that the company and operator itself seem to be avoiding change or reinvention of current organizational routines partly because of the nature of routines causing participants to focus on the repetitive task thus avoiding interference with any problems, and partly because it would require time, money and effort which is commonly keeping organizations from reinvention of routines according to (Feldman and Pentland, 2003). The order confirmation process is illustrated in figure 5.
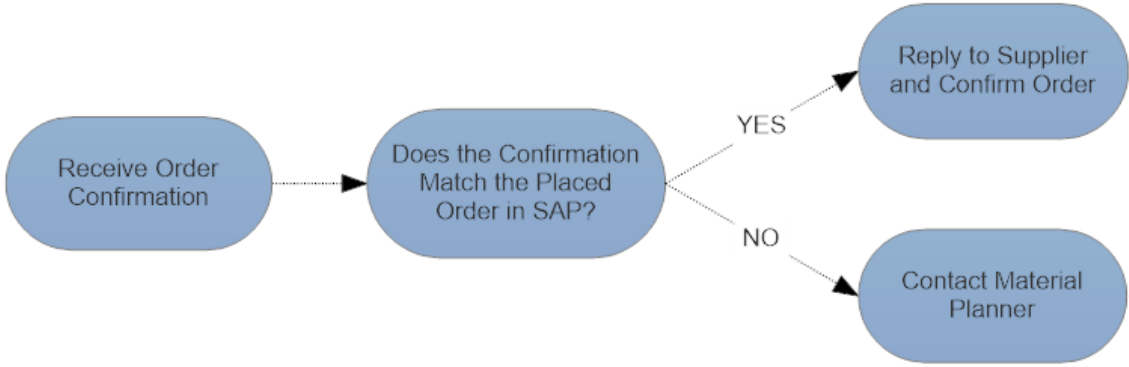

Figure 5. Routines of the Order Confirmer in the Purchasing Process.

In conclusion, the entire routine of procuring a product is handled through two systems of technology (SO99 and SAP) and two human actors within the company. There is also an external actor (apart from the customers) as the supplier plays a role in the decision making of the order confirmer. The analysis showed that the role of the material planner is considerably more stimulating than the role of the order confirmer. Although the routine shows instances of repetitiveness and simplicity at times, the analytical aspect in the job routine of the material planner makes it seemingly difficult to replace entirely with technology. The role of the order

confirmer however, should arguably be automated though technology as its overly simplistic, repetitive and dull nature evidently creates problems in the organization. The reason to why it has not been done is the lack of a general platform where all suppliers can confirm the orders digitally. Further, the great mix of big and small suppliers in terms of organizational size makes it difficult to construct a platform that could be used by all. For example, the bigger suppliers could adapt to a new digital way of confirming orders that allows computers to identify deviations in the order confirmation. The smaller suppliers however might face difficulties incorporating such technological platforms as some of them refuse or simply do not have the proper technology in the organization to do so. The entire purchasing routine is illustrated in the picture below. Note that this process illustrates one purchase from one material planner.
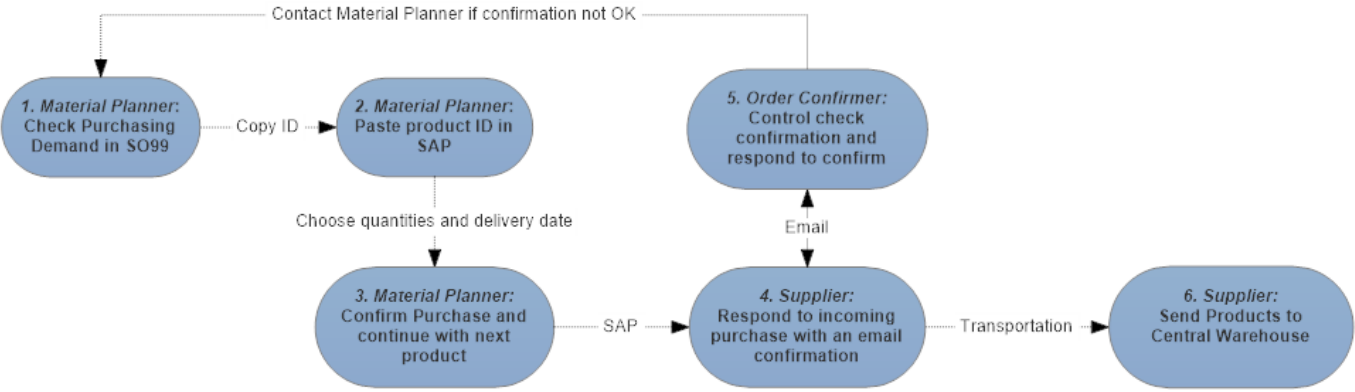

Figure 6. Entire Purchasing Routine and Involved Actors.

Support Box Routine

Further, the company also follows a routine for handling problematic situations such as missing deliveries, low stock levels, wrong quantities among others. This routine is usually initiated by an incoming phone call or email to the material planner.

Apart from being responsible for procurement of goods, the material planners also have the duty of acting as a "support box" for purchasing related issues to Solar's own department stores, suppliers and the central warehouse. This part of the job is usually done in the afternoon every day and means that the material planner works on solving issues such as missing deliveries, priority orders, wrong order confirmations etc. The material planner receives these errands via email or phone during the day. Emails are the most common while phone calls happen on occasion when it's almost a matter of panic e.g. that a priority product that needs to be delivered to an important customer is missing at the central warehouse. The emails are saved in the support box folder to be dealt with in the afternoon. The ostensive aspect of this routine is of a more flexible nature as it requires the operator to look for solutions to various kinds of problems.

The job task therefore requires analytical and problem-solving skills. However, the operator follows certain steps similarly in the support-box routine every time to deal with these issues. When the email is received, the operator contacts the material planning manager to find out if he/she has any information about the problem. The contact between the material planner and manager is primarily handled face-to-face and in times when the manager is not present he/she will be contacted via phone. After consulting the manager, the material planner proceeds to phone the supplier who is responsible for the delivery. After finding out what has happened, the material planner informs the person who contacted him/her with the problem to then mutually decide how to proceed to solve it. The material planner handles 5 to 10 support box errands per day. The performative aspect seems to be carried out in a similar manner each time as the operator have certain steps to follow to solve the problem. However, as there are possibilities for alternative ways to solve the emerging problems, and the fact that analytical skills are required to do so, I would not argue that this routine is in the risk zone of being replaced by technology based on Acemoglu´s (2002) and Autor´s (2015) findings that jobs involving cognitive tasks and analytical thinking, are not as prone to machine automation. The entire routine is illustrated in the figure below.
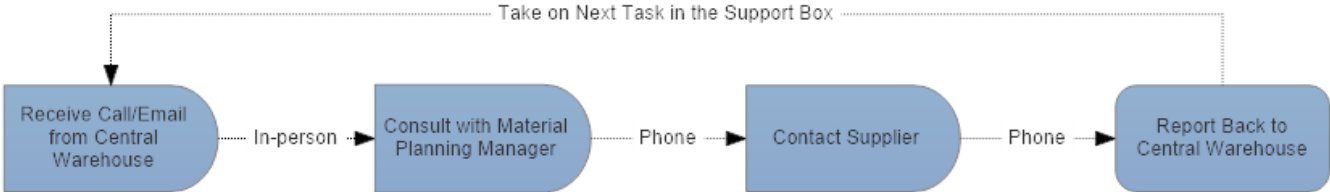

Figure 7. Support Box routine.

What are the Main Differences Between the Routines?

There are at least two types of recurrent routines in the procurement process. One routine that aims at handling purchase related issues when problems occur, and one routine specifically for the procurement of required products. Both routine types involve the material planner as a central actor making the role vital part throughout the entire procurement process. Apart from being vital to the organization in procuring the goods that needs to be delivered to the customers, the material planner also plays a role in solving purchasing related problems. The analytical aspect of the routine makes the human interaction irreplaceable thus requiring the organization to use technology interactively with human action. The analytical aspect seems to be missing in the order confirmation routine as it merely requires a comparative feature from the operator. It is also evident that the reverse flow of handling purchase-related problems seem to involve more actors overall as the Material Planning Manager and Central Warehouse are a part of it.

The problem related routine also requires more interactions between the various actors as the information travels back and forth more frequently between the involved actors as illustrated in the example in figure 8. The routine is therefore arguably more complex routine wise.
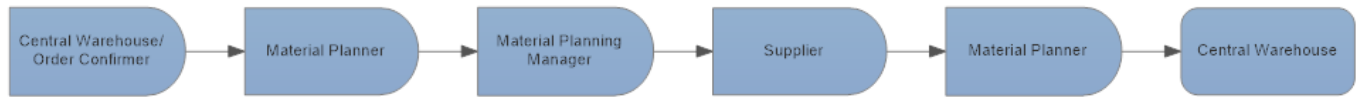
Another difference between the two routines is the degree of predictability of each step in the routine. In the procurement routine, it is known to a higher degree what the outcome of each step will be as a purchase typically looks the same each time. This aspect of the procurement routine aligns well with the role of organizational routines as bringing stability in coordination and control of operational activities as argued by de Boer and Zandberg (2012).

The support box routine however can take more diverse ways to complete as problem solving usually requires some flexibility. It shows signs of the kind of flexibility that Kozica et al., (2014) suggests is embedded within organizational routines. The contextual factors play a vital role in how the performative aspect of the support box routine will look from time to time thus proving Lannacci and Hatzaras (2012) argument on the naturally improvisational features of routines to be evident in this case. This can for example be the case when a priority delivery to customer is slowed down due problems with the supplier. It can be that the supplier does not have the products in stock, or it could have been damaged during transportation. In such cases, you either must look for an alternative supplier of the product or check with the customer how much time margin they have, to proceed and look for further solutions. These situations require understanding of contexts and action consequence mainly from the material planner for him/her to find a solution. Understanding the context and consequence of actions enables operators to continuously adapt and adjust their routines thus bringing an organizational change aspect to repetitive routines. While routines arguably still can be defined as repetitive-, recognizable-, patterns of action, Feldman and Pentland (2003) states that they are not static as routines entail self-reflective behaviour and understanding of performances which is evident in the problem-solving role of the material planner. Further, the process and solutions in the support box routine can look different thus also more unpredictable than the procurement routine which is rather static as. The interaction between the different actors in the procurement routine is illustrated in the figure below.
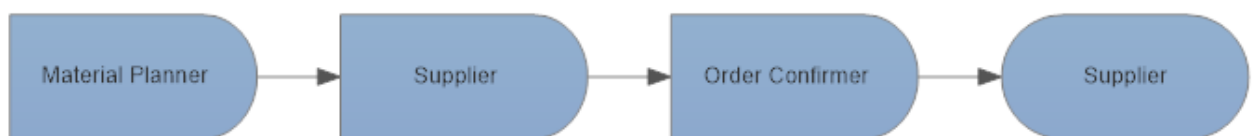
Further, the routine of the order confirmer seems to be of a more repetitive and inertial nature as the operator has very little authority to act when problematic situations occur. It clearly shows evidence of such repetitive aspects warned by Kozica et., al (2014) of causing organizational

inertia. The ostensive aspect of the routine involves the order confirmer to forward occurring problems to the material planner thus removing a possibly challenging and stimulating aspect of the routine.

The operator merely acts as an intermediary between the company and its suppliers to confirm to the suppliers that a delivery may take place. The work description sounds dull and unflattering. The operator confirms:

> It is a very boring job and we have started to talk about changing it or automate it because the way it is now, I don't think anyone wants to do it (the job). I am getting a new position at the company soon and I think that the person who gets to confirm order after me will feel the same. The job is important (for the purchasing process), but it doesn't feel like that when you sit there and perform the same simple tasks without any authority to solve real problems.

The operator seems to indicate that there is lack in one's personal sense of importance in this work routine. This could be another explanation to why dullness and inertia thrives from simple and repetitive job tasks. The operator sense that he/she is performing parts of a job task that doesn't require much thinking while forwarding the parts that are stimulating and do require more analytical thinking to other operators. This indication is closely connected the first organizational routines metaphor of the more traditional scholars that compares routines to individual habits with the perception of habits being automatic and not requiring any thinking. It seems as if the ostensive aspect or idea of the order confirmation routine is that it should be like a habit where the operator control check the received conformation, reply to it and proceed with the next one thus not including any critical thinking or authority to change and improve. What I personally noticed while performing the order confirmation routine myself is that the routine is memorized rather quickly where after the task was to follow the simple steps accordingly. After a while, the job did not require any thinking as each step was memorized so I just kept going on. As the time passed, the lack of stimulation made me slightly unconcentrated and bored. I sensed a risk of avoiding checking the details of each confirmation if I was to continue all day.

The Effects on the Organization

The analysis revealed a distinction between two diverse types of routines in the organization. It also showed that the routine has direct impact on the work behaviour of the operator e.g. problem solving avoidance. The case study showed that this work behaviour has a bullwhip effect which leads to emergence of more problems in the later stages of the supply chain. This was especially evident in the role of the order confirmer as failing to identify deviations in the order confirmation meant that problems will occur in later stages of the supply chain. The order confirmer failed to identify and at times avoided to resolve evident deviations in the order confirmation because of the dull and repetitive nature of the routine. The operator also seemed to lack understanding of the context and what effects his/her actions would have on the organization.

The effects of the routines of the material planner and order confirmer would reveal themselves initially in the Central Warehouse as it is the first part in the organizations supply chain to

receive purchased goods. The central warehouse receives the incoming goods from supplier daily. When a supplier delivers a batch of products to the warehouse, the staff checks the quantity, quality and add a note on the batch to document the exact time that the goods were received. This time notification is important as the warehouse measures their internal lead time as a key performance indicator. The internal lead time in the warehouse is made up of the time it takes from the point of receiving the products, until the point where they are on the warehouse shelves ready to be delivered to customers. The efficiency of this time is vital to enable shipment of goods to customer in the right stage. After the control is done, the warehouse staff separates the products depending on if it is small or large or full pallets. Full pallets and larger products are handled with an automatic warehouse system that scans and puts the goods on the warehouse shelves. Smaller goods are scanned manually one by one and is usually put on the shelves last. Once the entire delivery is on the shelves it is ready to be picked by the warehouse staff to be shipped to the customers. This entire process gets disturbed in cases where products show up late or not at all. The Warehouse Manager comments:

> My planning of staff and agreement with external transportation companies gets disturbed when goods don't show up at the right time. For example, if I am expecting a big delivery to reach us at Wednesday, I will plan for extra staff to ensure that we can handle the goods and make it ready for shipment when it needs to be. If the goods then don't show up or the quantities are wrong, I am not only standing there with extra staff costing the organization money, but also risking unsatisfied customers as they will not get their orders in time as promised.

It should also be noted that if certain customers, e.g. construction companies receive their order more than one day late, a compensation fee must be paid equivalating what it costs the construction company that their production stands still. The error in deliveries seem to emerge mainly from the avoidance of following up on deviations in the order confirmation routine as illustrated earlier in the report. The central warehouse is dependent on accurate planning of their staff to handle the incoming goods. Therefore, it is vital that deliveries show up at the right time.

Further, the central warehouse ships the goods to customers and retailers and therefore, to ensure a good customer service they need to receive the goods at the right quantity and time to enable handling and shipping routines to take place. When customer deliveries fail to meet time and quantity requirements, the customer service gets negatively affected as the central warehouse and the retailers have availability and delivery agreements with customers which are based on the information in the order confirmation. It seems as the inertial aspect of repetitive organizational routines does not only lead to a problem avoiding behaviour, but also serves as a problem creating mechanism in the sense that when operators fail to identify deviations, it leads to bigger problems in the later stages of the supply chain. This is evident in the role of the order confirmer as a failure of identifying deviations in the order confirmation, would eventually mean that problems will emerge in the central warehouse.

Not so Easy to Replace with Technology

The analysis has yielded evidence of organizational routines that seemingly should be automated through technology. However, when analysing the routines and their underlying reasons, it seems more difficult to automate than what is evident at first glance. Firstly, the procurement routine of the material planner involved some analytical aspects that arguably could be replaced with the proper technology. The systems of technology in this case lacked the functions to do so thus requiring human action to finalize the task. Further, the job task of the material planner showed to be not susceptible to computerisation as it involved flexibility and problem solving skills in the support box routine which could not be carried out by technology on its own (Autor, 2015).

The order confirmation routine was evidently of a very simple and repetitive nature. The dull and repetitive performative aspect of the order confirmation routine created problems in later stages of the supply chain in the organization. The analysis of the job task of the order confirmer left questions on why the human operator has not been replaced by an automated system for order confirmations as it not only contributed to mindlessness and problem avoiding behaviour, but also created problems for critical parts in the organization. The answer to this question could have several answers. What can be concluded in this case based on the information received in the case study is that automation of the order confirmation process through technology would require external actors to cooperate and change their processes as well. This is momentarily not possible as many of the suppliers in cannot be incorporated the automation. This would be an example of Autor's (2015) later study where he concludes that many of the previously argued jobs that were believed to be replaced entirely by technology, even by the author himself, are still being done by humans as there are evidently more complex underlying factors for automation to the seemingly very simple and repetitive human tasks.

Conclusion

The purpose of this study was to investigate what effects organizational routines have on operators and the organization itself in a routine intensive supply chain setting, and to draw connections or distinctions with previously conducted studies within the field. The aim was also to investigate the possibility and susceptibility of seemingly simple and repetitive human tasks being replaced by technology. To fulfil this purpose, the following research question was investigated:

> *RQ*: What type of organizational routines are evident and how susceptible are they to computerisation?

Established research has showed that repetitive and monotonic aspects of organizational routines are a reason to minimal stimulation and passivity that leads to lower levels of concentration and engagement of the operator who carries it out. Monotonic and simple aspects of repetitive routines should arguably be automated with the help of technology to avoid job functions that leads to lack of concentration and organizational inertia. The studied case company acts as an intermediary between suppliers and customers tying together different actors of a supply chain to deliver desired products to customers. The setting with the

interconnection between the many actors in the supply chain enabled a case study that provided an analysis of organizational routines in routine intensive environment. The literature review showed ambiguous findings on the effects of organizational routines. The ambiguity mainly arises in the continuous organizational change versus inertial aspects of repetitive routines as there is evident ambiguity in the repetitive and passive aspects of organizational routines provided by more traditional scholars such as Adler et al., (1999); Hodgson (2003) and March (1991), in comparison to the contemporary arguments of e.g. Kozica et al., (2014); Feldman and Pentland (2003) and Lannacci and Hatzaras (2012) who emphasize continuous organizational change through routines. This case study yielded evidence towards the latter effects as the oftentimes dull and repetitive work tasks seemed to create problems and organizational inertia in the case company. Examples of this can be seen in the way the operators fail to identify deviations and oftentimes chooses to neglect courses of action which aim at identifying and solving specific problems. This lead to further problems up in the later stages of the supply chain.

The case study showed that there were at least two types of recurrent routines in the procurement process. One specifically for the procurement of required products and one to handle procurement related problems. The routine of handling procurement related problems involved more actors and required a greater amount of interactions between the involved actors. The procurement routine involved two human actors with very different tasks, namely, the material planner and the order confirmer. The analysis revealed that the routine of the order confirmer is of a repetitive and inertial nature leading the operator to a mindless and problem avoiding behaviour due to dullness and lack of stimulation. This behaviour lead to problems in the later stages of the supply chain. Another difference between the two routines is the degree of predictability of the course of action in the routine. In the procurement routine, it is known to a higher degree what the outcome of each step will be as a purchase typically looks the same each time. The routine of handling procurement related problems showed to have specific steps that the material planner follows. However, as the occurring problems might look different, they will also require different solutions thus the routine of the material planner involved a more diverse set of tasks with analytical thinking and problem solving aspects.

Further, the findings in this case study revealed an interplay between humans and technology in the different routines. The routine of procuring products is handled through two systems of technology (SO99 and SAP) and two human actors within the company. The organization is dependent on technology in the procurement routine is highly dependent on technology as SO99 and SAP is used to plan and trigger procurement and to electronically confirm and send purchase information to suppliers. Simultaneously, the technology in this case is dependent on human action. Firstly, the procurement routine of the material planner involved analytical aspects that arguably could be replaced with the proper technology.

However, the technology in this case lacked the functions to do so thus requiring human action to finalize the task. Secondly, the analysis yielded evidence of a gap in the communication between SAP and SO99. SAP required data from SO99 to send the purchase order to the suppliers. This data needed to be transferred with the help of human action as the two systems are unable to communicate with each other thus requiring human action to fill the gap in

technology. The analysis of the order confirmation routine raised questions on why it has not been automated and replaced with technology. The routine was not only dull and repetitive for the human operator, but also contributed to a mindlessness and problem avoiding behaviour that created problems in critical parts in the organization such as the central warehouse. However, when analysing the possibilities of automation further, it was evident that it would require external actors to cooperate and change their organizational processes as well which is momentarily not possible as many of the suppliers are unable to meet the technological requirements of such an automation.

The evident difficulties of replacing human jobs with technology lowers the legitimacy of contemporary research arguing strongly for the susceptibility of jobs to computerisation. Based on the findings in this case study, it seems as technology now is too dependent on human action for it to be able to entirely replace human jobs. The theoretical implications on the subject suggests on the one hand that many of the standardized human jobs e.g. in manufacturing are susceptible of entirely being replaced by technology. On the other hand, one can find theoretical implications highlighting a more complex view of automating human jobs through technology as there are certain aspects of the seemingly simple job task that still cannot be carried out by technology without human interference along the way which has been evident in this case study.

Contribution to Previous Studies

From an organizational routine perspective, this case study added insights in a different setting. Previous studies have mainly steered focus towards combining and reinventing perceptions on organizational routines based on sociology research. What makes this study unique is the investigation of organizational routines is applicated in an office-environment, showcasing how they affect the actors, organization and the supply chain. Previous studies have dominantly focused on standardized job tasks in manufacturing environments. The study has also contributed to investigative studies on the connection between repetitive routines and organizational inertia by providing further insight into the effect of organizational routines both on human operators and the organization itself and thereby.

The study has also yielded a contribution to a very hot topic within organizational scientific studies, namely, human jobs susceptibility to computerisation. As many of the contemporary studies warns of the substantial risk that automation through technology will bring disappearance of a significant amount of human jobs, this study adds insights from a distinct perspective. Rather than confirming the notion of technology taking over human jobs, the analysis in this study yielded evidence of a high dependency between technology and human action as the interplay between the was necessary to keep the organization running.

Limitations of the Study

The findings in this study are based on one single case study thus needing application on further settings to test its generalizability. Also, due to time restrictions, a qualitative approach was used as a research method. The absence of a quantitative investigation has meant that the study has missed out on information from a larger number of participants. This is also connected to which extent the findings can be generalized in this case.

The study has exclusively focused on organizational routines in the purchasing department and not on several departments within the organization. Further, due to lack of resources and time, the study only investigated the setting of the Swedish branch of Solar Groups organization which means that the findings might not be generalizable for the entire organization. The study has evaluated the current situation regarding organizational routines and technology but has not included any improvement recommendations.

It should also be noted that the studied technology in this case study does not represent other possible technological solutions to the evident problems thus restricting the generalizability of the findings regarding technological substitution to human jobs.

Future Studies

As the study has been limited in terms of time and resources. It is necessary to conduct a deeper analysis of the underlying reasons of the routines per se, and to conduct a similar study in other organizations and settings to test and further develop and legitimize the findings of this study. It would also be interesting to make a comparative study in other branches of the organization to test the generalizability of the findings.

The author perceives the current research on organizational routines and their susceptibility to technological replacement rather limited. Contemporary research seems to lack investigation of the gap in technology that requires human action to complete seemingly simple job tasks. The author suggests that rather than focusing solely on the risks and possibilities of technological takeover in simple repetitive job tasks, researcher should steer focus towards why the technological takeover has not taken on the speed as expected. If researches manages to sort out this question, it would open possibilities to close the gap in technology.

Further, it would be interesting if future also studies steered focus towards what kind of new jobs that will emerge in a possible technological takeover of simple repetitive job tasks. The contemporary debate on the subject is dominated by focus on what kind of jobs that will disappear thus leaving room for research on what jobs that might emerge as well.

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