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INTERNAL COMMUNICATION AND COWORKERSHIP, IMPLICATIONS FOR DIGITAL TRANSFORMATION

A qualitative case study at Volvo Trucks, exploring coworkership through self-determination theory

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Abstract

Employee engagement is essential for companies' success, competitiveness and for handling large scale organisational changes. Specifying the barriers and drivers for employee engagement is therefore necessary to handle major organisational changes, such as digital transformation. This case study at Volvo Trucks Tuve manufacturing plant in Sweden explored the concept of coworkership (a form of employee engagement) in digital transformation efforts, through the basic psychological needs (self-determination theory) of employees. Sixteen semi-structured interviews, multiple internal company documents and on-site-observation data from Volvo Trucks Tuve were used to explore coworkership conditions. From a template analysis, eight major themes emerged, which pose four supporting and four hindering factors for coworkership conditions. This study makes a major contribution to research on coworkership, (a) by demonstrating the usefulness of self-determination-theory for understanding employee engagement in working digitally and (b) by specifying hindering and supporting factors for employee engagement in digital transformation.

Key words: Coworkership, Self-Determination Theory, Employee Engagement, Internal Organisational Communication, Case Study, Digital Transformation, Template Analysis

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1. Introduction

In 2011, German chancellor Angela Merkel coined the term “Industry 4.0” to describe the increase of digital technology usage in manufacturing processes with the aim of producing higher quality goods in a more time- and cost- effective manner (Davies, 2015; Paraskevopoulos, 2022; Tay et al., 2018). Until today the manufacturing industry is the EU’s biggest employment sector, providing more than 32 million jobs (Statista, 2022). Further, digitalising operations in resource intensive sectors, such as automotive, logistics and electricity, could save Europe 26 billion tonnes of CO2 emissions (DigitalEurope, 2019a). Reducing greenhouse gas emissions lowers industrial environmental impact and is necessary to combat the global climate crisis (IPCC, 2023). Thus, the manufacturing industry poses societal, economical, and environmental significance.

In digitalising Europe’s industry, DIGITALEUROPE, the leading trade association, made an open call to action towards 2025, for a stronger digital Europe (DigitalEurope, 2019a). Amongst other actions, (a) digitalised operations and (b) increased research on digitalisation, by up to 3% of a country's GDP (DigitalEurope, 2019b), have been identified as success indicators for pushing Europe ahead of the US, China and Japan in digital manufacturing (DigitalEurope, 2019a).

Focusing on digitalising a company’s operational processes, the implementation of digital technologies is normally realised by employees utilising digital technologies to enhance productivity and efficiency (Meske & Junglas, 2021). For example, the use of Microsoft’s App Power BI to visualise production KPI’s. In contrast to the benefits of digitalisation on increased operational quality, productivity and efficiency, the shortage of labour due to the increased demand for digitally skilled employees has been identified as a

side-effect of digital transformation (EIT, 2021). Consequently, the enhancement of existing employees' digital skills in digital transformation, for example at Volvo Trucks Tuve manufacturing plant, is highly relevant from a business perspective. However, employee resistance to digitalization, e.g., in the form of failed technology acceptance, is an open issue at company level which hinders Industry 4.0 transformation (Molino et al., 2021).

Employee engagement in digital transformation relies on interaction between coworkers in a sense that coworkers influence each other with their views on digital transformation (Solberg et al., 2020). Lowering resistance and increasing employee's willingness for partaking in digital transformation is vital, as employee engagement is related to positive influences on productivity, reputation and an organisation's competitiveness (Heide & Simonsson, 2018). Thus, maintaining a well-functioning working climate, characterised by trust, openness, community spirit, cooperation, responsibility, initiative, engagement and meaningfulness, is vital for supporting coworkers in coping with increasingly digitalised workplaces, to secure future employee well-being and performance (Gruman & Saks, 2011; Heide & Simonsson, 2018; Schrøder et al., 2017; Strauss & Parker, 2014).

Our thesis is structured into four major sections. First, a literature review presents state of the art research on digital transformation, employee engagement, the concept of coworkership, and Self-Determination Theory. Second, the method section explains the qualitative approach of this ethnography-inspired case study at Volvo Trucks Tuve. Third, the findings of this study are structured in supporting and hindering factors for coworkership in digital transformation initiatives. Fourth, the discussion relates the findings of the current study to previous research and showcases how findings from this case study

expand the current field of knowledge in coworkership and employee engagement in digital transformation. Last, a conclusion highlights research findings, provides practical implications for supporting coworkership in industrial digital transformation settings and points out the limitations of this research, as well as suggests future research inquiries.

2. Literature Review

This chapter will discuss the literature relating to (a) Digital Transformation; (b) Employee Engagement; (c) Coworkership and (d) Self-Determination-Theory. The final section of this literature review explains the purpose of the current study and states the research question that drove our investigation.

2.1. Digital Transformation

The term digital transformation, sometimes digitalisation, has been used extensively in contexts ranging from academic literature (Carlsson et al., 2022) to promotional messages by consultancy firms (McKinsey & Company, 2023). According to Verhoef et al. (2021), digital transformation refers to "change in how a firm employs digital technologies, to develop a new digital business model that helps to create and appropriate more value for the firm" (Verhoef et al., 2021, p. 889).

Verhoef et al. (2021) identified three phases in the process of digital transformation: (a) *Digitisation:* physical/analogue documentation is digitalised, for instance ordering production parts through a digital instead of analogue form; (b) *Digitalisation:* digital technologies are used in a way to optimise or change value creation activities, for instance online communication processes to simplify firm-customer interaction; and (c) *Digital transformation:* the use of digital technologies leads to fundamental changes in the business model and logic of the organisation, for instance data driven business models may require hiring digital officers and the creation self-steering teams as an agile way of working. The fundamental changes of the third phase, digital transformation, entail a major focus on the mindset and attitudes of a workforce (Meske & Junglas, 2021). In other words, "digital workplace transformation should not just be about technology – it is about enabling a

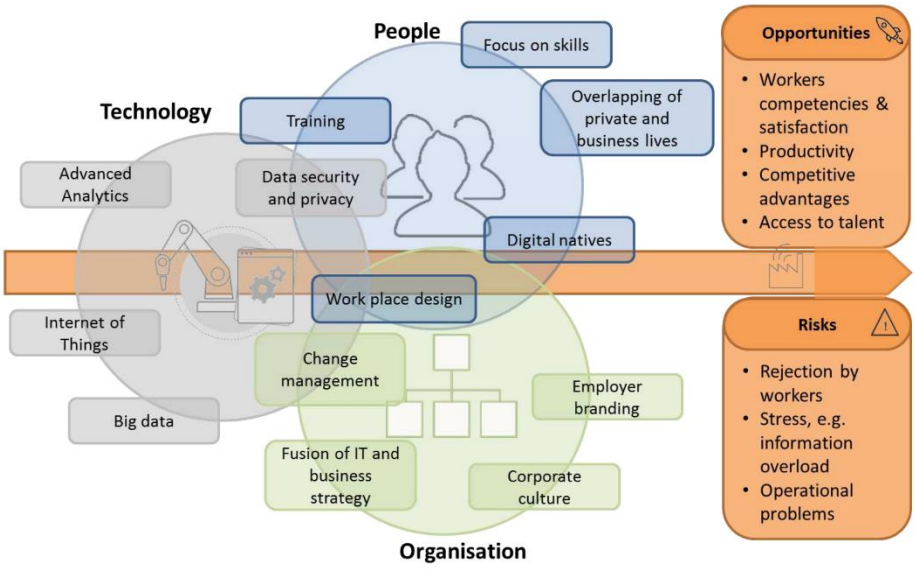
workforce to feel competent, autonomous and connected with others." (Meske & Junglas, 2021, p. 1131).

Applying data analytics for data-based decision making is part of the digital transformation in industrial manufacturing (Duraivelu, 2022). For instance, products are equipped with sensors to report the real-time status of a product, which is relevant for business management, material allocation, production planning and order configuration (Liu et al., 2018). A digital transformation in manufacturing organisations is particularly beneficial for waste reduction, quality improvement, adaptation for market demands and overall cost reduction (Duraivelu, 2022). Digital transformation in the manufacturing industry entails two processes: one is the digitalisation of existing operational processes for efficiency improvement (such as saving quality check data of a product digitally, instead of paper based, as poor hand-writing and stains can make deciphering of information time consuming); the other process is the delivery of digitally improved services and products for customer satisfaction (Duraivelu, 2022), (such as the addition of a digital display in a truck cab, automatically showing maintenance- and navigation- data).

The holistic nature of digital transformation has been addressed by Richter et al. (2017), as digital transformation does not only refer to the implementation of advanced and modernised technology, but also to the change in people (such as digital skills, mindset, way of working) and the change in the organisation (such as organisational structure, product, business strategy) (see Figure 1) (Richter et al., 2017).

Figure 1

Socio-Technical Trends in the Manufacturing Sector (from (Richter et al., 2017))



For manufacturing companies undergoing digital transformation, the interplay of technology, people and organisation as shown in Figure 1, causes challenges in successfully implementing digital changes at work, e.g., sharing of digital knowledge among employees (Richter et al., 2017).

A case study utilising interviews as well as direct observations and secondary document analysis by Machado et al. (2019) identified the following five best practices for successful digitalisation at a company: (a) regular team meetings for the creation of a shared language and understanding of digitalisation; (b) working in cross-functional teams; (c) improvement of transparency regarding digitalisation efforts by showcasing and sharing individual initiatives; (d) promotion of discussions and demonstrations during implementation processes to support managers as well as operators; and (e) employment of specialists to map competences and needs (Machado et al., 2019). The core of each of these

five best practices for successful organisational digitalisation are of a human centric perspective. The human centric perspective in digital transformation has also been described by Meske and Junglas (2021), as the focus on workforce instead of technology in digital transformation. Transforming a workforce to operate in a digital environment requires employee engagement (Meske & Junglas, 2021). Employee engagement for example in the form of employees' positive attitudes towards digitalisation and their active participation in digital workplace changes, impact not only work performance but also employee's well-being at work (Alrasheedi et al., 2022; Meske & Junglas, 2021).

Focusing on employees instead of technology in digital transformation, the thesis now follows the human-centred view on digital transformation as a major organisational change. A more detailed account of employee engagement in organisational change is given in the following section.

2.2. Employee Engagement

Schaufeli et al. (2022) define employee engagement as “a positive, fulfilling, work-related state of mind that is characterized by vigor, dedication, and absorption.” (p. 74). Vigor refers to highly energetic workers who are willing to invest effort and dedication, even into challenging tasks; dedication refers to employees who are enthusiastic and see a significance in what they are doing and take pride in additional responsibilities that go beyond their minimum daily job requirements; and absorption means the intense concentration and maximum attention of an employee on their work (Schaufeli et al., 2002). In general, employee engagement is a complex human communication phenomenon that describes the interaction between employees (Johnston & Taylor, 2018). Thus, employee

engagement as a specific work-related form of human interaction and behaviour has a psychological foundation (Johnston & Taylor, 2018).

Employee engagement can be of utmost significance to a company as increased employee engagement is often related to positive influences on productivity, reputation and an organisation's competitiveness (Heide & Simonsson, 2018). Firms with high employee engagement consequently show higher profitability, shareholder value, and return on assets compared to firms rated low in employee engagement (Macey et al., 2009; as cited in Gruman & Saks, 2011). Thus, an organisations competitiveness may be improved through high employee engagement (Macey et al., 2009; as cited in Gruman & Saks, 2011).

According to Heide and Simonsson (2018), the scientific literature has two major perspectives on employee engagement: (a) the dominant, functionalistic perspective; and (b) the "communication constitutes organisation" (CCO), alternative perspective. The dominant perspective on employee engagement views communication as a key driver that fosters employee engagement (Heide & Simonsson, 2018). Employees are seen as an initially passive recipients of information, who after gaining trust in the organisation by receiving timely and reliable information, incorporate company values and communicate key messages to coworkers (Heide & Simonsson, 2018). Successful internal communication of key messages, such as "New technology does not create digital transformation - we create change." (Volvo Tuve, personal communication, February, 2023), can enhance employee engagement (Bedarkar & Pandita, 2014). Internal communication thus poses the possibility for managers to govern engagement through strategic key messages (Hynes, 2012).

The alternative COO perspective on employee engagement views communication both as a driver and as an outcome of employee engagement (Heide & Simonsson, 2018). Thus, communication is seen as an integral part of employee engagement, rather than a contributing factor. According to this perspective, engagement should not be the result of manager communication. Rather, for meaningful and mutual sensemaking to happen, the time, space, and situation need to occur (Heide & Simonsson, 2018; Karanges et al., 2015), for example in the form of regular meetings, workshops, seminars, internal events, get-togethers or even breaks. Engagement during meetings can lead to dialogue, and dialogue helps in the creation of a shared meaning (Heide & Simonsson, 2018; Karanges et al., 2015).

The level of an employees' engagement in digital transformation initiatives is determined by a social cognitive process (Solberg et al., 2020). The cognitive process starts with the sensemaking of new information (e.g., noting the number of missing screws in an Excel sheet instead of writing it on a whiteboard), leading to decision making (whiteboard or Excel) where the social components of this process are colleagues and managers (Solberg et al., 2020). Colleagues and managers view, and expression of digitalisation, will impact an employees' belief about technological change and further that employees' decision about being on board for digitalisation or not (Solberg et al., 2020).

In sum of the two perspectives and understanding employee engagement: (a) employee engagement has its roots in psychology and social relatedness; (b) employee engagement can have a business relevant impact; (c) communication can be seen as a key driver and at the same time as an outcome of employee engagement; and (d) employee engagement in digital transformation relies on human connection.

2.3. Coworkership

Where employee engagement describes the interaction between employees, there is a closely related concept in "coworkership" which describes the interaction between *employees and managers* (T. Andersson & Tengblad, 2009; Heide & Simonsson, 2018; Johnston & Taylor, 2018). The term coworkership stems from the Swedish word "Medarbetarskap" and is commonly conceptualised in two ways; descriptive and normative (Andersson et al., 2021; Andersson & Tengblad, 2009).

In the descriptive view, coworkership is seen as a purely theoretical, ideal representation of a typical working life that is commonly found in Scandinavia. The focus is on employees' horizontal relationships with colleagues and vertical relationships with managers and employers, in harmony with the how the employees approach their work (Andersson et al., 2021; Andersson & Tengblad, 2009). This view does not provide any "before" state of coworkership, only the ideal state in its fully developed form.

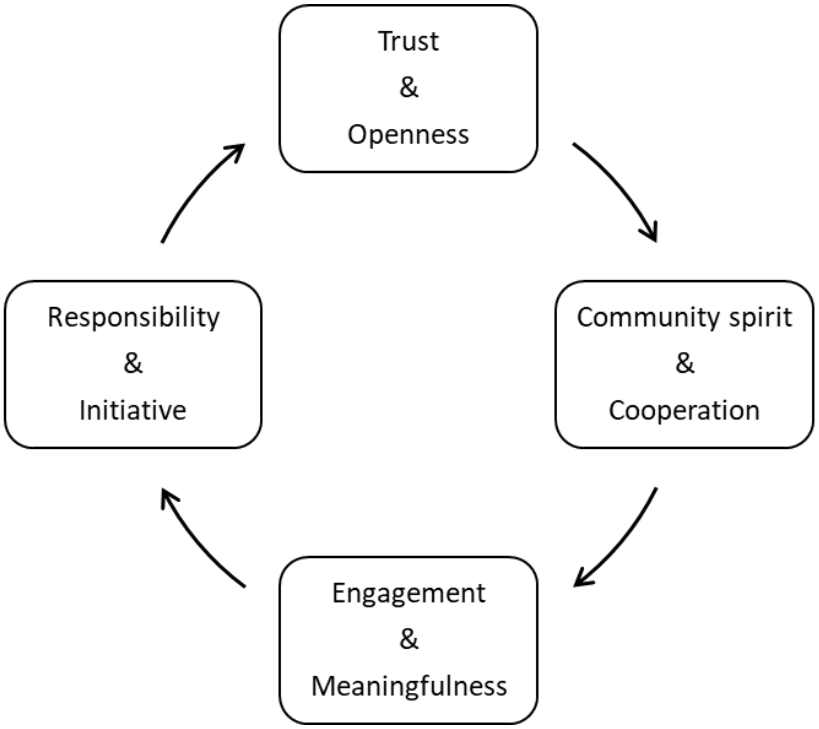
In the normative view, which is the view that this thesis will take, coworkership is seen as an organizational ideal to strive for in practice (Andersson et al., 2021; Andersson & Tengblad, 2009). The idea is to support a high-involvement work system and to achieve the important preconditions (hereafter referred to as just "conditions") for coworkership to develop. That is, the creation of an organisational state "characterized by cooperative, inter-dependent relationships between managers and workers, based on trust, participation and responsibility." (Andersson et al., 2021, p. 427).

The coworkership conditions are defined in the coworkership wheel model (see Figure 2) developed by Hällsten and Tengblad (2006) and refined by T. Andersson and Tengblad (2009). The wheel is the authors' attempt at visualising the relationship between the

coworkership conditions in line with the descriptive view of coworkership, as the wheel is only displaying the fully developed state of coworkership.

Figure 2

The Coworkership Wheel Model



Note. Adapted from ”Strategies for co-workership retention,” by T. Andersson, H. Stockhult, and S. Tengblad (2021) p. 429. Copyright 2020 by Informa UK Limited.

The coworkership conditions consist of: (a) Trust and openness (trust is defined as the foundation for all healthy relationships and is manifest as an open communication climate at the workplace); (b) Community spirit and co-operation (a spirit of encouragement towards learning among colleagues, and an organisational culture of co-operation that transcends the borders of organisational structures such as hierarchies, departments and professions etc.); (c) Engagement and meaningfulness (coworkers that are engaged in and

committed to their work, alongside a commitment to the organisation itself, which give meaning to both challenging or monotonous types of work); and (d) Responsibility and initiative (coworkers that seek to influence and take responsibility for their work, responsibility that leads to more active coworkers who also take initiative) (T. Andersson et al., 2021).

Though helpful in conceptualising what constitutes coworkership, the coworkership wheel model (T. Andersson & Tengblad, 2009; Hällsten & Tengblad, 2006), in line with the descriptive view, only provides a descriptive image of coworkership in its developed and ideal state. Observing the coworkership wheel model, it is not apparent if there is any specific order to the emergence of the conditions, i.e., what makes the coworkership wheel start spinning. In line with this argument, scholars (Andersson et al., 2021; Bergman et al., 2017; Carlsson et al., 2022; Heide & Simonsson, 2021; Larsson et al., 2022) call for more explorative research into coworkership to validate if the coworkership conditions (see Figure 2) identified so far are sufficient.

2.3.1. The Current State of Coworkership Research

So far coworkership has been explored through qualitative studies in Swedish work environments, for instance healthcare (Andersson, 2018; Bergman et al., 2017; Eriksson, 2018; Kilhammar & Ellström, 2015), elderly care (Andersson et al., 2021), local government (Kilhammar & Ellström, 2015), and private industrial manufacturing (Carlsson et al., 2022).

T. Andersson et al. (2021) investigated the institutionalization of co-workership practices in a Swedish elderly care centre. The authors followed an institutional theory approach, and used a combination of interviews and observations to identify three structural factors in retaining coworkership in organisations: (a) sufficient staffing (which

ensures that time, structure, and support is allocated for employees to facilitate the development of coworkership); (b) supportive leadership (in the sense that leaders/managers should voice support for the values of coworkership and for the conditions coworkership requires); and (c) institutionalisation of coworkership values (in other words incorporating the coworkership values into the organisational values to maintain the (continuously) developing state of coworkership as it is being attained) (Andersson et al., 2021). The study highlighted the importance of having organisational structures, such as a system of standardised feedback, can support coworkership and its conditions. However, a weakness of the study is that no detailed explanation is given for the process that led them from their initial results to the three aforementioned structural factors.

Bergman et al. (2017) investigated employee perceptions of coworkership in a Swedish healthcare organisation, where the authors followed a phenomenography approach and used focus group interviews. They discovered, firstly, that coworkership in the hospital environment, a bureaucracy with strong profession-affiliated identities (e.g., physicians), was only present at the team/group level in the form of group belonging and cohesion between colleagues, excluding managers and the organisation at large (Bergman et al., 2017). Secondly, that coworkership is supported by a well-functioning communication climate, in the sense that (a) employees talk to each other when unconfident; (b) experience is exchanged between colleagues, departments and professions; (c) respect is shown towards fellow colleagues, especially during arguments; and (d) employees having the choice to speak up (Bergman et al., 2017). Though insightful, a weakness of the study is that no explanation for the causal relationship between coworkership and a well-functioning

communication climate is given. Further, the authors explore sub-variants of coworkership (e.g., individual-oriented coworkership) without stating their stance on the commonly used descriptive and normative views on coworkership. This created ambiguity as to how coworkership should be defined in their research.

Kilhammar and Ellström (2015) investigated strategies for the implementation of coworkership in a city council and a state-owned healthcare organisation. Kilhammar and Ellström (2015) followed a mixed approach of neo-institutional theory, theories of implementation, and organisational change, using a combination of interviews and documentation to collect data. The authors identified three factors that likely support both the development and the implementation of coworkership: (a) local adjustment (meaning that coworkership and the local context must mutually adapt to each other to ensure successful implementation by, e.g., identifying existing organisational or departmental values that align with coworkership values and start implementation from there); (b) coworkership in daily operations (meaning that efforts are actively made to change organisational practices by, e.g., ensuring that opportunities for employees to learn about the meaning of coworkership are created); and (c) active participation by organisational members (meaning that the participation of individuals with the richest knowledge of the local context, i.e., managers and employees of the organisation, are actively involved in the development of coworkership) (Kilhammar & Ellström, 2015). Their study highlighted the importance of considering existing employee values and organisational practices in an organisation to facilitate a seamless implementation of coworkership.

Carlsson et al. (2022) used the coworkership conditions as a frame for analysing employee perceptions of industrial digitalisation at a Swedish manufacturing organisation.

The authors used a combination of interviews, meetings, and reading of documents to collect data. Carlsson et al. (2022) did not explore coworkership but showcased what might be considered a successful application of the coworkership conditions to create a codebook for thematic analysis. Suggestions for industrial manufacturing organisations that aim to successfully digitalise their business included (a) continuous support of adaptive culture; (b) continuous support of learning; and (c) to continuous support of competence. In addition, Carlsson et al. (2022) suggested that a coworkership approach to digital transformation could reframe organisational members' perception of the change that digital transformation implies. In other words, shifting the perception of digital transformation as a sudden change (driven by a technology centred approach), into perceiving digital transformation as a gradual change (driven by coworkerships human centred approach). Which, in turn, may facilitate the rate of employee engagement/participation in digital transformation according to the authors.

In conclusion, coworkership has been explored in several organisational settings where supporting factors were identified (Andersson et al., 2021; Bergman et al., 2017; Carlsson et al., 2022; Kilhammar & Ellström, 2015). However, the concept of coworkership suffer from a serious shortcoming in that; no detailed description nor model of the development process of coworkership have been proposed.

2.4. Self-Determination Theory

Self-determination theory (SDT) is a "macro theory of human motivation that evolved from research on intrinsic and extrinsic motivations and expanded to include research on work organizations and other domains of life" (Deci et al., 2017, p. 20). The two types of human motivation SDT defines are *autonomous motivation* and *controlled motivation*. The

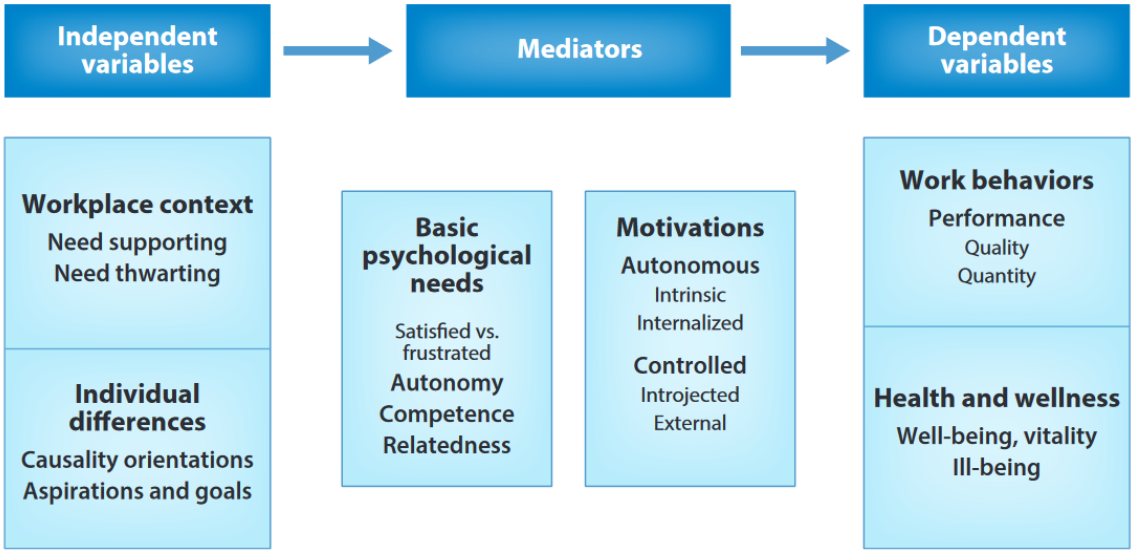
former describes a state where activities are being engaged in with an individual's own sense of will, volition, and choice. The latter describes instances where the motivation for engaging in activities is somehow influenced and/or controlled by external factors such as the power dynamics found within a hierarchical workplace (Deci & Ryan, 2014; Deci et al., 2017).

Having defined the types of motivation that SDT propose, the current study will focus on the other aspects of SDT that are detailed in Deci et al. (2017)'s "basic self-determination model in the workplace" (see Figure 3). Here, alongside the two mediating motivations (described above), we can observe the other mediators in the so called three "basic psychological needs": (a) competence (the need to feel effective and capable in one's interactions with the environment); (b) autonomy (the need to experience a sense of choice and control over one's actions and decisions); and (c) relatedness (the need to feel connected to and cared for by others) (Deci & Ryan, 2000). The three basic needs are in turn influenced by the independent variables of "workplace context" and "individual differences", which affect the three basic psychological needs by either satisfying (support) or frustrating (hinder) them. The first variable of workplace context could be interpreted literally, as it specifies how the workplace is influencing the three basic needs (of employees at the workplace). Workplace context is also strongly tied to the type of managerial style practiced at the workplace, e.g., an open communication climate supports the employees' basic need of autonomy (Deci & Ryan, 2014; Deci et al., 2017). The second variable individual differences refer to how individuals' aspirations and goals, as well as general causality orientation (being proactive vs. being passive), affect the three basic psychological

needs. For example, an aspiration to learn programming supports the basic need for competence (Deci & Ryan, 2014; Deci et al., 2017).

Figure 3

The Basic Self-Determination Theory Model in the Workplace



Note. Adapted from " Self-Determination Theory in Work Organizations: The State of a Science," by E. L. Deci, A. H. Olafsen, R. M. Ryan (2017) p. 23. Copyright 2017 by Annual Reviews.

Moving on now to consider the last aspect of Deci et al. (2017)'s basic self-determination model in the workplace, there are the dependent variables of "work behaviours" and "health and wellness" (see Figure 3 above). These variables are the end-result of the aforementioned interactions between the basic psychological needs, workplace context and individual difference. They can also be interpreted literally as they are both referring to the work behaviours as well as health and wellness of organisational members. Previous organisational studies using SDT have adapted the basic self-determination model

in the workplace and introduced their own variables from other areas of organisational studies, a prominent example that Deci et al. (2017) highlighted was studies examining transformational leadership.

In sum, the practicality of using the basic self-determination model in the workplace to examine variables from the area of leadership studies suggests that it would be a useful tool in the current study. As coworkership is closely related to leadership (T. Andersson et al., 2021), and the aforementioned coworkership conditions of engagement, initiative, responsibility, cooperation, and trust may be defined within the SDT dependent variable of work behaviours.

2.5. Current Study

Among the relatively few studies conducted on coworkership, only studies in elderly care (Andersson et al., 2021) and manufacturing (Carlsson et al., 2022) were conducted in the private sector (no ownership of or involvement in a business by the government). Considering that the studies of coworkership in the private sector are so few, alongside the fact that roughly 70% of the Swedish workforce is employed in the private sector (SCB, n.d.), the authors argue for the relevance of more research into coworkership in organisations belonging to the private sector. And this, by extension, also functions to justify the selection of a private sector organisation for the case study conducted in this thesis.

Even though coworkership has a connection to human behaviour and feelings (e.g., the coworkership conditions of trust, meaningfulness, and initiative) where a close connection to the cognitive sciences and psychology might be argued for, no study on coworkership was found to have used a motivational and needs focused approach to explore the concept. Thus, exploring coworkership through the theoretical framework of

Deci et al. (2017)'s basic self-determination model in the workplace will provide new and valuable insights into coworkership and its human behaviour underpinnings.

Further motivation for our study is found in, first, the suggestions of Deci et al. (2017) to apply SDT to (a) organisational settings in general, and (b) organisational settings where the impact of advanced technologies can be studied. And second, in taking up the call to explore the conditions of the relatively new and much debated concept of coworkership (Andersson et al., 2021; Bergman et al., 2017; Carlsson et al., 2022; Heide & Simonsson, 2021; Larsson et al., 2022), in this case through the use of an established and well tested theoretical framework, here SDT. In this manner, the present study seeks to contribute to the existing literature on coworkership (Andersson & Tengblad, 2007; Hällsten & Tengblad, 2006) by exploring the factors that may impact the coworkership conditions. In sum, the research question that inspired our study was:

RQ: What factors support or hinder the coworkership conditions in digital transformation initiatives?

3. Methodology

3.1. Research Design

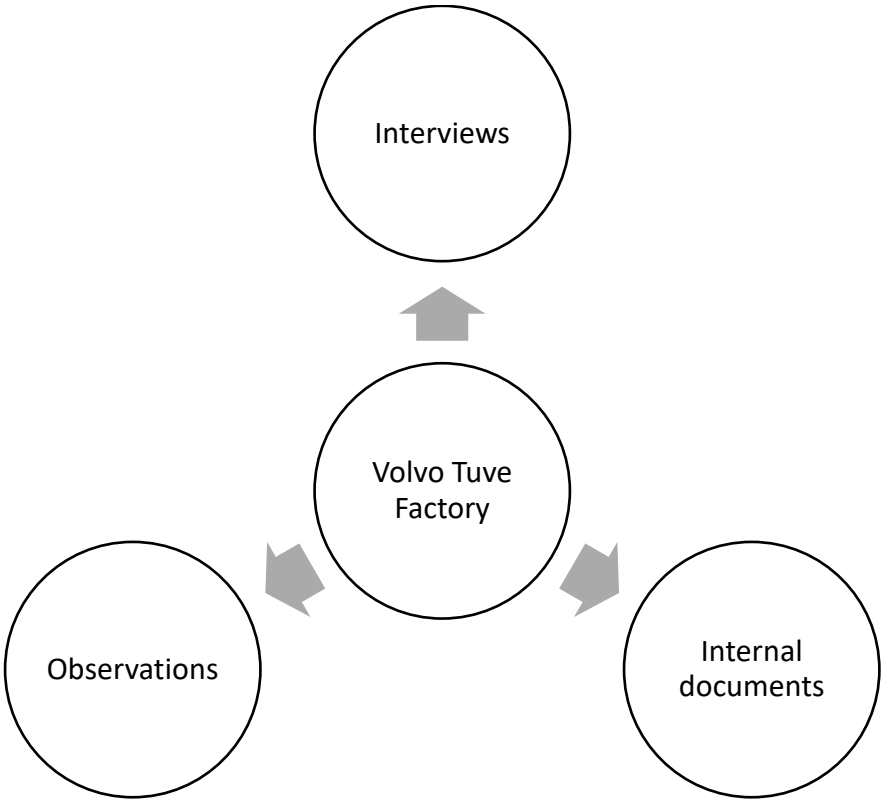
The overall research design of this thesis followed a qualitative approach. Qualitative research is an umbrella term for several research methods that aim to present a holistic and in-depth report of the social world (Staller, 2010). Qualitative research methods are valuable for understanding and interpreting human behaviour, as such methods account for the interactive, complex and contextual structures of the social world (Staller, 2010).

3.2.1. Case Study

Case studies belong to qualitative methods and are defined as an "empirical inquiry which investigates a phenomenon in its real-life context. In a case study research, multiple methods of data collection are used, as it involves an in-depth study of a phenomenon" (Yin, 2009, p. 18; as cited in Priya, 2021, p. 95). Multiple methods of data collection (semi-structured interviews, on-site observations, internal documents) were used in this case study to explore employee engagement in digital transformation initiatives (see Figure 4).

Figure 4

Case Study at Volvo Tuve Factory



The current study was conducted at the multinational manufacturing company Volvo, in particular at a Volvo factory based in Gothenburg, Sweden. The factory, Volvo Tuve, is designed to produce customized heavy-duty trucks and is currently in the process of digital transformation to reach the future of manufacturing, Industry 4.0 (Volvo Group, 2021). Consequently, Volvo is about to create a fully digitalised 'smart factory' by improving physical processes, products and employees' ways of working with the help of digital technologies (Bertrand, n.d.; Volvo Group, 2021). According to management at Volvo Tuve, many of the 2700 employees need to be engaged in and aligned with the mission of digital transformation, and the organisation thus faces a challenging process of workforce

transformation (Tuve Director of IT & Tuve Director of Communication, personal communication, February 2, 2023).

Case studies are particularly valuable for research in operational environments such as factories, because they allow to capture companies' complex operations through identifying patterns and insights to create an understanding of "what" is going on (Stuart et al., 2002). In providing such observational richness with research participants from real-life settings, case studies are deemed to have high validity, i.e., accuracy of measurement, for the population of the observed community (Treadwell & Davis, 2020). Consequently, the findings of this case study are believed to provide high validity, in a sense that a holistic understanding of employee engagement in digital transformation at Volvo Tuve can be achieved. In contrast, a quantitative approach, testing only two variables (for example digital literacy and employee engagement) could not provide observational richness into dynamics, barriers and supporting factors for employee engagement in digital transformation at Volvo Tuve.

According to Ying (2018), three different types of case studies exist: (a) descriptive studies (seeking to describe a phenomenon, often inquiring about the "How" of a situation); (b) explanatory studies (explaining conditions of a situation, seeking how and why something happened); and (c) exploratory studies (generally discovering a phenomenon or circumstances, often inquiring about "What" is happening). The aim of the current research is to examine the coworkership conditions in a factory setting using SDT. Therefore, we opted for an exploratory case study, which examines and analyses a concept, theory or phenomenon through complex insights and presents detailed descriptions (Treadwell & Davis, 2020).

This research was conducted as a single case study, meaning that a direct comparison to a previous case study or the continuation of more cases to this research was not intended (Tight, 2022). The weakness of single case studies is that findings cannot be generalised with a high level of confidence (Treadwell & Davis, 2020), in other words the findings will be specifically relevant for Volvo Tuve. However, there is a notable difference between *statistical* generalisation, drawing conclusions from one sample of a population to another sample of the same population based on empirical data, and *analytical* generalisation, contributing to (existing) theories or concepts through the findings of a case study. Statistical generalisations from this case study cannot be made, as the case does not represent a sample unit of a wider population (Yin, 2018). However, the "lessons learned" from a case study can be generalised in a way that findings can shed light on theoretical concepts (Yin, 2018), as in this case contributing to the theoretical concept of coworkership through utilising SDT.

Yin (2018)'s argument is similar to Ridder (2017)'s critique that case studies are often confined to their explorative character, although there are several ways in how case studies can contribute to a theory (theory -building, -development and -testing). Following Ridder (2017), results of case study research can enhance the scientific usefulness of a theory and reveal effects or causes of a concept more accurately. Therefore, the current research was designed as a case study to explore the factors of communicative interaction in a digital transformation setting to further understand the concept of coworkership.

To increase the quality of a case study and improve the possibility for analytical generalisation, our study followed Tight (2022), who suggested that a case study should (a) have a general framework, such as a fundamental theory or acknowledged concept and (b)

provide triangulated findings (multiple forms of evidence or comparison to other case studies). SDT functions as a framework to explore the concept of coworkership in a factory undergoing digital transformation. Multiple forms of evidence are provided by using triangulation. Triangulation "refers to the practice of using multiple sources of data or multiple approaches to analysing data to enhance the credibility of a research study." (Hastings, 2012, p. 2).

To conclude, the chosen research design of a case study was also deemed appropriate as the latest academic practices in researching coworkership also employ qualitative, explorative case studies (Andersson et al., 2021; Bergman et al., 2017; Carlsson et al., 2022; Heide & Simonsson, 2021; Kilhammar & Ellström, 2015; Mazzei, 2010; Mazzei et al., 2012).

3.2.2. Elements of Ethnography

Case studies often have an ethnographic character, meaning that a detailed and rich understanding of a particular context is the aim of the research (Willis, 2007). Elements of ethnography were applied in the sense that this research: (a) took place in natural/social settings namely Volvo Tuve factory; (b) combined interviews with direct observations and the collection of documents; and (c) involved direct engagement, listening, and conversing with community members (Bryman, 2012; Caines, 2012; Kirsch, 2001; Treadwell & Davis, 2020). Due to the lack of long-term immersion into the community at the factory, this research was however not entirely ethnographic. Most ethnographies require one year of fieldwork to realise key assumptions, discover important values, and draw valid conclusion from the community under study (Kramer & Adams, 2018).

3.2.3. Triangulation

A common feature of ethnographic research is the triangulation of methods (Caines, 2012). The section that follows, will explain the details of triangulation for this study. Triangulation aims to provide knowledge on different levels by taking multiple perspectives on a research phenomenon into account (Flick, 2022). Using triangulation also poses benefits for validity (Stuart et al., 2002). Validity refers to the suitability of chosen indicators to measure a concept (Bryman, 2012), such as this study investigated employees' basic psychological needs (indicator) to determine employee engagement in the form of coworkership (concept).

Four different types of triangulation were applied. First, *data source triangulation*, i.e., data gathering with the same method but differing in time and data source (Morris, 2018). Data were gathered at different points in time (observations of this study were made over the span of eight weeks) and from multiple interviewees. Second, *theory triangulation*, i.e., using more than one theoretical perspective to study a phenomenon, for (a) improving knowledge about the complexity of the phenomenon under research and (b) grasping different meanings and viewpoints, especially from human interaction of study participants (Flick, 2022). For theory triangulation, the concept of coworkership (Andersson et al., 2021; Andersson & Tengblad, 2007; Hällsten & Tengblad, 2006) was investigated from the theoretically more established perspective of SDT (Deci et al., 2017). Third, *methodological triangulation*, i.e., multiple methods for data collection to achieve a most detailed and thorough data set (Morris, 2018). Multiple data gathering methods within this case study were applied, in form of interviews, observations, and documents. Fourth, *investigator triangulation*, i.e., multiple researchers study the same phenomenon to reduce single

researcher bias or style (Morris, 2018). In the current study two researchers studied the same research question in the same setting.

3.2. Data Collection

We collected data with (a) semi-structured interviews; (b) on-site observations; and (c) internal documents, see Table 1 for a detailed breakdown.

Table 1

Overview of empirical data

Material	Volume	
	Number	Pages/time
interviews	16	45 min length each (average)
documents	4	186 pages
intranet	26 pages	111 subpages
observations	full-time	9 weeks
meetings	9	7 pages notes

Note. The data collection of the above materials was performed at Volvo Tuve factory from 2nd February until 31st March 2023. The 111 subpages were determined by converting the 26 intranet web pages into A4 format.

3.3.1. Semi-structured Interviews

A total of sixteen interviews were conducted along with three pilot interviews. We chose a semi-structured style of interviewing to allow for (a) the specific topics relevant to the authors to be covered, alongside (b) the possibility to pursue topics that might appear during the interview that are of interest to the interviewees (Bryman, 2012; Kirsch, 2001). The interviews were structured as informational interviews, the most common type of interview aiming at eliciting opinions, feelings and making observations (Stewart & Cash, 2017).

Following Kirsch (2001)'s advice, pilot interviews were conducted to test the preliminary questionnaires. Drawing from the pilot interviews and on-site observations (e.g.,

meeting attendance), we decided to conduct single interviews instead of group interviews for two reasons. First, it was challenging to obtain participants knowledge of, and relation to each other due to the size of the factory with 2700 employees. Forming groups where participants had established relationships, whilst forming another group where participants meet for the first time, would go against the recommendation of Stewart and Cash (2017), that interviews should be conducted under the same circumstances for all participants. Group interviews would have added an uncontrollable variable (interpersonal relationships with colleagues) that could have potentially led to inaccurate conclusions about employees' motivations to engage in digitalisation efforts. Second, single interviews are beneficial for capturing personal circumstances and detailed perspectives of participants as participants do not get influenced or interrupted by peers (Kirsch, 2001).

Interview responses can be treated as (a) the direct experiences of an individual or (b) an actively constructed narrative (Silverman, 2010). An actively constructed narrative could for example be the description of a work situations that puts a coworker in a more favourable or more critical light, e.g., for reasons of internal relations of power. This study views participants' responses as the direct and real experience of a participant as opposed to an actively constructed narrative. Nevertheless, to reduce the risk of running into the methodological issue of solely capturing participants actively constructed narratives, observations were used to balance differing realities (Silverman, 2010).

The interview participants - employees of the privately owned, Swedish based truck factory - were selected strategically using purposive sampling (Bigsby, 2017; Bryman, 2012) with assistance from organisational representatives. In purposive sampling the researchers select participants that are relevant to the research question(s) based on clear criteria of

relevance, such as experiences or skills (Bigsby, 2017; Bryman, 2012). For this thesis, employees (a) from various departments to account for different approaches to digitalisation; (b) with some level of responsibility for other employees, one or more steps up the hierarchy of the organisation; and (c) that were participating in digital transformation initiatives (e.g., pilot testing digital software tools for operations). They were intentionally chosen with the help of information provided by the case study organisation. Purposive sampling was thus deemed by the researchers to be a good choice to ensure that the results of the sampling were relevant to the research question. The sample consisted of mostly white-collar workers with a slightly higher distribution of male to female participants. Corporate positions were varied as study participants stemmed from different departments such as logistics, production, and IT. As with the qualitative nature of this thesis, the purposive sampling method has the weakness of lacking generalisability to the target population (Allen, 2017). In our study, the lack of generalisability stems from the fact that interviewees were selected on the condition that they were part of digital transformation initiatives, which the general population of the Tuve factory are not yet a part of. For a detailed overview of social demographics see Table 2. Interviews were recorded with Microsoft Sound Recorder App and transcribed with Microsoft Words embedded transcription tool.

Table 2

Overview Social Demographics of Interview Participants

Social criteria	Distribution	
Age	20 - 29	6
	30 - 39	3
	40 - 49	6
	50 - 59	2
	60+	-
Gender	female	6
	male	11
	transgender	-
	non-binary	-
	do not wish to say	-
	other	-
Position	Area Manager	4
	Data Scientist	1
	Director of Production	1
	Internal Material Controller	1
	Production Leader	3
	Quality Technician	1
	Team Leader	3
	Technical Trainer	1
	VPS Coach	2
Years of employment at Volvo Tuve plant	Less than 2	3
	More than 2	3
	More than 5	7
	More than 10	4

3.3.2. Interview Guide

The final interview guide used for the semi-structured interviews consisted of eight questions, such as “Please describe digitalisation at Tuve”; “What are the 2 to 3 most common topics of conversation about digitalization with your colleagues?”. Introductory questions aimed to warm-up and prompt the participants to think on their own understanding of what digitalisation is. This was followed by two questions that asked for the frequency that digitalisation is talked about with coworkers; and managers. The

structure of the aforementioned questions was rationalised by, first, practicality in the sense that; limiting the number of answers to a set number (five) of possibilities would facilitate the ability to compare interviewee answers. And second, based on the suggestion we received in our meeting with PhD student L. Carlsson (personal communication, February 22, 2023) that addressing digitalisation in a "roundabout" way may improve the quality of interviewee replies. The interview guide ended with four open-ended questions that tied directly into the topic of the research question (see Table 3).

Table 3

Interview Guide

Topic	Questions
Introductory	1) Please describe your role, position, duties. 2) Please describe digitalisation at Tuve.
Leading question	1) How frequently do you have conversations about digitalization with your colleagues? a) More than once a day, Once a day, Once a week, Once a month, Less than once a month 2) How frequently do you have conversations about digitalization with your manager? a) More than once a day, Once a day, Once a week, Once a month, Less than once a month
Mainly coworkership related	1) What are the 2 to 3 most common topics of conversation about digitalization with your colleagues? 2) What are the 2 to 3 most common topics of conversation about digitalization with your managers?
Mainly SDT related	1) What motivates you to have a conversation about digitalization with your colleagues? Please provide 2 to 3 examples. 2) What internal and/or external factors motivate you to have a conversation about digitalization with your managers? Please provide 2 to 3 examples.

The creation of the interview guide was inspired by previous studies that used SDT (LeRoy & Kaufmann, 2022; Visser et al., 2019) and coworkership (Carlsson, 2022; Heide & Simonsson, 2018). In creating the interview guide the authors followed Bryman (2012), Staller (2010) and Treadwell and Davis (2020) in the sense that: (a) the topic areas of the

questions were investigated in detail, followed by several rounds of restructuring to ensure a natural progression; (b) the questions were broken down into smaller units as well as formulated and iteratively reformulated to make sure they would help the authors answer the research question; (c) the language was adjusted by translating the chosen academic concept into a language style that matched experience, culture and common expressions of the interviewee; (d) a pilot guide was put to the test and after certain issues were detected the interview guide was finalised; (e) participants were asked to indicate their age, gender, organisational position and tenure to oversee social demographics of all research participants; and (f) re-translating interviewees answers into a more scholarly and research-question related statement during data analysis.

For language adjustment in terms of comprehensibility and relevance to the interviewees, it was particularly helpful that one of the researchers is a Swedish mother tongue (Erkut et al., 1999; Squires, 2009; Staller, 2022). The researcher was thus able to understand the nuances in English words or phrases and their perception in Swedish, which allowed for (a) tailoring the interview questions to the mainly Swedish participants, and (b) supported the identification of meaning in several interview transcripts at a later stage (Erkut et al., 1999; Squires, 2009; Staller, 2022).

The interview guide mainly contained open and moderately open questions, as these types of questions are most effectively for capturing depth of potential information (Stewart & Cash, 2017). Open questions are inquiries that give respondents the freedom to choose the amount and content of information they want to disclose (Stewart & Cash, 2017), for example “Please describe digitalisation at Tuve.”. Moderately open questions are more restrictive than open questions but still leave room for elaboration (Stewart & Cash, 2017),

for example “What motivates you to have a conversation about digitalization with your colleagues?”. The benefit of both forms of open questions is that interviewees have the possibility to express their feelings and any other information unrestricted; the downside is varying answers in length and relevant information density (Stewart & Cash, 2017). For instance, answers may range from a few words to a several minute long monologue, or from expressing study relevant opinions to going off topic.

The choice for open questions and the resulting variation in answers between interviewees was made at the expense of reliability. Reliability refers to the consistency of a measure, meaning that when repeating a study with the same procedure, a researcher should ideally get to the same findings and conclusions (Yin, 2018). Asking open questions makes the reproduction of similar interview answers and thus similar study findings challenging, because interviewees have such freedom in how to answer an open-ended question. To keep interviewees focused on the topic of engagement in digitalisation at their factory, to delve deeper into the meaning of unclear responses and to limit the variation of answers to at least some extent, the researchers asked follow-up questions, often in form of closed questions. Closed questions are narrow inquiries that restrict the interviewee in choosing the amount and kind of information for the purpose of controlling answer length or eliciting specific information (Stewart & Cash, 2017), such as “When did you have that conversation?”; “Do you approve or disapprove of this way of operating?”. Follow up questions were not part of the interview guide, as they were formed on the spot as a result of researchers listening and determination of relevant information that would support answering the research question.

The order of interview questions (Treadwell & Davis, 2020) was considered by starting with an uncomplicated question for participants (inquiry about role and every-day duties), and then moving from broad questions (employees general understanding of digitalisation) to more specific questions (inquiry of internal and external factors that motivate employees for digitalisation at work), a structure that is referred to as funnel sequence (Stewart & Cash, 2017). Asking about employees understanding of digitalisation did not only function as a warm-up question, but also as an assessment of shared understanding and sensemaking, as recommended by Heide and Simonsson (2018).

For stimulating concise answers as well as the sharing of stories about situations and processes, within-method triangulation was used. Within-method triangulation refers to triangulating at a more detailed level, such as the interview guide by inquiring for episodic and semantic knowledge (Flick, 2022). Episodic knowledge encompasses situations and processes (Flick, 2022), e.g. "How frequently do you have conversations about digitalization with your manager", whereas semantic knowledge can be defined as expertise and awareness for concepts and relations (Flick, 2022), e.g. "What are the two to three most common topics of conversation about digitalization with your managers?". In sum, applying within-method triangulation served as a support to elicit research-related responses from study participants.

3.3.3. Observations

In addition to interviews, we conducted observations. Observations involves researchers to be present in the community under study, and are usually collected in form of field notes, either in the moment of an observation or as a reflection of the community and the setting at a later stage (Caines, 2012). Observations and field-notes were made by

both researchers through visits to the shop floor, other spaces such as offices in the facilities of the organisation, and the attendance of several meetings that covered the topic of digitalisation efforts within the plant. As an example, meetings were titles as “digital initiatives Tuve – weekly update” and lasted from 30 minutes to one hour. Observations also contained researchers’ notes about ethnographic interviews (Munz, 2018). Ethnographic interviews in contrast to semi-structured interviews are not scheduled, informal, have a more conversational character and require a relationship between the researcher and participant, meaning that both parties should not meet for the first time (Munz, 2018). As both researchers were given independent temporary access to the organisation, including individual office spaces, the establishment of relationships to community members was possible and thus allowed for what Caines (2012) calls “in-the-moment conversations”. The benefits of ethnographic interviews lie in, (a) capturing spontaneous interactions with study participants in their community setting, and (b) observing the co-construction of knowledge and meaning between member of a community (Munz, 2018).

3.3.4. Internal Documents

The observation step also included the review of internal documents, where two kinds of internal documents were considered for this research. First, internal documents presenting a detailed strategy, such as "communication plan 2023", or "digital transformation Tuve" drafted by the IT and communication department. The strategy documents outlined important goals for the Tuve factory in the coming three years, how these goals were to be reached, as well as key messages to the employees. These documents were therefore considered to provide insights into the management perspective of digitalisation at Tuve. The documents were received via email from the respective

department directors upon request by the researchers. Second, content from the company's intranet such as announcements and blog posts using the keywords "digitalisation", "digital transformation" and "Tuve" were selected as they were considered to provide insight into the management and *organisational* perspectives of digitalisation at Tuve. A total of 21 documents was gathered from which four were discarded after the researchers reviewed the content and found them irrelevant. For instance, because the information was outdated, e.g., more than 3 years old and only relevant for business under COVID19 pandemic work restrictions. As an example, a post about encouraging employees to set up a digital background instead of showing their private surroundings when working from home, was excluded from the data set.

3.3. Data Analysis

Our data were analysed using "thematic analysis", thematic analysis is commonly defined as "forms of qualitative data analysis that principally focus on identifying, organising and interpreting themes in textual data" (King & Brooks, 2018, p. 2). Our analysis was specifically inspired by King and Brooks's (2017) style of thematic analysis called "template analysis". Template analysis is a generic approach to thematic analysis, meaning that it does not have any ties to a particular philosophical foundation, but should follow the general philosophical (ontological and epistemological) position of the conducted research (King & Brooks, 2018). Template analysis have a few unique aspects compared to other types of thematic analysis. First there is the development of a *coding template* that is first based on subsets of the whole dataset, after which the coding template is applied to more data to be revised and defined, resulting in a *final template* that is applied to all data. This process allows researchers to delve deeper into significant themes and consequently provides more

detailed insights into the data (King & Brooks, 2018). Second, template analysis allows for both bottom-up and top-down approaches to the coding of data, i.e., it allows for inductive coding, deductive coding, or a combination of both. This can prove helpful in guiding researchers through their analysis and provides researchers an opportunity to examine the key concepts or perspectives from their research (King & Brooks, 2018). Third, it allows researchers the flexibility to code *parallel codes,* that is the coding of data into more than one code, which could reveal larger patterns in the data. And fourth, the iterative *preliminary coding* process of smaller subsets of the data, and the simultaneous familiarisation with the data that this allows, gives researchers room to adjust their approach to template analysis to suit their situational and timely needs (King & Brooks, 2018).

Owing to the aforementioned unique aspects, we found that template analysis would be a tool well suited to the extensive amount of data and time-sensitive nature of our research. Additionally, template analysis has been widely used in organisational and communication contexts to examine qualitative data (Frambach et al., 2014; McCluskey et al., 2011; Radcliffe, 2013). And in line with thematic analysis, template analysis can be applied to a combination of different data such as interviews, observations, documentation etc., allowing for the discovery of a broad range communicative processes, patterns, ideas, and issues (Allen, 2017; King & Brooks, 2018). These various insights in the form of patterns, problems, possibilities and structures allow the researcher(s) a comprehensive understanding of the observed communication, and recurring observations can further help the explanation of, for example, case specific phenomena (Allen, 2017; King & Brooks, 2018). The value of using thematic analysis consist in the possibility to create a full picture of

a communicative interaction, the uncovering of problems, and later on the suggestion for solutions and improvement (Allen, 2017; King & Brooks, 2018).

3.3.1. Coding and Template Creation Process

The initial a priori coding scheme (hereafter referred to as “deductive codes”) for this study was based on the three basic psychological needs found in SDT (Deci & Ryan, 2000), with one code for each basic need that could be either positively (supported) or negatively (hindered) met (see Table 4). These three codes can be defined as King and Brooks’s (2017) theory-driven "hard" type of codes, as they represent the foci of answering the research question.

Table 4

Overview of the deductive codes

Items	Details
Code label	Competence
Definition	The need to feel effective and capable in one's interactions with the environment (Deci et al., 2017; Deci & Ryan, 2014).
Description	To engage optimal challenges and experience mastery or effectiveness in the physical and social worlds (Deci & Ryan, 2000, p. 252).
Code label	Autonomy
Definition	The need to experience a sense of choice and control over one’s actions and decisions (Deci et al., 2017; Deci & Ryan, 2014).
Description	To self-organize and regulate one’s own behaviour (and avoid heteronomous control), which includes the tendency to work toward inner coherence and integration among regulatory demands and goals (Deci & Ryan, 2000, p. 252).
Code label	Relatedness
Definition	The need to feel connected to and cared for by others (Deci et al., 2017; Deci & Ryan, 2014).
Description	To seek attachments and experience feelings of security, belongingness, and intimacy with others (Deci & Ryan, 2000, p. 252).

We used the specialist qualitative software NVivo in the preliminary coding and familiarising process, where the deductive codes were applied to analyse four of the interview transcripts. In the terminology of template analysis, these four interviews would

constitute a small subset of the entire dataset. In this first stage of preliminary coding three new codes emerged from the data and were included as “inductive codes” in the next stage of preliminary coding and familiarising. An example of the inductive codes can be observed in Table 5.

Table 5

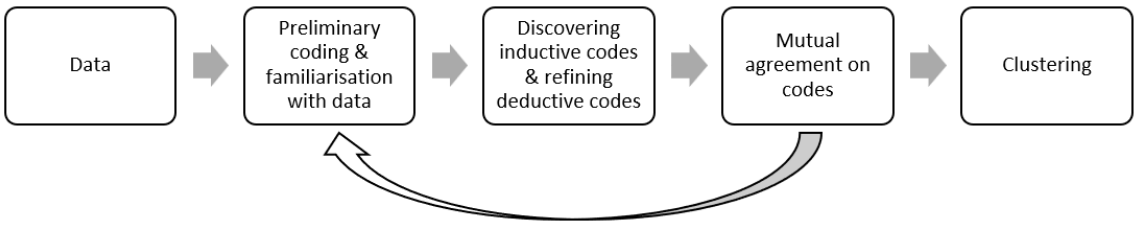
Example of Inductive Code Discovered in the First Stage of Preliminary Coding

Items	Details
Code label	Definition of Digitalisation
Definition	An interpretation of the meaning of digitalisation is expressed, including the description of its features and/or how its manifest.
Description	Expressing a view of the essential nature of digitalisation for Volvo or for each individual employee.

The preliminary coding process went through a total of three iterations (consisting of four interview transcripts per iteration) before we came to a mutual agreement on the codes. Following mutual agreement, we again used the specialist qualitative software NVivo to cluster the preliminary codes into groups, which resulted in the merging of all but one inductive code into one or more of the deductive codes. The full iterative process of preliminary coding we undertook in preparing for the creation of an initial template is outlined in Figure 5 below.

Figure 5

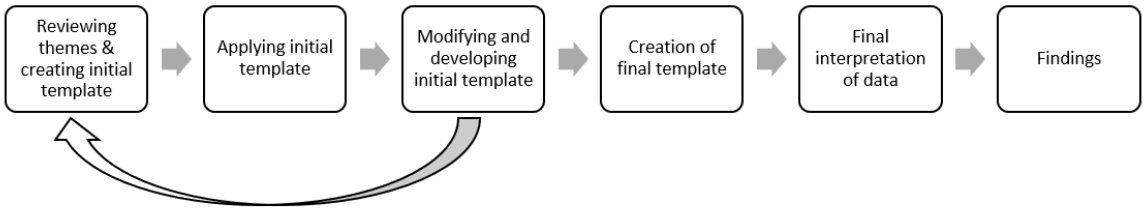
Preliminary Coding and Data Familiarisation Stage



Following the first stage of preliminary coding and clustering, we reviewed the clusters (groups of codes) for potential emergent themes and created our initial template based on the results of the reviewing. The initial template was then applied to four interview transcripts and six internal documents per iteration, and the process went through a total of two iterations. At this point we reached a mutual agreement that the template provided, in line with King and Brooks (2017)'s suggestion, an exhaustive depiction of our interpretation of the data. The ensuing final template was used for the final interpretation of the whole dataset, resulting in the identification of the factors that had an impact on the coworkership conditions. The full iterative process of refining the initial template and creating the final template is visualised in Figure 6 below.

Figure 6

Final Template and Final Interpretation of Data



3.4. Ethical Considerations

This study has been conducted in line with the European General Data Protection Regulation (2017) and the Swedish National Data Service guidelines (2022) on "research material with personal data". The three fundamental principles for research material with personal data that were respected are: 1) lawfulness (data processing based on GDPR); 2) fairness (research relevant data processing); and 3) transparency (data subjects are informed of data processing).

3.5.1. Collaboration

This research has been conducted with the involvement of another party, namely Volvo Tuve. A collaboration agreement between the researchers and Volvo has been made, clarifying data collection in terms of privacy and confidentiality, as well as access of data material (Swedish National Data Service, 2022). To protect the integrity and privacy of research participants, observational notes and interview recordings belong entirely to the

two researchers and cannot be accessed by the company. However, Volvo does hold copyright for internal use of the final thesis report. Observational notes and interview recordings can be requested for viewing by the researcher's supervisor and appointed academic staff to control the quality of this thesis. Internal documents were either given to the researchers by Volvo staff or originate from open internal access and thus do not require special privacy or confidentiality efforts regarding research participants.

3.5.2. Informed Consent

Prior to recording, all interviewees gave consent by signing a consent form (see appendix). As GDPR recommends, any information addressed at a study participant shall be "concise, easily accessible, and easy to understand, and that clear and plain language" ('Regulation (EU) 2016/679', 2017, p. 11) should be used. Thus, participants were given a document in easy language, explaining overall plan and aim of the research, use of methods, possible consequences and risks from participation in the research, research principal, voluntary participation and withdrawal from the research at any time (Swedish National Data Service, 2022). Further, the specification of which personal data was collected, purpose of the personal data collection, data processing and storage and legal basis for data processing (GDPR) were listed. To ensure comprehension, the information in the consent form was also given orally (Van Stee, 2018). All transcripts were anonymised, in other words obvious connections (such as names, place references, etc.) between an interview transcript and an individual research participant were removed (Vetenskapsrådet, 2017). The researchers assured confidentiality, integrity and privacy (Vetenskapsrådet, 2017), in the way that no confidential information given during interviews or observations would be communicated further.

3.5.3. Ethical Considerations in Triangulation

Specific ethical considerations were taken regarding triangulation. Triangulation (multi evidence) implies the possible exposition of study participants to multiple methods of data collection, such as interviews and observations (Flick, 2022). This was not deemed problematic or straining on participants for two reasons. First, interview participants were hardly subject to observations, as employees subject to observations happened to be mostly other employees within the factory facilities. Second, the researchers always aimed to make observations in an un-disturbing and comfortable manner for the subjects under observation, for example by (a) not remaining too long at workstations, (b) not asking interrogative questions, (c) being accompanied by internal staff to validate researchers appearance in certain places or meetings, (d) listening and observing in a tactful and respectful manner.

4. Findings

The aim of the study was to investigate what factors support or hinder the coworkership conditions in digital transformation initiatives, through the theoretical lens of SDT. From our template analysis eight themes emerged, which pose four supporting and four hindering factors on coworkership conditions in digital transformation initiatives (Table 6).

Table 6

Factors that Support or Hinder the Coworkership Conditions

Supportive factors	Hindering factors
Personal interest	Incoherent understanding
Interpersonal connections	Unaddressed concerns
Opportunities for sensemaking	Unclear direction
Open communication & trust	Overreliance on skilled individuals

Findings are divided into two separate sections. The first section presents supporting factors, the second section presents hindering factors for the coworkership conditions in digital transformation initiatives. The structure of the findings was inspired by Carlsson et al. (2022), who also studied employee's perspective on digital transformation, using thematic analysis and coworkership. All factors are thus presented by providing a brief meaning of the factor, followed by a table containing examples (mostly interview quotes), closing with a detailed elaboration on why and how a factor was discovered as supportive or hindering.

4.1. Supporting Factors for Coworkership in Digital Transformation Initiatives

4.1.1. Personal Interest

The first supporting factor “personal interest” refers to employees with an individual enthusiasm for digitalisation. This personal interest and conviction for digitalisation either

originated from (a) a private setting (smart homes, technological gadgets, AI helper tools, hobby programming), and/or (b) were related to their workplace context (believing in a digital way of working, simplifying manual labour, fast information sharing, saving resources). The factor ‘personal interest’ is exemplified by excerpts in Table 7.

Table 7

Excerpts Exemplifying Employees' Personal Interest in Digitalisation

Source	Excerpt
Interviews	"I'm motivated to showcase what we can do with the data. I'm interested in that [digital] problem solving in general. That’s part of my personality.”
	“Yes, yes, I like to, what do you call it, the automation to make the life easy? So, like at home I have digitalized my lamps, my TV, my door lock.”
	“I can talk a lot about it. I’m inspired and I'm doing a little project on the side with the data scientist.”
	“Yeah, I am a bit of a nerd. So yes, that helps. So like, I'm an enthusiast for those things. I'm interested like in my spare time and actually see things related to that and so on.”
	“Yeah, I'm very curious, so I ask everything. ‘Oh what’s that? What’s this?’.”
	“But he's really interested in it so mostly that's why he is doing it.”
	“Chat GPI, it's my best friend. I love it so much. It's like in Excel as well now, so it's pretty good when you're wondering something you just ask it.”
	“We have like [assembly instructions] still on paper. I hate paper. Really hate it. Yeah, because it gets lost. I don't know, I just want everything on my computer. It's simple, it's easy.”
	“I'm just like sitting at home in the evening, typing HTML codes and like trying to build different sites.”
	“But also some people were really interested and stayed ten minutes after the meeting to ask more questions. And ‘Ok, this is very good. Can you do this as well?’. So, there is interest.”
	“Then it’s the overall benefits for the people, if it's benefiting me or my team, yes then I would be motivated to use it of course.”
	“It's more like working together and to do something good and I wanted them to be more driven, like ‘I want this’. Cause if they want it, then it will be fun to make something.”
	“And I asked them and make them more involved into the digital journey.”

Employees with a personal interest in digitalisation (regardless of privately or professionally motivated) showed more curiosity and initiative for testing digital ways of working (e.g., using Microsoft Power BI App instead of Excel; using a laptop to visualise production progress instead of whiteboard). Personal interest was identified as a supporting factor for the coworkership conditions of meaningfulness and engagement, because enthusiastic employees were convinced by the necessity of digitalisation, and thus open to talk about digital initiatives (e.g., spreading of ideas) at work. Further cooperation, as interested employees get approached by their coworkers for help and exchange as they were seen as automatically knowledgeable.

Whilst personal interest was identified as a supporting factor, the *lack* of personal interest was not identified as a hindering factor. The lack of personal interest did not enhance employee engagement in digital initiatives, but neither the observations nor the interviews revealed the lack of personal interest as a strong barrier for engagement in digital initiatives. Instead, enthusiastic and knowledgeable coworkers were able to convince and encourage their colleagues to try out different ways of working with their help and for the benefit of the team.

4.1.2. Interpersonal Connections Within the Workplace

The second supporting factor “interpersonal connections within the workplace” refers to the informal networks that surrounded employees with highly valued digital skillsets, i.e., knowledge of and experience with digital software, ranging from Excel and Power BI to programming and data-engineering. The factor ‘interpersonal connections within the workplace’ is exemplified by the excerpts in Table 8.

Table 8

Excerpts Exemplifying Employees Dependence on Digitally Skilled Co-workers

Source	Excerpt
Interviews	"So we have some numbers that we can call, but it's just [....] to get things to work on the line. It's not for the digitalization, it's just for support, emergency support."
	"When I, it depends who I meet, if I meet and I'm sitting with these IT guys I have a lot of ideas its digitalization all the time."
	"Trying to find these sort of champions in the organisation to pull from those who really have [digitalisation] as a driving interest. That's one of the things I think could be beneficial."
	"And he's been working here for a long time in Tuve as well so he knows a lot. Knowing systems and processes"
	"I have good connection with [IT-person]. We worked together for one year now as a close team. And [person] has helped me a little bit understand because we have digital digitalized with power BI, yeah, many things."
	"[NAME] and [NAME] they are from [place], where everything is on screen. They talk a lot about it [digitalisation] and they're good at it. And they have showed me the benefits of it."
	"[Digitalising workflows] is quite hard, but it's also about knowing people, knowing the right people [with IT/software knowledge]."
	"So in IMC, in that department, we have one person, who is working a lot with this, to create reports and create easier way to work and so on. "
	"When I, it depends who I meet, if I meet and I'm sitting with these IT guys I have a lot of ideas, its digitalization all the time."
	"Well, the ideal situation would that I would have a [NAME] on my own."
	"Of course yes, if they know that you are interested or you have knowledge about it, they're gonna ask you about it."
	"Some of them know that I was working with this power BI. So when they are talking to someone, someone says like 'ohh this person was working with this so maybe she can help."
	"Yes, I worked in the production. Maybe it's their way to say "oh we have somebody in the IT, we can talk to him". And I'm not from the IT. But they often they come to me."

Interpersonal connections to coworkers with digital knowledge mainly supported the coworkership conditions cooperation, engagement and initiative among employees. Communication, often between two to three employees, helped coworkers in need of digital support to spark ideas, understand and to progress with their digital efforts. In

particular, employees who were acquainted with a digitally skilled coworker had a clear advantage in receiving support for their own digital initiatives.

Observations revealed that the organisation did not provide a clear structure of how or whom to contact for digital initiatives at work, which could explain why employees relied on their self-established network. Employees did not seem to contact staff at the IT department for support, unless they personally knew them. If digital support seeking employees were not familiar with someone at the IT department, employees would inquire support from someone who was said to be knowledgeable by other coworkers.

4.1.3. Opportunities for Sensemaking

The third supporting factor "opportunities for sensemaking" refers to places and/or situations where employees were able to communicate with each other to understand the why(s) and how(s) of digitalisation. Opportunities for sensemaking meant platforms of communication about digitalisation (i.e., interaction between employees) and not communication channels (i.e., employees being silent receivers of information). Opportunities for sensemaking' are exemplified by the excerpts in Table 9.

Table 9

Excerpts Exemplifying Meaningful Interaction Regarding Digitalisation Efforts

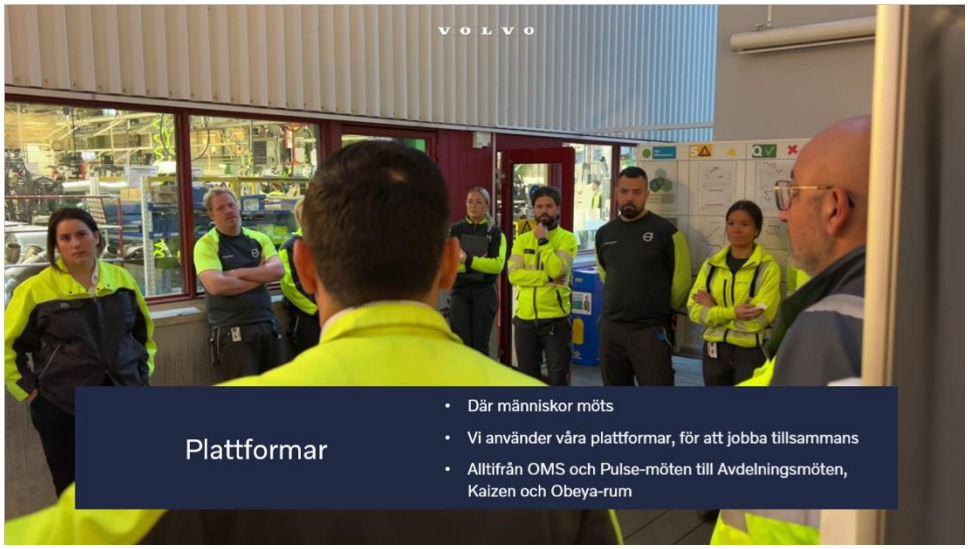
Source	Excerpt
Interviews	"We are moving to team leader seminar for team leaders to meet. We have […] this mission operator, when your part of different mission you can meet also in some place, so we're helping the mission [operators] to meet"
	"Then you have an owner of that programme. So you have to [...] ask them to come to one of your meetings so they can see what's working, what's not, how do we want it?"
	"I think they're going to have like a meeting to see all of the suggestions. And see the ones that's not done and maybe discuss what they should do."
	"I had this idea yesterday, on Tuesday I booked half an hour with him. That so my idea is to sit with him and then we discuss about it, […] then we can try to do something together."
	"So we did the coding camp once. And the coding camp gave them [employees] inspiration to do something their self."
	"We had people from CA here in Gothenburg, people from CA from Ghent connected online, people […] from different areas [of Volvo group]. And I supported them […], like facilitating the workshop"
	"If I meet and I'm sitting with these IT guys I have a lot of ideas, its digitalization all the time."
	"in every team you have like someone who is working with FMS […] doing everything as good as they can on the station, and often they are going up to cabtrim to see what they are doing up there, because they're so good at it."
	"[digitalisation is discussed in] this cross functional team in the Obeya [room] once in a week."
Internal documents	"Platforms. Where people meet. We use our platforms, to work together. Everything from OMS and pulse-meetings to department meetings, as well as Kaizen and Obeya rooms".

The factor 'opportunities for sensemaking' was mainly constituted by various forms of (a) meetings and gatherings (in the form of "official" planned reoccurring meetings or gatherings (platforms), as well as "unofficial" spontaneous meetings or gatherings); and (b) cross-functional collaboration (activities or situations where valuable knowledge was shared between departments, locations or professions). The platforms for sensemaking, i.e., "official" planned reoccurring meetings and gatherings (see Figure 7), appeared to impact

the conditions of (a) trust (in the sense that employees felt heard by the management), and (b) openness (as a result of employees being able to express their ideas and concerns). The importance of the communication platforms, providing opportunities for employees to meet and work together, was particularly emphasised by internal company documents.

Figure 7

Volvo Tuve Internal Communication Platforms



Note. English translation of the Swedish text reads “Platforms. Where people meet. We use our platforms to work together. Everything from OMS and Pulse meetings to department meetings, Kaizen and Obeya rooms”.

The “unofficial” spontaneous type of meetings and gatherings also seems to have had an impact on the coworkership conditions community spirit, initiative and meaningfulness by (a) creating a sense of community as a result of the enthusiasm shared in the sensemaking opportunity; (b) facilitating co-operation as a result of continued interaction between coworkers; and (c) facilitating meaningfulness as a result of the understanding gained from the knowledge sharing. The interviews hinted that the driving factor, or

initiative, behind the occurrence of these types of “unofficial” spontaneous meetings and gatherings mainly originated from personal interest.

4.1.4. Open Communication and Trust

The fourth supporting factor “open communication and trust” refers to an organisational environment that (a) allowed employees to share ideas, concerns and feedback both horizontally across departments, as well as vertically across hierarchies; and (b) allowed employees to try new solutions in their work by providing a supporting structure in the form of other colleagues and managers. The factor ‘open communication and trust’ is exemplified by the excerpts in Table 10.

Table 10

Excerpts Exemplifying Open and Trustful Interaction Between Co-workers

Source	Excerpt
Interviews	"Tuve is actually, people are very honest"
	"[Communication] has changed over time [....] it took a couple of years to get the understanding from people that it's OK to talk. [...] [In the past] if it didn't [work] we were just yelling, and then we didn't care."
	"The management team says 'go for it' and we have the support."
	"So we're pretty open to discussion everything you have"
	"Yeah, we're pretty open group."
	"All management team goes and they ask questions and the operators talk. In this sense I would say it's like a very flat organization. Like in terms of no bureaucracies, […] simple environment if I could say like that, very easy going."
	"But, in general, people are very helpful and every place you go they try to talk to you and they try to help."
	"I'm trying to use it now and being encouraged to use it, […] don't be afraid to do it wrong, just learn to use it. And that, that I think is a very good thing because sometimes we are afraid to register improvement because we want to do it just right."
	"The culture […] it's like there is, actually there is no hierarchies. You feel like you can talk to everyone, and everyone wants to talk to you. That's what I feel."
	"I have a problem […] you miss material for example and then you say it and everyone online hears it and they send someone down to the pilot plant to support you."
	"Since I arrived basically everything that I needed, I always got support, or whenever someone needed something and I helped, the person was able to get support also."
Internal documents	"Everyone can use data. We share ideas with each other. We dare to try and fail. We take one step at a time, and continually make small improvements. We do it together"

The observed flat organisational structure of Tuve, i.e., the close distance between departments, management and operators, was found to have an impact on all coworkership conditions. By creating a sense of openness where (a) it was acceptable for employees to share ideas and concerns with management, and (b) where employees could freely interact with their peers from other departments. The interviews also hinted that the sense of

openness at the organisation was facilitating a community spirit focused on equality and the importance of *people*.

Interviews, documents and observations pointed to a supportive workplace through open communication and trust, having a significant impact on the coworkership conditions. Trust was facilitated through (a) colleagues who made an effort to assist each other, and (b) managers who gave employees the permission and support needed to try new things. Again, observations suggested that trust could was also facilitating a community spirit of togetherness and teamwork, spanning across departments.

4.2. Hindering Factors for Coworkership in Digital Transformation Initiatives

4.2.1 Incoherent Understanding of Digitalisation

"Incoherent understanding of digitalisation" was a recurrent theme in the interviews and observations. Incoherence manifested as a differing understanding, or even confusion, of what digitalisation at Volvo Tuve meant and how digitalisation was practised in the every-day-operations. The hindering factor 'incoherent understanding of digitalisation' for coworkership in digitalisation initiatives is exemplified by the excerpts in Table 11.

Table 11

Excerpts Exemplifying Employees Differing Understandings of Digitalisation at Work

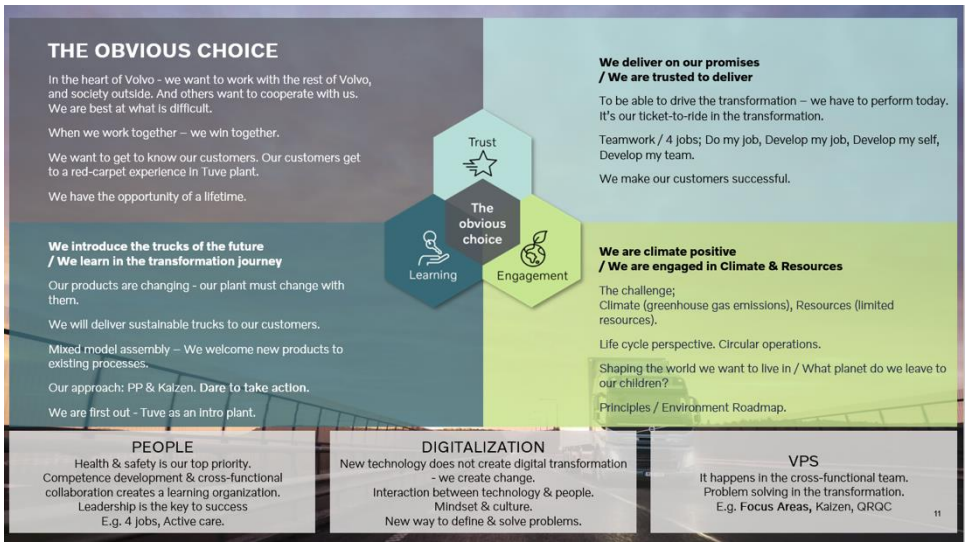
Source	Excerpt
Interviews	"We are utilising digital tools and mainly power BI to try to simplify visualisation of manual reporting."
	"I mean, just the definition. What does that mean? Because it means so many different things for different people."
	"Gathering information to automate my world, not really digitalize, but automate the structure of manual reporting, which goes up to the production manager"
	"I don't maybe know what digitalization actually is for me. It's the more go from paper to computer, but it's not only that."
	"For me is the digitalisation to not do all of the extra job."
	"I mean, it's simplifying manual work that is the greatest benefit for us"
	"We have the core systems, that's where we work with the real data and digitalization is the smart layer on top of it so that we can visualise what is happening"
	"But I feel it's more about automation."
	"I talk to my boss and he wants you know, everything should be digital, we should not have it in the paper."
	"For me, it's like my computer, like how I work everyday"
	"The only thing I hear is the Power BIs. Everybody wants to have Power BI on everything."
	"I don't really understand it."
	"I think it's quite a tricky question […]. Is it digitalization because you are creating Power BI or what is it really?"
Internal Documents	"To become a fully data driven organization, where we treat data as a company-wide asset, we have to create and enhance our data governance and management capabilities, with clear data governance structure at all levels with distinct data roles, responsible for a subset of data based on commonly defined data domains."
	"To reach the Volvo Group ambitions for 2030, a digital transformation is needed"
	"new technology doesn't create digital transformation, we create the change"
	"Digitalisation is therefore an important area for Tuvefabriken to reach our 2025 targets."
	"The power of good data enables innovation and team autonomy. Digitalization improves our ability to steer and optimize complex flows."

Some employees felt that digitalisation was the switch from paper to computer, or working with the digital App 'Microsoft Power BI' for visualising production analytics in a manufacturing operation dashboard. Other employees considered digitalisation as a hype, did not know how to describe digitalisation or said that digitalisation had very differing meanings from coworker to coworker. Only a small number of interviewees, mainly those who were in more frequent and direct interaction with the top management, understood digitalisation as an enabler for more effective truck production, instead of digitalisation as a goal in itself.

Internal documents described digitalisation as an enabler for Volvo Tuves greater goal, being market leader for heavy duty trucks. Digitalisation was found as an integral part of Volvo Tuves target image (see Figure 8).

Figure 8

Outline of Volvo Tuve Long Term Strategic Plan



Note. Digitalisation (bottom middle) as one of three foundations for Volvos business success.

Volvo Tuves description of digitalisation indicated a human-centred approach to digital transformation by acknowledging that new technology alone could not facilitate the change to digitalised operations (see Figure 8 above). In contrast to the strategic significance that digitalisation appears to have (see Figure 8 above), stand (a) the low frequency, on average once a week, of how often employees indicated to have conversations about digitalisation efforts; and (b) the lack of understanding and insecurity regarding digitalisation at work.

4.2.2. Unaddressed Concerns

The second hindering factor “unaddressed concerns” refers to the feelings of worry that interviewees described in relation to the digitalised future of the workplace. The factor “unaddressed concerns” is exemplified by the excerpts in Table 12.

Table 12

Excerpts Exemplifying Employees Concerns Related to Digitalisation at Work

Source	Excerpt
Interviews	"The risk that we maybe feel is, if everything is packed in the information and goes so fast that we maybe lose this ownership for "OK, I need to act here.""
	"How should we act if the power is off on the screens? Then we don't have any instructions for how to work."
	"OK, we wanna pull in all these technologies and all these things but our infrastructure is not ready for it."
	"There's potentially a resistance that we're not aware of. Are we afraid that this evolution of digital alliance with tools or whatever will change the basis entirely? […] OK, if this has been my task, what do I do then?"
	"It's a competitive edge when it comes to digitalization [...] it feels like in […] how other companies are developing, we [Tuve] are far behind, that's my feeling."
	"I could look at the production at home on my screen, but would it help me? Because […] the consequence could be that you're actually more stressed and it's not helpful in the long run."
	"We have the famous wording for Tuves way of working: 'If the electricity goes for one minute, we have stoppage for two hours sometimes' because all the systems need to restart. And then suddenly we can't have OMS, because it's on the screen."
	"People can lose a little bit of ownership because the data is there. It doesn't matter if I prepare or not for the meeting."
	"So when the system is down, you cannot build the car because you need the instruction to do it, and then you know it's really vulnerable."
	"Can we open up the mind and do something crazy? […] but they don't want to be foolish to tell something that is not good."

Employees worries specifically addressed topics such as future employment, reliability of the technology, work in their private life. All concerns were unaddressed in the sense that management had not provided employees with clear answers or solutions. The result of this was observed in the impact that the factor "unaddressed concerns" had, in hindering the coworkership conditions. Namely in (a) lowering trust between employees, management as a direct consequence of not addressing the concerns (i.e., providing answers/solutions); (b) losing meaningfulness because the concerns were outweighing any potentially perceived

benefits of digitalisation; (c) lowering responsibility and initiative because the concerns created an uncertainty that made employees hesitant towards digitalisation; and (d) lowering engagement among employees as a result of all the aforementioned effects along with the negative sentiment that the concerns introduced towards digitalisation.

In internal documents one instance was found to affect the concerns of employees being replaced as a part of the digitalisation process, seen in the phrase “the [digital] development will ultimately become too advanced for us humans to manage on our own”. This statement may actually increase employees concern for being replaced as a result of digitalisation moving forward.

4.2.3. Unclear Direction

The third hindering factor “unclear direction” was prominent in both interviews and observations and refers to the observed lack of a clear direction for digitalisation. Lack of direction included: missing objectives and unclear or contradicting goals, differing connotations for digitalisation and an indefinite organisational structure for digitalisation. “Unclear direction” is exemplified by the excerpts in Table 13.

Table 13

Excerpts Exemplifying Unclear Direction and Goals for Digitalisation at Work

Source	Excerpt
Interviews	"We say that we are now involving [employees] at all levels, you can produce your own app. But at the end it will be a lot of apps that are not used, they are being cleaned out from the system."
	"If you just leave every coworker to develop their own apps it works for a while. And then it doesn't anymore. You don't have guidance and management of how to do apps, documenting how it has been done, what it's doing, what it should do."
	"We need to be much better overall to share our own plans, I think that's the main challenge we have. First of all, to share inside [the plant]. Yeah, that's a headache sometimes."
	"I see […] reports are created and not used and not maintained. So last updates a year ago, so the information there is old. Could be that the person left, have another job."
	"When I started […] the group was very interested and me and [person] we showed the group what we're doing […]. But that was like a year ago. Now is fading-off."
	"And I think [digitalisation] it's really not on the agenda, or […] we're showing up our Power BIs and 'look what I got here'. So, we're talking about it in that way, but it's not in a structured way on the agenda"
	"I think it's a little bit like 'I work here and I create the system just for here'. […] It's just for here, and when you have to put all the system together, they're not going to work together because you do it like separate in the beginning."
	"We don't have a clear vision of what we actually want with [digitalisation]."
	"What is missing maybe with the communication from the management team is like […] it doesn't say 'What do we want to achieve [with digitalisation]'."

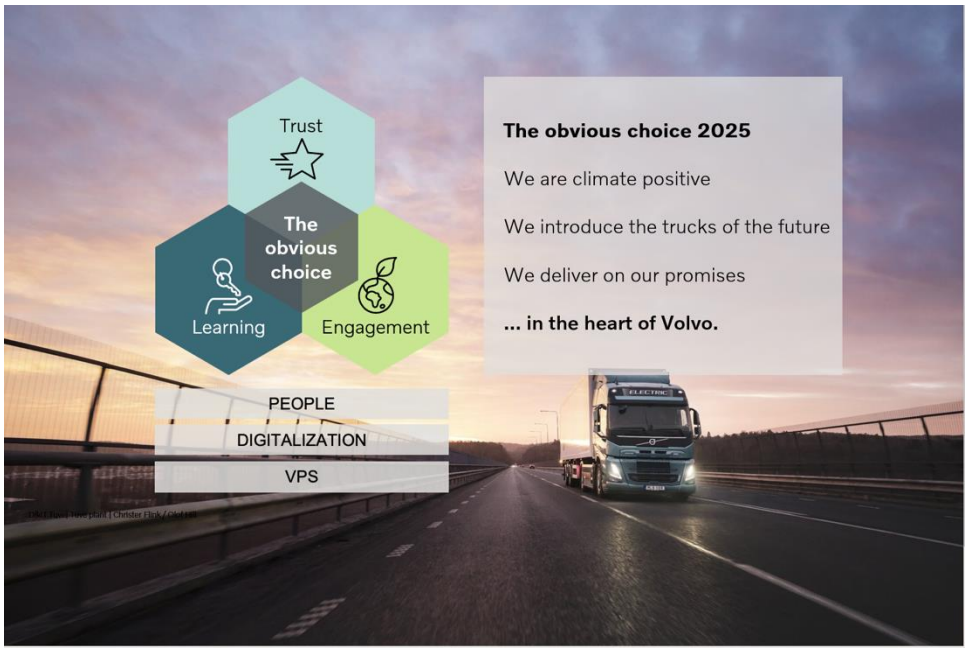
Insufficient and unclear communication of objectives and goals for digitalisation have been stated by the vast majority of interviewees. In explaining the goals for digitalisation some interviewees pointed out the need for more employees creating apps (digital operation dashboard), whilst others hinted that the creation of more apps would be counterproductive. First, increasing app quantity instead of app quality would not support effective and daily usage of the apps but over time only result in a large number of

unmaintained apps. Second, if targeted by too many apps, the background systems from which the apps retrieve information would slow down which would be extremely problematic for production planning and management. Almost all employees expressed confusion about specific objectives for digitalisation, though several employees understood the vision behind digitalisation.

Volvo Trucks vision and target image demonstrates the alliance of people, digitalisation and Volvo's production system (VPS), together with organisational core values (trust, engagement, learning), for creating Volvo's business success and a positive future (see Figure 9). To reach the target image, producing future trucks, becoming climate positive, and delivering best quality, digitalisation was portrayed by Volvo as a fundamental enabler. In contrast, communication at Volvo Tuve regarding digitalisation sometimes appeared to have a negative connotation. Observations and interviews showed that digitalisation was often talked about when there were issues with digital tools (e.g., unable to display relevant production KPI); or issues with digitalisation and IT in general (e.g., system crash, no real-time data available). The negative connotation of digitalisation was described by a participant in combination with the lack of instances that digitalisation was generally communicated: "We only talk about IT [and digitalisation] in that meeting when we have issues, 'This system is down. Why isn't this working?'. We don't talk about it [in other ways like], 'How are we doing better? How do we create?'". Another participant agreed with the vision but described the lack of clear objectives for digitalisation: "So, I read a lot about [digitalisation], but I don't know what we're doing here.".

Figure 9

Vision and Target Image of Volvo Trucks

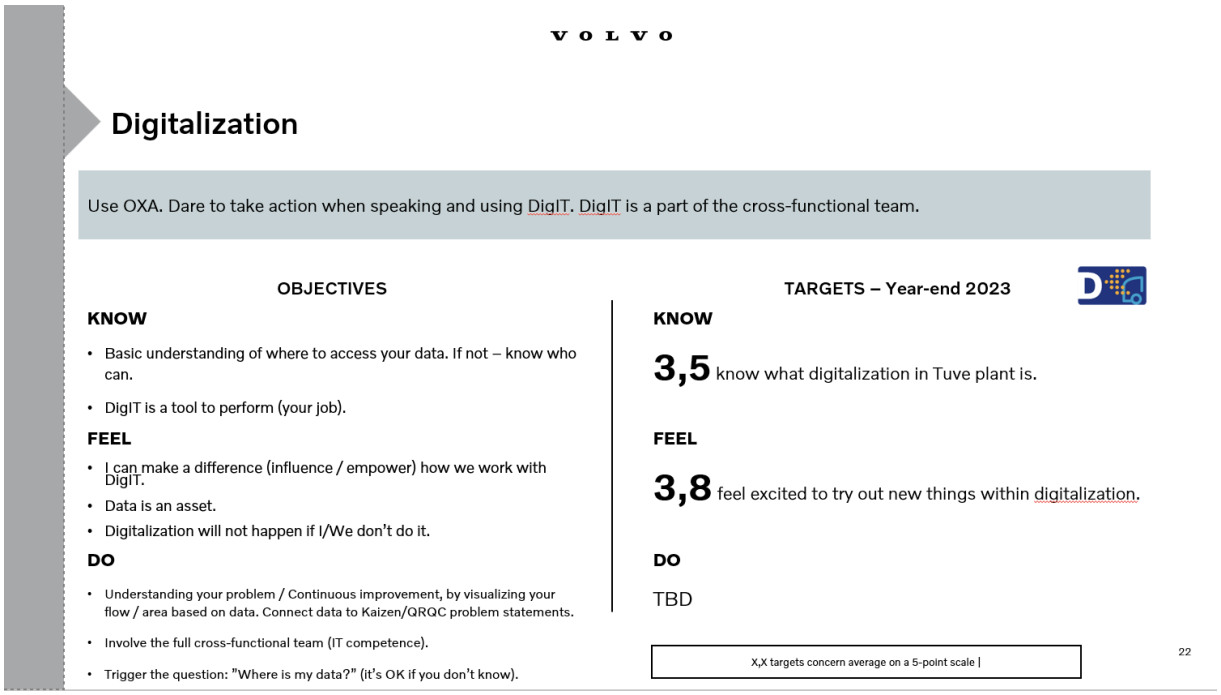


Note. Volvo Trucks vision and target image, utilised in multiple documents, power-points, videos, at events and on information screens at Tuve factory.

Incomplete objectives and undefined goals for digitalisation became noticeable in more specific internal documents, such as the current communication strategy for Digitalisation and IT (see Figure 10). Observations confirmed that digitalisation as a matter of importance for communication was hardly addressed between the communication and IT department.

Figure 10

Volvo Tuve Communication Strategy for Digitalisation



VOLVO

Digitalization

Use OXA. Dare to take action when speaking and using DigIT. DigIT is a part of the cross-functional team.

OBJECTIVES

KNOW

- Basic understanding of where to access your data. If not – know who can.
- DigIT is a tool to perform (your job).

FEEL

- I can make a difference (influence / empower) how we work with DigIT.
- Data is an asset.
- Digitalization will not happen if I/We don't do it.

DO

- Understanding your problem / Continuous improvement, by visualizing your flow / area based on data. Connect data to Kaizen/QRQC problem statements.
- Involve the full cross-functional team (IT competence).
- Trigger the question: "Where is my data?" (it's OK if you don't know).

TARGETS – Year-end 2023

KNOW

3,5 know what digitalization in Tuve plant is.

FEEL

3,8 feel excited to try out new things within digitalization.

DO

TBD

X,X targets concern average on a 5-point scale |

22

Note. Internal document, communication strategy 2023 for digitalisation and IT, stating objectives and how objectives are intended to be measured. The action target 'DO' for digitalisation at the bottom right corner had not been defined and thus was marked as "TBD".

Observations, interviews and the reviewing of internal documents showed an indefinite organisational structure for digitalisation in the sense that (a) employees weren't sure of other coworkers: "There might be other people [doing digitalisation] that I don't know of."; and (b) employees experienced challenges because they did not know exactly who to approach with matters regarding digitalisation: "It's hard when you go from the shop floor to talk to the IT. I think [colleagues] don't know who is the person to go and talk to.".

4.2.4. Overreliance on Skilled Individuals

The final hindering factor “overreliance on skilled individuals” was prominent in both interviews and observations and refers to the few individuals onto whom, both voluntarily and involuntarily, the task of driving digitalisation was befallen. The factor “overreliance on skilled individuals” is exemplified by the excerpts in Table 14.

Table 14

Examples of Overreliance on Skilled Individuals in Digitalisation

Source	Excerpt
Interviews	“So I want to see that it's [digitalisation is] much more integrated and that we are spreading the competence. So that we are not so sensitive to when people […] go on their career and so on.”
	“Today it's more connected to; people, pilots, and so on, ideas. Which is good that our company has given us this opportunity to test of course. But in future I would see more robust system in place.”
	“One of the concerns is what happens, for example, if [data scientist] is not still at Tuve? We will stop or how [do] we educate someone else? And so on. So for me t's more “OK now this works. OK how can we get a robust system for this?” So we can keep it alive and have it [as] one of our methods and way of working.”
	“It's not like. It's like less than five people. There are not many people in Tuve using Power BI.”
	“And one second fear, or weakens that I see is that, digitalization Is connected to one person. So if you quit, then it stops.”
	“I am in my new role, [...] I'm stuck and then I called [IT-person] and check with them but they’re busy elsewhere. So now I don't move forward because I don't get the help that I need to move forward.”
	“We have like some key people for some subjects that we end up knowing. [...] We go to the person's desk and ‘ah what do you think about it?’ So there is no ‘official network’ If I would say.”
	“I think we can work more in a standardised way with with digitalisation. Because today, like I said it's ‘I know a person in IT who helps me if I want to get help’.”
	“But my colleague doesn't know [the IT-person] so he doesn’t get that much help.”
	“I have more work than I can do. There's not more that I can do currently”

This overreliance on a few individuals hinted at a lack of a standardised approach to digitalisation, and was impacting the coworkership conditions by (a) creating potential barriers to collaboration and co-operation if employees were not aware of or connected to the right people; (b) eroding trust in the long run if these few individuals were not available when they were needed; (c) limiting the sense, or distribution, of responsibility among employees when critical knowledge was held only by these individuals; and (d) limiting engagement in initiatives as a result of the reliance of personal connections, i.e., employees not having equal access to resources and assistance.

5. Discussion

This thesis set out to explore the factors that support and/or hinder the coworkership conditions for employees in digital transformation initiatives, using SDT (Deci and Ryan, 2000). Our analysis revealed eight major factors that impacted the coworkership conditions. The following section combines our findings and previous literature.

5.1. Adding to the Understanding of Coworkership

Generally, in line with Bergman et al. (2017)'s findings, we find that coworkership in digital transformation initiatives is supported by a well-functioning communication climate. A well-functioning communication climate is, in our research, first exemplified by the supporting factor of "interpersonal connections at the workplace", where employees who are not confident in handling digital tools seek the help of individuals that have the required knowledge. Second, by the supporting factor of "open communication and trust", where employees repeatedly stress the fact that they are able to speak freely, and with everyone. Because our observations also indicated that respect was shown between all employees, we argue that a well-functioning communication climate should belong within the existing coworkership conditions of trust, openness, and cooperation. Instead of Bergman et al. (2017)'s description for well-functioning communication climate as supporting factor separate of the coworkership conditions. Therefore, the relationship between a well-functioning communication climate and the concept of coworkership could be defined in the same manner as the coworkership conditions itself, that is as "both conditions [for] and outcomes of […] co-workership" (Andersson et al., 2021, p. 430).

The coworkership conditions of trust and openness were strongly supported by all three of our data sources and as a consequence were found in the organisation at large. We

could also observe values expressed by employees and managers that are aligned with the coworkership conditions of trust and openness in this study's supporting factors of "opportunities for sensemaking" and "open communication and trust". Our findings may contribute some degree of validity to Kilhammar and Ellström (2015)'s claim that "local adjustment" is a factor that likely supports the development of coworkership. Because the employees' values reflected in the two factors "opportunities for sensemaking" and "open communication and trust" exist in the organisation and are aligned with the conditions of trust and openness, the employees' values could be partially responsible for the strong support of the conditions of trust and openness. Therefore, if an organisation would intentionally adjust the way trust and openness is communicated to closer match employee values expressed in "opportunities for sensemaking" and "open communication and trust", it may facilitate a stronger development of coworkership.

The three hindering factors of "incoherent understanding of digitalisation", "unclear direction", and "overreliance on skilled individuals" all point to a lack of supporting structures in the digital transformation initiatives at Tuve. This finding indirectly supports what T. Andersson et al. (2021) highlighted regarding the importance of supporting structures in the development of coworkership. Most notably, the identified lack of supporting structures could explain why the coworkership condition of responsibility was not supported by any factor. As previous studies have described supportive structures as an important requirement for workers to take responsibility in their everyday work (Karlsson & Lovén, 2006).

Becoming reliant on the knowledge and drive of enthusiasts in digital transformation is a challenge for organisation that was identified by Carlsson et al. (2022) in their study on

industrial digitalisation. The trend of becoming reliant on the knowledge and drive of enthusiasts was also obvious in the supporting factor “interpersonal connections in the workplace” as well as in the hindering factor “overreliance on skilled individuals”. Markedly, this trend of organisations becoming reliant on digital enthusiasts both supported and hindered the coworkership conditions in our study. We would therefore suggest that organisations carefully consider how much they decide to rely on these individuals, as overreliance may hinder coworkership due to the negative knock-on effects that we described under the hindering factor “overreliance on skilled individuals”.

5.2. Practicality of SDT for Coworkership

Analysing data through SDT has provided eight detailed insights about the supporting and hindering factors for the coworkership conditions in digital transformation initiatives. In other words, looking at employees' basic psychological needs helps to assess and explain the coworkership conditions. The practicality of SDT to understand employee interaction in work environments undergoing digital transformation has also been confirmed by Meske and Junglas (2021). In the following, we demonstrate the practicality of SDT for coworkership through two of our own research examples.

First, peoples’ need to feel taken care of by others (SDT relatedness) was satisfied when employees had interpersonal connections with a coworker that possesses digital knowledge (supporting factor). Direct interaction with a known colleague was beneficial for trust and open communication (coworkership condition), in the sense that employees were comfortable asking questions and addressing challenges regarding digitalisation. Organisational support in the form of transparent and easily accessible company information, feedback sessions, and the discussion of critical issues with employees, create

an internal freedom for employees (Mazzei, 2014) that can facilitate the coworkership conditions of trust and openness.

Second, peoples' need to feel capable at work (SDT competence), was hindered by the top management not addressing employees' concerns about digitalisation (hindering factor), such as how to continue truck assembly when digital systems were down, or whether digitalised operations would lead to staff-cutbacks. Such unaddressed concerns created an insecurity amongst employees, which lessened initiative and responsibility (coworkership condition), in the sense that coworkers were hesitant towards digitalisation and sometimes didn't feel responsibility for driving digital transformation efforts themselves. A similarly detailed description of proactive employees (a closely related idea to the concept of coworkership) by applying SDT has also been given by Strauss and Parker (2014). Employees do not show initiative for the sake of change or improvement only, but more so for the reward that is associated with their initiative for change (Strauss & Parker, 2014). In other words, employees want to be seen for their initiative. Thus, organisational support, for example by rewarding employees for their initiative in digitalisation efforts with a personal announcement, flowers, free lunch, etc. can facilitate the coworkership conditions of responsibility and initiative.

5.3. Modification of the Coworkership Wheel

Assessing coworkership in this case study was challenging, because coworkership is only described as the ideal state of employee interaction (Andersson et al., 2021; Andersson & Tengblad, 2009) that can support major organisational changes such as digital transformation (Carlsson et al., 2022). In their efforts, Andersson and Tengblad (2009) do not provide a clear starting point for coworkership. Including such an entrance into the

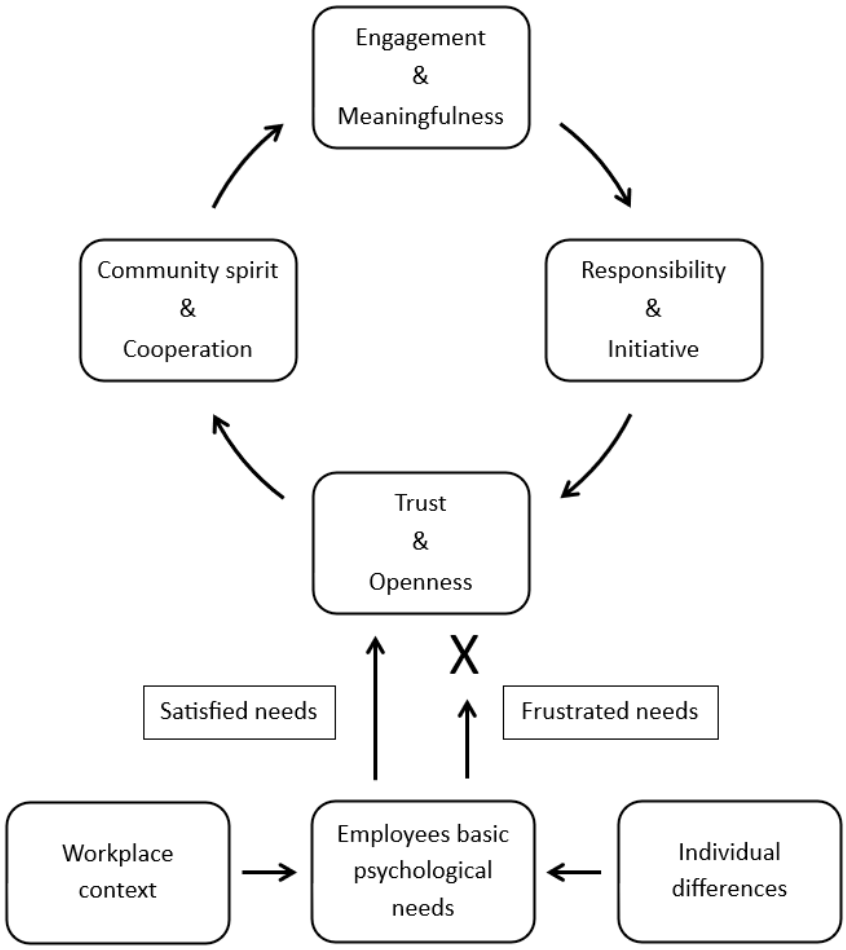
coworkership wheel would contribute to (a) answering the theoretical question of how to develop coworkership (as an ideal state of employee interaction); and (b) providing suggestions to organisations on how to identify what may hinder and support employees' engagement in digital transformation.

A topic that stands out in this study's findings is "open communication and trust", as it was found to be a supporting factor for all coworkership conditions except engagement and responsibility. Observations and interviews also confirmed that the open communication allowed employees freely to interact with each other, and voice their concerns, which facilitated trust. Adding to the significance of the factor "open communication and trust", we point to the earlier reaffirmation of Bergman et al. (2017)'s findings that a well-functioning communication climate is likely important in supporting coworkership. In sum, we would therefore argue in line with T. Andersson et al. (2021) that the conditions of trust and openness play a central role in facilitating all remaining coworkership conditions (community spirit & cooperation, initiative and responsibility, engagement and meaningfulness). As "open dialogue strengthens the sense of community, promote cooperation, create greater engagement in work, and make work more meaningful, all of which strengthens followers' sense of responsibility and willingness to take initiative." (Andersson et al., 2021, p. 430). Consequently, we suggest beginning with addressing the condition of trust and openness when initiating the development of coworkership.

To conclude this section, we combine (a) the practicality of SDT for describing coworkership; (b) the critique of a missing starting point for the conceptual coworkership wheel; and (c) the major role of trust and openness, to suggest the following adjustment of the coworkership wheel (see Figure 11).

Figure 11

Modified Dynamic Version of the Coworkership Wheel Model



Taking inspiration from Deci et al. (2017)'s basic self-determination theory model, our modified dynamic version of the coworkership wheel model proposes a clear structure for the development of coworkership. While incorporating the original coworkership wheel with its self-reinforcing structure of conditions reinforcing each other in a process that continues as long as the conditions exist (T. Andersson et al., 2021). The workplace contexts (e.g., those described in our supporting factor of "opportunities for sensemaking") and individual differences (e.g., those described in our supporting factor of "personal interest")

influence the employees' basic psychological needs for autonomy, relatedness and competence. Satisfying these basic psychological needs would support the emergence of the coworkership conditions. However, not addressing or frustrating the basic psychological needs would instead hinder the coworkership conditions from emerging.

As a final remark on the organisational responsibilities, we argue that organisational support – in the form of providing employees with time, space and leadership – underpins the coworkership wheel model, i.e., all four coworkership conditions (engagement and meaningfulness, responsibility and initiative, trust and openness, community spirit and cooperation). Examples include managers practicing a clear communication, welcoming questions, and following up on feedback to set a good example and foundation for trust and openness; organisations acknowledging and turning the internal spotlight on high-performing employees can boost engagement and meaningfulness; and organisations creating opportunities for employees from different departments and roles to share knowledge and network can strengthen community spirit and cooperation.

6. Conclusion

Highlighting the people-centric perspective in digital transformation through the use of SDT, this research concludes eight major factors that impacted the coworkership conditions. Personal interest, interpersonal connections at work, opportunities for sensemaking as well as open communication and trust supported the coworkership conditions. In contrast, incoherent understanding of digitalisation, unaddressed concerns, unclear direction and overreliance on skilled individuals hindered the coworkership conditions. The use of SDT was instrumental in the creation of the thematic template that led to the discovery of the eight factors, and in uncovering the underlying context that constituted the eight factors. The design of this research, a single case study at a Swedish manufacturing company, limits the generalisation of this study's findings. Nevertheless, (a) a theoretical contribution for the concept of coworkership, as well as (b) an illustrative contribution in the form of practical implications can be made.

6.1. Theoretical Contribution

First, in line with the suggestion put forth by Deci et al. (2017) to further apply SDT to organisational settings, the current study demonstrated the practicality of applying the psychology theory, SDT, in a case study on coworkership in digital transformation. Utilising SDT to review the coworkership conditions at an organisation, allowed to describe and exemplify the specific coworkership conditions. Second, major conceptual contributions to coworkership are the identification and description of four supporting as well as four hindering factors for the coworkership conditions, framed in a manufacturing setting undergoing a digital transformation. Third, a modified dynamic version of the coworkership wheel was suggested.

6.2. Practical Implications

This study makes an illustrative contribution in the sense that findings could be useful for companies in a similar situation to the one studied. Any Scandinavian or European factory undergoing digital transformation (regardless of the type of operation), might consider the creation of clear support structures for digital transformation at work. Support structures not only (a) promote digitalisation but also (b) provide a starting point for those interested in engaging in digital transformation and (c) enhances employees' inclination towards taking responsibility for driving digital transformation. For instance, appointing digital ambassadors across departments to provide 'a person to contact', sending an internal newsletter with digitalisation relevant information, offering regular seminars about digitalisation initiatives on-site or offering regular digitalisation-Q&A-sessions with IT staff, would provide such supportive structures.

Further, addressing employees' concerns about digitalised operations might lower confusion, insecurity, and resistance among employees for digital transformation efforts. Announcements and posts covering topics such as (a) digital security handling at the organisation; (b) the benefits of digitalisation; (c) steps taken to modernise the digital infrastructure (e.g. stronger Wi-Fi, data back-ups); and (d) how to develop digital skills, could be communicated on an organisations intranet, internal social media or even on physical notice boards around offices or factories. Companies wanting to specify their employees concerns about digital transformation, poses the possibility for collaboration with university students who could gather employee feedback through surveys or interviews.

6.3 Limitations and Future Research

First, the reliability of this study's findings is limited, as the chosen qualitative method does not take variability of human behaviour over time into account (Treadwell & Davis, 2020). Thus, especially employees' opinions and descriptions from interviews, might differ greatly in only a few years' time. Second, generalising the practical recommendations and qualitative findings of this research is not entirely recommended, as purposive sampling was used and all results are based on the environment and operations of this specific organisational case study (Bryman, 2012; Treadwell & Davis, 2020). Third, although this research did not pose any conflict of interest, the natural researchers own influence on the outcome of any interview, or the observations made in the factory cannot be ruled out (Treadwell & Davis, 2020). Lastly, the natural time constraints of this thesis and the specific production schedule at the factory (i.e., limited possibilities to interact with the majority of shop floor employees), pose the question to which depth the researchers were actually immersed in the research environment. Ethnographic studies are usually conducted over a span of at least one year (Kramer & Adams, 2018), thus the insights gained in this study are possibly not extensive enough. Both researchers agreed that a fully ethnographic study, where the researchers had more time to immerse themselves into the community of employees (such as a year or two compared to four months), would have given significantly deeper and more detailed insights into employees' motivational factors for digital transformation, as well as the coworkership conditions at Tuve plant.

The question raised by this study only covers factors that support or hinder the coworkership conditions in an organisational setting. Thus, several questions remain to be answered, such as 'Do the coworkership conditions differ in organisational settings of

different cultures, specifically non-Scandinavian?'; 'In which relationship stand the four analytical pairs of coworkership to each other?' and 'Do language differences between employees have an effect on coworkership communication, especially on engagement and meaningfulness?'. If the debate about in which sense employee engagement and coworkership differ is to be moved forward (especially in a Scandinavian context) a better understanding of coworkership needs to be developed. More information on the coworkership conditions in organisational settings would help to establish a greater degree of accuracy on distinguishing the two concepts.

Digital Transformation is impacting jobs across all sectors, not only the manufacturing industry. Supporting coworkers in how to cope with increasingly digitalised workplaces, by maintaining an open communication climate, especially about digitalisation at work, is vital for future employee well-being and performance.

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Appendix A

Consent Form

UNIVERSITY OF GOTHENBURG

Consent to Participate in Research

Motivational factors for employee interaction in digital transformation – a qualitative case study exploring coworkership through self-identification theory.

You have been invited to take part in a research study that explores the role of communication in the context of industrial digitalisation (Industry 4.0). This study is part of the final degree project of the MSc in Communication at the University of Gothenburg. André Andersson (gusandanfl@student.gu.se) and Wiebke Weiland (gusweilwi@student.gu.se), under the supervision of Dr. Davide Girardelli (davide.girardelli@ait.gu.se), Gothenburg University, Department of Applied IT, are conducting the study and ask you to participate in this project because you are at least 18 years old, and you have been part of digitalisation initiatives at Tuve factory.

1) Project Description – Activities and Time Commitment: If you decide to take part in this project, you will be asked to participate in an interview. Completing the interview will take approximately 45-60 minutes.

2) Benefits and Risks: there won't be extra, direct benefits to you for taking part in this project. The findings from this project may enable participants to reflect and interpret work related practices. There is little risk to you in participating in this project.

3) Confidentiality and Privacy: The entire interview will be voice recorded with Microsoft Sound Recorder App (Röstinspelaren). The interview audio files will be stored in the Gothenburg Universities Microsoft Cloud, in a password-protected folder, that only André and Wiebke have access to. The recordings will be uploaded to Microsoft Word for automatic transcription. Our

supervisor and the academic personnel appointed to control the quality of the thesis project will be the only individuals who can require gaining access to the audio files for academic research purposes only. The data collected during the study will be destroyed after the completion of the thesis project. In the thesis your responses will always be presented in an anonymous manner. No names or other identifying information will be used when discussing or presenting data.

4) Voluntary Participation: You can freely choose to take part or not to take part in this study. There will be no penalty or loss of benefits for either decision. Even if you agree to participate, you can stop the interview at any time and request the recording to be deleted.

5) Questions and interest: If you have any questions about this study, please email André Andersson (gusandanfl@student.gu.se) and / or Dr. Davide Girardelli (davide.girardelli@ait.gu.se). If you are interested in the final research findings, feel free to reach out and request a copy of the thesis.

By agreeing to sign this consent form, you understand the purpose, risks, and benefits of this research study. Your questions and/or concerns have been answered. You have received a copy of this consent form for your own records.

Name, last name and signature of the participant:

_____ Date_____/03/2023

Appendix B

Interview Guide

Social demographics

(were filled out manually on paper by the participants without providing name)

Please indicate your age:

20-29/30-39/40-49/50-59/60+

Please indicate your gender:

female / male / transgender / non-binary / not listed: __ / do not want to say

Please indicate how many years you have worked at Volvo Tuve:

less than 2/more than 2/more than 5/more than 10

Introductory questions:

1. Please describe your role, position, duties.
2. Please describe digitalization / digital transformation at Tuve.
    a. "Power-BI", "Paperless", etc.
3. How frequently do you have conversations about digitalization with your colleagues?
    b. More than once a day/Once a day/Once a week/Once a month/Less than once a month
4. How frequently do you have conversations about digitalization with your manager?
    c. More than once a day/Once a day/Once a week/Once a month/Less than once a month

Mainly Co-Workership related:

5. What are the 2 to 3 most common topics of conversation about digitalization with your colleagues?
6. What are the 2 to 3 most common topics of conversation about digitalization with your managers?

Mainly SDT related:

7. What motivates you to have a conversation about digitalization with your colleagues? Provide 2 to 3 examples.
8. What internal and/or external factors motivate you to have a conversation about digitalization with your managers? Provide 2 to 3 examples.

Appendix C

Statement of Division of Work

Herewith we, André Andersson and Wiebke Weiland, state that we have been working on this thesis together. Both of us have been part of all steps in the thesis process, including theoretical as well as practical work relating to the case study organisation. In general, the workload has been evenly divided between the two of us.