Harder, Better, Faster, Stronger:

Digitalisation and Employee Well-Being in the Operations Workforce

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Abstract

Operations management is experiencing a digital transformation that affects the entire industry landscape. There has been scant research on how digitalisation affects employee well-being in the operations workforce. Using self-determination theory, we bridge this research gap by examining how basic psychological needs among the operations workforce are affected by digitalization. Our empirical data is collected by a survey from 132 employees in the operations job function in the U.S. The empirical evidence is analysed in a configurational manner by using a fuzzy set Qualitative Comparative Analysis. Our findings suggest there are five empirical important empirical solutions for explaining the presence of employee well-being, as well as four important empirical solutions for the absence (negation) of employee well-being. Our configurational solution consists mostly of both digital competence, social relatedness, and digital autonomy. This is in accordance with the self-determination theory. However, there are several alterations to how important they are among different configurational solutions. The presence of well-being in life and psychological well-being seems less relevant for obtaining well-being at work. We discuss the theoretical and practical implications of our findings and provide recommendations to managers for how to promote employee well-being.

1. Introduction

Digitalisation is an ever-present feature of modern society. This is reflected in the ongoing transition from industry 4.0 towards industry 5.0 in the industry sector (Madsen and Berg, 2021). Digitalisation in organisations entails the implementation of digital tools, technologies, and data that, when combined, act effectively and efficiently to enable customised products or services (Parviainen et al., 2017, Zangiacomi et al., 2020, Bortolotti and Romano, 2011).

Firms pursue digital initiatives to develop, strengthen, and remain competitive in an uncertain environment. Digitalisation has gained traction in operations management research as well. There are several special issues and articles devoted to research themes related to digitalisation (Hennelly et al., 2020, Papadopoulos et al., 2017, Fatorachian and Kazemi, 2021, Seyedghorban et al., 2020, Bag et al., 2020). However, the current research on digitalisation has focused primarily on how it contributes either to organisational outcomes (see for instance Fatorachian and Kazemi, 2021, Buer et al., 2018, Frank et al., 2019, Seyedghorban et al., 2020, Eslami et al., 2021) or changes in the external work environment (Ambrogio et al., 2022, Kadir et al., 2019, Richter et al., 2018). Little is known about the effect of digitalisation on operations workforce from a people-centered perspective (Kadir et al., 2019, Winkelhaus and Grosse, 2020).

The purpose of this study is to explore how digitalisation in operations influences employee well-being. Well-being is a broad concept that may be defined as "*the overall evaluation of one's life as the overall quality of an employee's experience and functioning at work, including life satisfaction and positive affect, which influence individual performance*" (Huang et al., 2016). The antecedents to well-being are related to the theory of self-determination (Deci and Ryan, 1985, Deci and Ryan, 2000). Self-determination theory (SDT) is a macro theory about human motivation that influences all dimensions of well-being. SDT suggests that well-being stems from an individual's urge to satisfy three basic human psychological needs: i) the need for competency, ii) the need for autonomy, and iii) the need for social relatedness (Ryan et al., 2021). SDT will be used as a lens for understanding how well-being is formed and developed among the operations workforces.

Current research demonstrates that digitalization can be both a blessing as well as a curse. At one end, there is the possibility of creating digital workspaces that ensure that the workforce can deal with the current needs of the firm (Volberda et al., 2021, Ambrogio et al., 2022), as well as providing opportunities for professional development and job security among employees (Hashemi-Petroodi et al., 2021). Increased digitalization may also lead to flexibility at work, which makes it easier to create flexible work arrangements, thus providing a healthy work-life balance (Ter Hoeven and Van Zoonen, 2015). Digitalization is also argued to have other benefits for the workforce, such as providing decent and safe work (Tatic and Tesic, 2017). Digitalization seems to have the transformative capacity of making employees working harder, better, faster, and/or stronger.

On the other hand, there is also increased pressure and demands regarding skills and competence in the operations workforce. It is not sufficient to solely have "know-how" skills

in digital competence. It must also be combined with soft skills that facilitate effective work and collaboration in an overall highly digitalized work environment (Gekara and Thanh Nguyen, 2018). The increased automation of manual job tasks means that more time is devoted to understand and use abstract information, solve complex problems, and demonstrate digital literacy (Kadir et al., 2019). The idea of an agile and resilient workforce with "plug-and-play" workers also implies that they can be replaced if deemed necessary. This implies that employees potentially face increased job insecurity, lower degree of employability, and intensified work-related pressure (Ambrogio et al., 2022, Peruzzini et al., 2020, Romero et al., 2016).

Current research about digitalization and employees emphasizes such as whether digitalization supports or replaces workplaces and job tasks (Nardo et al., 2020, Golan et al., 2020). A different research stream is concerned about monitoring and control of employees through digitalization (Cram et al., 2022, Kellogg et al., 2020). While another research stream studies how digitalization creates changes in job skills (up-skills or re-skills) and competences (Kaasinen et al., 2020, Agrawal et al., 2020), or leads to technostress and productivity paradox (Taser et al., 2022, Salo et al., 2019). However, the current research about digitalization and how it affects employee well-being is still in its infancy (Granter et al., 2019, Zahoor et al., 2022, Karani and Mehta, 2022). As such, there are several research calls for achieving more empirical knowledge about employee well-being as an outcome itself (i.e., Findlay et al., 2017, Peccei and Van De Voorde, 2019), how employees' perceive digitalization (Schneider, 2018, Culot et al., 2020), and how digitalization affects employee's well-being (Papagiannidis and Marikyan, 2020, Xu et al., 2018, Culot et al., 2020).

Our study is positioned within the latest effort to empirically exploring how employee well-being may be affected by digitalization in the context of operations management. This motivates the research question in this study:

RQ1. How does digitalisation affect employee well-being in the operations workforce?

The research question is answered by studying a survey sample consisting of 132 employees from the operations function in the U.S. The U.S. is relevant to study as it is a developed country with the level of economic activity and resources required for digital transformation (Acemoglu and Restrepo, 2020). The survey data collection was conducted during the fall of 2021. We use perceptual data and apply a fuzzy set Qualitative Comparative Analysis (fsQCA) (Ragin, 2008). fsQCA has gained traction as a method for handling complexity in empirical supply chain and operations management research (Ketchen et al.,

2022, Bokrantz and Dul, 2022). To the best of our knowledge, this is the first empirical study that uses a configurational approach to explore how digitalization affects employee well-being in the operations workforce.

Our contribution is twofold. First, we contribute to two different theoretical debates. The first debate is about how to understand basic needs in SDT. SDT originally postulates that need satisfaction is universal and must not be equalled with need strength (Vansteenkiste et al., 2020, Deci et al., 2017, Van den Broeck et al., 2016, Ryan et al., 2019). However, our empirical findings challenge this notion, as we find that there are differences in need strength among employees. This is not only related to each dimension of SDT but also to whether the assumed "universal" needs are truly universal in a work-related context. This has both theoretical and practical implications since there is no single "recipe" for how to promote employee well-being regarding their basic psychological needs. The second debate is related to the well-being literature and assumed interdependencies between work, life, and psychological well-being, respectively (Zheng et al., 2015). This is based on the assumed spill-over hypothesis between work and other domains of life (Kim et al., 2019, Tang et al., 2016, Bowling et al., 2010, Grzywacz and Marks, 2000). We rather find mostly support for a detachment between work and life (Parker et al., 2021, Bennett et al., 2016, Garrosa-Hernández et al., 2013, Etzion et al., 1998).

Second, we contribute empirically and methodologically by shifting the attention from a variable-centered approach (i.e., regression approach) to a person-centered variable (i.e., configurational approach). Gabriel et al. (2018) argue that a person-centered approach (in our case, by using fsQCA) emphasizes "people" as opposed to "variables". A person-centered approach is perhaps more applicable to organizational practice as it captures a complex reality and multiple interdependent relationships (Morin et al., 2016, Meyer and Morin, 2016). Configurational theorizing adds empirical richness and accuracy, as opposed to more generalizability and simplicity in the variable-centered approach (Ketchen et al., 2022). Richness and accuracy have practical relevance, as it may provide recommendations about operations managers' role in human resource management. Talent management is crucial as there is a general shortage of talent within the supply chain (Birou and Hoek, 2021) and operations management (van Hoek et al., 2020).

The remaining structure of the paper is as follows. The next section describes the background of the paper. This leads to the following sections that describes our method and results. The discussion section describes our main findings and the theoretical and practical implications of this study. Lastly, we acknowledge limitations in our study and offer

suggestions for future research.

2. Background

2.1 Self-determination theory

SDT is viewed as an antecedent to well-being in this study. The fundamental idea of SDT is that individuals have a limited set of basic psychological needs, with well-being as an outcome of experiencing need satisfaction (Vansteenkiste et al., 2020, Kluwer et al., 2020). On the other hand, the unfulfillment of need satisfaction can lead to frustration. Frustration due to lack of need satisfaction has been linked to diverse forms of dysfunctional work-related behavior (Cockrell, 2018, Bartholomew et al., 2011).

There are several characteristics that constitute the theoretical premises of the three basic needs in SDT (Vansteenkiste et al., 2020). One characteristic is that needs are psychological in nature. Psychological needs are prioritised according to how they promote psychological growth, integrity, and overall experience of wellness in life (Van den Broeck et al., 2016). The fulfilment of basic psychological needs also forms an inherent part of an individual's development, functioning, and adaptiveness to the environment (Ryan and Hawley, 2016). Another characteristic is that SDT is experiential and dynamic. This means that needs are experienced as being qualitatively different, and they are independent of each other (Ryan and Deci, 2017, Van den Broeck et al., 2016). The last characteristic is the universal nature of basic needs (Ryan and Deci, 2017, Deci and Ryan, 2000). This means that need satisfaction is more relevant than need strength (Ryan et al., 2019). While the SDT does acknowledge that needs may vary in strength between individuals, they are still universally shared among humans (Vansteenkiste et al., 2020). An important notion is that SDT differentiates between "needs" and "desires". For instance, employees may desire power, money, and status, but they are not "needs" in an SDT sense. Therefore, since not all employees express such desires, they are not essential to include in studies about well-being (Greguras and Diefendorff, 2009).

2.2 Basic psychological needs

The three basic psychological needs are need satisfaction of i) competence, ii) social relatedness, and iii) autonomy. Developing competency can increase the level of competence satisfaction, which refers to a more general and affective experience of effectiveness that results from mastering a task (Zangiski et al., 2013). Digital technology competence may act

as a buffer against technostress in terms of mitigating techno-complexity, as well as not feeling overwhelmed by the implementation of digital technology (Paulsson et al., 2005). Those with digital technology have also accumulated this type of resource that enables them to improve how they handle future changes related to digital technology in their job tasks. Having digital technology competence may also enable a work autonomy that provides the employee with a resource to determine how and when to choose to do specific job tasks. This may mitigate the sense of overwhelming invasion and work overload (Paulsson et al., 2005).

Social relatedness draws on social identity theory (Brewer, 1991). Individuals need to feel that they are part of a group while simultaneously feeling distinct from other group members (Brewer, 1991). Social relatedness provides employees with the security and support to be themselves and perform at work (Birkinshaw and Gibson, 2004). Digitalisation changes how social relationships are formed, developed, and maintained. From an organisational outcome perspective, employees who experience a high degree of social relatedness have a 56% increase in job performance, a 50% drop in turnover risk, and a 75% reduction in sick days (Carr et al., 2019). For instance, Liu et al. (2011) conducted research on a U.S. manufacturing firm on the relationship between support and employee well-being. The authors found that support from both managers and colleagues, as well as autonomous causality-orientation, led to improved employee well-being and decreased turnover intention (Liu et al., 2011).

The need for autonomy concerns the experience of acting with a sense of personal choice and control (Deci et al., 2017). The relationship between work autonomy and employee well-being has been found to be positive (Wheatley, 2017). This can be explained by several reasons, such as autonomy enabling employees to use their skills and creativity, managing work-family life balance, and reducing work-related stress through job control (Wheatley, 2017). Greater autonomy is often accessible to those who already possess autonomy. Being given more autonomy does not necessarily represent a great change in their "normal" working routines (Wheatley, 2017). This suggests that digitalisation may not necessarily reflect substantial changes in an employee's working conditions. Furthermore, autonomy does not insulate employees from experiencing adverse and challenging situations (Gardner, 2020). Jobs with high levels of autonomy can often create more challenging work-related situations. That said, work autonomy may facilitate toleration of work pressure, as employees make choices independently and can act as qualified professionals (Sabzevari and Rad, 2019).

2.3 Well-being

The concept of well-being is based on motivational research. Ryan and Deci (2001) argue that an individual's well-being is associated with both pleasure orientation (i.e., hedonic) and growth orientation (i.e., eudaemonism). Well-being from a hedonic perspective suggests that need satisfaction reflects itself through the subjective feeling of happiness, while one's realization of personal potential in life leads to the experiences of eudaemonic well-being.

The hedonic perspective has inspired research about subjective well-being in life (Diener and Ryan, 2009, Diener et al., 2017), while eudaemonic satisfaction is related to psychological well-being (Ryff and Singer, 2006). SDT posits that satisfaction with the basic psychological needs typically fosters both subjective and psychological well-being as they are interrelated (Ryan and Deci, 2001). This interrelationship is also examined by Peng and Hong (2010), as they combined life and psychological well-being into a higher-order construct of well-being. While the authors saw the two concepts as related, they were also distinct from each other.

Feeling that needs are satisfied at work is not necessarily the same as feeling well-being in life or psychologically (Page and Vella-Brodrick, 2009). While life- and psychological well-being is context-free concepts, well-being at work is instead a domain-specific concept (Taris and Schaufeli, 2018). Zheng et al. (2015) demonstrate the multidimensional nature of well-being by conceptually and empirically verifying the links between well-being at work, in life, and psychologically.

The multifaceted nature of well-being has also practical implications in organizations, as several large US firms have implemented various programmes that promote employees' well-being in a holistic manner. For instance, Amazon has a "WorkingWell" programme that includes both work, mental, and physical well-being[2]. This seem to be based on the logic of a spill-over effect between the dimensions of well-being (Bowling et al., 2010).

2.4 Well-being in the operations workforce

The current empirical research has used a narrow conceptualization of well-being. For instance, Kaasinen et al. (2020) and Winkelhaus et al. (2022) use job satisfaction as a measure of well-being for studying digitalization among operators. This is an affective state that is one of several facets of well-being at work (Page and Vella-Brodrick, 2009). Kaasinen et al. (2020) find that monotonous job tasks are eliminated by digitalization, and new challenging

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[2] https://www.aboutamazon.com/news/workplace/meet-employees-behind-amazons-new-health-and-wellness-program

job tasks are created. This may stimulate the need for competence. At the same time, social support among colleagues seems to be decreasing. This is somewhat paradoxical, as employees are perhaps more connected than ever before while simultaneously experiencing more social isolation or social exclusion (Ozcelik and Barsade, 2018). Kadir and Broberg (2020) distinguished between the effects on well-being before, during, and after digitalization initiatives. For instance, the employee workforce looked forward to learning new skills and competence before implementation but also experienced fear about mastering the new technology, being provided necessary training, and potentially losing their jobs (Kadir and Broberg, 2020).

Maloni et al. (2019) studied logistics practitioners and uncovered how time schedule conflicts created work-family conflicts. The work-family conflicts reduced overall job satisfaction and increased their intention to leave the logistics business as outcomes (Maloni et al., 2019).

Well-being and digitalization are also related to physical health, with potential problems such as computer vision syndrome (Randolph, 2017), physical fatigue, and ergonomic deficiencies (Buomprisco et al., 2021). This has led several researchers to develop the concept of "Healthy Operator 4.0" (Kaasinen et al., 2020, Sun et al., 2020). However, these studies are mainly conceptual and about work design and processes, with the argument that it should be beneficial to employees' health and safety.

3. Method

3.1 Configurational method

Configurational methods offer a person-centered approach that is better suited to the examination of theoretical frameworks that include interactionist and dynamic conceptualizations (Rouse et al., 2019, Howard et al., 2016). In our context, this is based on how the complexity of the dynamics of the three basic needs are not easily examined by common variable-centered techniques (Howard et al., 2016). As well-being concept consists of several dimensions makes it almost impossible to analyse all potential interaction effects. Interaction effects also treat conditions as separate and in isolation, but a person-centered approach suggest they form a holistic motivational system (Howard et al., 2016, Gabriel et al., 2018).

Fuzzy set Qualitative Comparative Analysis (fsQCA) is one type of configurational method that is based on set-theoretic reasoning. Set theoretic reasoning has some advantages compared to other common configurational-based techniques such as cluster analysis

(Vansteenkiste et al., 2009) or latent profile analysis (Parker et al., 2021). The most important differences are that fsQCA is well-suited for answering the type of exploratory research question that we address in this paper, and has specific criteria for assessing reliability and validity (Rasoolimanesh et al., 2021). In addition, cluster analysis suffer especially from the lack of formal criteria for identifying the "best fitting solution", as well as forces individuals into only one cluster (Wang and Hanges, 2011).

fsQCA is based on complexity theory. Complexity theory contains four tenets that is relevant for our person-centered approach (Woodside, 2014). The first tenet states that a single condition is insufficient for consistently indicating cases having high scores for an outcome condition. This is also emphasised in the theoretical foundation of SDT, as there are three universal basic human needs (i.e., three main conditions) that need to be fulfilled for achieving well-being at work (Deci et al., 2001). Van den Broeck et al. (2016) also demonstrates in a meta-analysis that each of the basic needs uniquely contributes in a significant manner to well-being. This suggest that there is not a singular need that in itself is sufficient for generating employee well-being.

The second tenet claims that a few combinations (two or more) of conditions are sufficient for generating the outcome of interest (Woodside, 2014). In our context, this means that there is a selection of few key conditions of interest for explaining well-being at work. This is done by selecting conditions based on SDT and other dimensions of well-being.

The third tenet assert that a few, not just one, complex antecedent condition leads to the same outcome (i.e., the concept of equifinality) (Woodside, 2014). The equifinality condition suggest that conditions may have different role in generating the outcome of interest (see Fig.1). For instance, Spivack and Woodside (2019) uses complexity theory to link personal attributes to whether people experiences subjective well-being at work. The authors shows that there are various combinations of conditions that leads to the same level of subjective well-being. This indicate that there is no single universal way to experience job-related autonomy.

The last tenet claims that the same single condition can either support or negate influence on the same outcome condition (i.e., causal asymmetry) in various configurational solutions (Woodside, 2014). This may lead to contradictory findings, as the same condition can have different role in generating the outcome of interest. For instance, greater satisfaction of the need for competence has been shown to be associated with higher turnover intention and lack of affective commitment (Van den Broeck et al., 2016). This is in contrast with the general view that positive well-being is associated with need satisfaction related to

competence (Gagné and Deci, 2005). Winkelhaus et al. (2022) found similar results, as there were no linear and unidirectional relationship between digital maturity in intralogistics function and job satisfaction (i.e., well-being) among employees.

Figure 1. Venn diagram of conditions.

[FIGURE 1 HERE]

3.2 Participants and sampling frame

This study used a web-based survey approach to collect data. Surveys are relatively cost-effective ways of collecting information from employees (Shee et al., 2018). The target sample consisted of U.S. employees working in the operations functions. The survey was sent to both managers and non-managers. The key eligibility criteria was that employees in operations are personally using one or more of the following digital technologies in their daily work: (i) Connectivity, data and computational power, ii) analytics and intelligence, iii) human-machine interaction and/or iv) advanced engineering) (Wade and Shan, 2020, Modgil et al., 2021).

As we wanted employees that works on a daily basis with digital technologies, our filtering was on managerial level below the C-suite level at firms. We assume that larger firms have necessary resources for endorsing digital technologies to a larger extent. This made us exclude firms with less than 10 full-time employees (FTEs). The sampling strategy was a simple random sampling, as all employees had an equal chance of participating in the survey. The participants were randomly drawn out of approximately 118.000 potential respondents that contained the entire database at Bookyourdata.com. The survey started in October and concluded in December 2021. Bookyourdata.com. uses LinkedIn for updating contact information and job titles, and they provide respondent emails selected on job function. LinkedIn is a relevant data source, as it is one of the most popular channels for information sharing and collaboration for professionals within supply chain and operations management (Chae et al., 2020). As such, it is assumed that professionals in operations keep their profile information up to date.

The respondents received an invitation to participate in the survey via a unique link created by Qualtrics. The potential respondents received an initial invitation and then two waves of reminders. The survey obtained necessary ethical approvals before submitting. 4,087 unique emails addresses received an invitation to complete the survey. 517 emails bounced.

After removing incomplete surveys, 132 respondents remained. This leaves a response rate of approximately 3.7%. The respondents' profiles are shown in appendix (Table 1).

3.3 Test of the non-response bias and common method bias

As the response rate was somewhat low, it is necessary to conduct checks for the non-response bias and common method bias (Wagner and Kemmerling, 2010). Lambert and Harrington (1990) define the non-response bias as the difference between the answers of respondents and non-respondents. Armstrong and Overton (1977) suggest comparing early and late respondents to capture the potential effects from non-response bias. A t-test between early and late respondents was performed using several background variables. Early and late respondents were separated between the first quartile and the fourth quartile. If there are no significant differences between the two sets of background variables (e.g.,, gender, age, job title, years of experience, firm age and firm size) $p>0.05$, then the null hypothesis is accepted (i.e., there is no significant differences between early and late respondents). All background variables yielded $p>0.05$, except for age ($p<0.05$). Since most of the variables accepted the null hypothesis, the results suggest that data is free from non-response bias issues.

The survey is perceptual and collected via a single source at one point in time. As such, a Harman's one-factor was used to assess the potential common method bias (Podsakoff et al., 2012, Podsakoff et al., 2003). The results showed that a single factor accounted for approximately 32.1% of the variance in the data sample. This is below the common threshold of 50% (Eichhorn, 2014). A second approach is the correlation matrix procedure between latent variables (Bagozzi and Yi, 1991). The common method bias exists when there is a large correlation (i.e., 0.9 or higher) between latent variables. The correlations were smaller than <0.5 between all latent variables, well below the threshold for the common method bias (Bagozzi and Yi, 1991). The third approach is a common latent factor approach (Eichhorn, 2014). This was estimated by using a new latent variable that all manifest variables are related to. The paths are constrained to be equal, and the variance of the common factor is constrained to be 1. The common variance is then estimated as the square of the unstandardised common factor path loadings. The results showed approximately 31.4% common variance. This is below the suggested threshold of 50% (Eichhorn, 2014). The overall conclusion is that non-response and the common method bias are not of concern in this study.

Social desirability is a related concern as employees are asked to provide information

about their current workplace and their well-being. In order to mitigate potential bias from social desirability, we provided information about anonymity and confidentiality. This means that there is no collection of identifying information such as name, email address, and IP Address. In addition, it is not possible for other people at the workplace to assess the survey response in any common ways, as access is authenticated against the respondent's email address when sending out survey invitation. We did not include dedicate social desirability scales as the use of such scales lacks empirical support (Lanz et al., 2022).

3.4 Measurement

This study uses already pre-validated items from other studies. However, construct validity is ensured by conducting confirmatory factor analysis (CFA) on latent variables. Before administering the survey to the full sample, feedback was supplied by two academics from operations with industry experience, as well as three academics with relevant expertise within IT and management. The feedback was carried out to ensure content and face validity for the questionnaire. The main changes from their feedback were to focus on the period during COVID-19 and have a forward-looking measure of well-being to capture the future prospects in life. This enabled a contemporary view on the effects from digitalization, as well as being future-orientated. The final version was entered in Qualtrics.

The respondents were provided with instructions to respond based on their current work situation (in this context, COVID-19) and how digitalisation has affected their work and well-being. Statements related to well-being were future-orientated, here, over the next six upcoming months.

Self-determination theory (SDT) is measured by using three different measurement scales created to capture digital technologies competency, digital work autonomy and social relatedness at work. This is carried out to capture the effect from digitalisation on three basic psychological needs. *Digital Technologies Competency (DTC)* is a 11-item measurement scale developed by Balakrishnan and Ramanathan (2021). The measurement items capture key features related to the processes and outcome from using digital technology and are based on previous work by Ghasemaghaei (2019), Ghasemaghaei (2018) and Richey et al. (2016). The Likert scale ranges from 1 (Strongly disagree) to 5 (Strongly agree).

Digital work autonomy is a 9-item measurement scale developed by Breaugh (1999). The scale consists of three factors with three items each: method autonomy (DMA), scheduling autonomy (DSA) and job criteria autonomy (DCA). The Likert scale ranges from 1 (Strongly disagree) to 5 (Strongly agree).

Social relatedness at work is a 10-item measurement scale developed by Chung, Ehrhart, Shore, Randel, Dean and Kedharnat Chung et al. (2020). The scale consists of two different factors with five items each: *Belongingness (SRB)* and *uniqueness at work (SRU)*. The Likert scale ranges from 1 (Strongly disagree) to 5 (Strongly agree).

Well-being is measured by a scale developed by Zheng et a. (2015) and consists of three different factors each with six measurement items: *Life Well-Being (LWB), Psychological Well-Being (PWB)* and *Employee Well-Being (EWB)*. The Likert scale ranges from 1 (strongly disagree) to 7 (strongly agree).

Analysis of the reliability and validity of the constructs was carried out by CFA in Stata 20.0. Some items were dropped after initial analysis (see appendix). We adhered to recommendations of using a minimum of three measurement items per factor (Anderson and Gerbing, 1988).

3.5 Reliability and validity

All perceptual measures were assessed for reliability and validity. The psychometric properties of the six latent variables were evaluated simultaneously in CFA using Stata 20.0 and are shown in Table 1. A full measurement model involving all latent constructs was tested to evaluate the fitness with data. The overall measurement model showed a model fit index (χ^2/df) =1.62, RMSEA=0.069, CFI=0.901, TLI=0.891, and SRMR=0.077. The overall measurement model yielded satisfactory results (Hair, 2014a, Brown, 2015)[3].

Table 1. CFA of latent constructs.

Construct	Abbreviation	Range of standardised factor loadings	Composite reliability	Cronbach's alpha	Maximum shared variance	AVE

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[3] A cautionary note about the different thresholds must be stated: None of them should be considered as set in stone and are only indicative of model fit statistics (Ketokivi and Mantere, 2021).

Self-determination Theory						
Competence						
Digital Technology Competence	DTC	0.418-0.910	0.932	0.926	0.235	0.641
Autonomy						
Digital Method Autonomy	DMA	0.822-0.955	0.907	0.908	0.213	0.771
Digital Scheduling Autonomy	DSA	0.771-0.936	0.874	0.876	0.217	0.710
Digital Criteria Autonomy	DCA	0.874-0.907	0.920	0.920	0.417	0.794
Social relatedness						
Belongingness	SRB	0.778-0.861	0.906	0.905	0.307	0.657
Uniqueness	SRU	0.724-0.905	0.925	0.925	0.256	0.717
Well-being						
Life well-being	LWB	0.643-0.890	0.910	0.911	0.354	0.640
Employee well-being	EWB	0.854-0.944	0.961	0.959	0.417	0.799
Psychological well-being	PWB	0.714-0.957	0.919	0.918	0.354	0.656

The reliability of the measures in the final model was examined by using Cronbach's alpha and composite reliability (CR) values. CR-values and Cronbach's alpha met the threshold of higher than 0.7 in all latent constructs (Hair, 2014a). The results indicate that the internal consistency of the items within each latent construct and the item reliability are satisfactory.

Factor loadings were also used for confirming item reliabilities. All standardised factor loadings exceeded 0.5 and were significant (e.g., $t > 1.96$, $p < 0.05$). However, two standardised factor loadings were below 0.5. in the DTC construct. It is not uncommon for some indicators not to fulfil the minimum thresholds and we choose to include these as it only entailed a few items (Hair, 2014a).

Convergent validity was confirmed by investigating the AVE for each latent construct. The value of the average variance extracted (AVE) measured as the square root of CR was higher than the threshold of a minimum of 0.5 (Hair, 2014a). The maximum shared variance was found between DCA and EWB (0.417). However, the maximum shared variance did not exceed the AVE for any latent constructs. This suggests satisfactory discriminant validity is as per Fornell and Larcker Criterion (Fornell and Larcker, 1981).

4. Fuzzy set qualitative comparative analysis

4.1 Calibration procedure

Several steps are involved in conducting fsQCA (Ragin, 2008). First, Likert scale values need to be calibrated. That means transforming a 1-5 or 1-7 scale to a fuzzy-set membership score. The membership score follows a log-odds distribution that ranges between 0 and 1. The average scores of the latent constructs are used for calibration purposes (Cao et al., 2021). A common approach is to use 0.95, 0.5 and 0.05 as the cut-off thresholds for full- set membership, maximum ambiguity, and full-set non-membership, respectively (Pappas and Woodside, 2021). As Pappas and Woodside (2021) explains, using percentiles in the dataset allow us to calibrate regardless of its original values. This is also followed in this study, as in line with other empirical studies (Cao et al., 2021). The reason is that the respondents scored somewhat higher than the middle-point of our Likert scales. This means that most of the respondents would have been categorized as being full-set membership in all instances if we had set the middle-point of the Likert scale as threshold for full-set membership.

Our calibration procedure assumes normal distribution of observation (Pappas and Woodside, 2021). We use two common measures for verifying the assumption of normality; i) skewness and ii) excess kurtosis (Hair, 2014a). Skewness assesses the extent to which a variable's distribution is symmetrical, whereas excess kurtosis is a measure of whether the variable's distribution peak too much. As a rule of thumb, skewness should not be greater than +1 and kurtosis should not be less than -1. Looking at excess kurtosis and skewness in our sample, the value for each indicator lies within the range of +1/-1. This suggest that the distribution in our sample is normal (Hair, 2014a).

On the other hand, if one assumes that our data sample are skewed as a consequence of means above the middle-point of Likert scales, it makes more sense to use more lenient thresholds to capture full-set (non-)memberships (Pappas and Woodside, 2021). As such, we also did robustness checks to validate our findings by using an alternative calibration procedure.

A challenge is empirical cases that after the calibration procedure lies at the exact threshold for maximum ambiguity (i.e., 0.5). They will subsequently be filtered out and not included in further analysis. As fsQCA assumes that each empirical case may be of empirical importance, we would like to include as many cases as possible (Fiss, 2011). Fiss (2011) recommend adding a constant of 0.0001 to all empirical observations that matches the threshold for maximum ambiguity. This ensures that these empirical cases are not filtered out.

We follow this recommendation after the calibration procedure has been performed.

4.2 Analysis of necessary causal conditions

The next stage is to conduct an analysis of causal necessity (Ragin, 2008). This uncovers whether the causal conditions are subset of the outcome or vice versa. If there is causal necessity, then it means that one or more causal conditions need always to be present in order to creating the presence of an outcome (Ragin, 2008). A condition or combination of causal conditions that exceed the threshold of 0.8 is considered "almost always necessary" and above 0.9 as "always necessary" (Afonso et al., 2018, Ragin, 2008). The coverage threshold is commonly set to 0.6 (Mattke et al., 2022). The analysis of necessary causal conditions is done both for presence and negation of the outcome of interest (Mattke et al., 2022).

Table 2 shows the analysis of the necessary causal conditions both for the outcome being present or negated (i.e., "high" or "not high/absent" levels of employee well-being):

Table 2. Consistency and coverage in the presence and negation of outcome (EWB).

Causal conditions: Presence of outcome (EWB)	consistency	coverage	Causal conditions: Negation of outcome (EWB)	consistency	coverage
DTC	0.75	0.73	DTC	0.57	0.53
SRB	0.76	0.78	SRB	0.54	0.53
SRU	0.80	0.76	SRU	0.56	0.51
DMA	0.70	0.81	DMA	0.51	0.56
DSA	0.75	0.74	DSA	0.58	0.55
DCA	0.78	0.79	DCA	0.52	0.51
LWB	0.68	0.71	LWB	0.58	0.58
PWB	0.68	0.69	PWB	0.61	0.60

Table 2 shows that SRU is closest to "almost always necessary" while none are "always necessary" in the presence of the outcome. This is based on how the condition has a consistency of 0.8 and coverage above 0.6. This is not problematic for subsequent analysis, as it is not always necessary (Ragin, 2008). No conditions can be seen as necessary causal conditions for the negation of the outcome, as they are below the suggested thresholds for both consistency and coverage. However, even if the analysis reveals a necessary condition in the presence of an outcome, it may be a "trivial" necessary condition (Type 1 error) (Mattke et al., 2022). We can see in Table 3 that the presence of SRU condition is both related to generation of the presence of employee well-being, and negation of employee well-being in

Table 4 (NC4) (Mattke et al., 2022). This indicates that SRU is a "trivial" necessary condition, and can be interpreted in a similar manner as the other conditions.

4.3 Analysis of sufficient causal conditions

The analysis of sufficient causal conditions is carried out by creating a truth table. A truth table consists of three steps: i) construction, ii) reduction and iii) analysis (Ragin, 2008). Construction is performed by generating a truth table consisting of all the possible logical combinations of causal conditions that could create the presence of the outcome. Each row in the truth table represents one logical combination. The 2^k possible combinations equal to 256 (2^8) rows in this context.

However, not all combinations are theoretically expected or typically not represented in the empirical cases (i.e., limited diversity). The theoretical expectancy is based on SDT, which suggests that the presence of the causal conditions is related to the presence of outcome (Ryan and Deci, 2017). The same holds for well-being, as they are assumed to be positively interrelated (Zheng et al., 2015). The assumed causal relations in the fsQCA software are, therefore, set to "present".

The reduction of possible configuration solutions is carried out by introducing two key concepts: consistency and coverage (Ragin, 2008). Consistency refers to how consistently a configurational solution containing a given condition or combination of causal conditions can produce the outcome of interest. Consistency scores range from 0 to 1, with recommended thresholds typically varying between 0.75-0.9 (Greckhamer et al., 2018, Greckhamer et al., 2013, Ragin, 2008). This study chooses the most conservative threshold of 0.9. This ensures both that the identified solution is consistent, but also uses the recommendation made by Fiss (2011) to use a natural breaking point in the consistency values estimated in our empirical data. The proportional reduction in inconsistency (PRI) scores is used for analysing whether there is an overlap between solutions being represented in the presence of an outcome compared to the negated solutions of an outcome. (Greckhamer et al., 2018). As such, the recommended PRI-score threshold is at least 0.5 or above. This is also followed in this study. A lower score would indicate that the solution shows significant inconsistency in whether it produces the presence or negation of an outcome (Greckhamer et al., 2018). A related decision is regarding the frequency threshold for how many empirical cases needs to be represented in a configurational solution to be deemed empirical relevant (Mattke et al., 2022). Since we have a relative small sample, we use the suggested approach of including all

configurational solutions that has at least one empirical case (Capatina et al., 2018, Mattke et al., 2022).

Coverage refers to the proportion of the produced outcome that can be explained by the configurational solutions (Ragin, 2008). While consistency reflects accuracy in describing how a configurational solution produces the outcome of interest, coverage is rather about empirical importance. In other words, high accuracy is not necessarily the same as high empirical importance. While there are no common agreed thresholds for acceptable coverage, (Fiss, 2011), Rasoolimanesh et al. (2021) suggest that the coverage threshold should at least be 0.2 or higher.

Several coverage measures are used for determining which percentage of the outcome is covered through a configurational solution (Park et al., 2020). The "overall solution coverage" indicates how much percentage of the outcome is covered through all solutions. The "raw coverage" suggests which share of the outcome is covered by a certain solution. The "unique coverage" separates what is uniquely covered by a given solution that is not covered by other solutions (Park et al., 2020).

Following in the same line as Ho et al. (2016) and Lyngstadaas (2020), we exclude interpretation of configurational solutions that do not exceed 1%. The reason is that our results are above minimum thresholds for overall consistency of 0,75 (Ragin, 2008) and shows satisfying overall coverage, and as such, we do not miss any substantial empirical information. Since the configurational solutions with low unique coverage will not be further interpreted, we choose not to report them in Table 3 and Table 4. We do see the generation of multiple solutions with low unique coverage. This is expected as the conditions are assumed to be theoretically connected, and as such, typically be represented in most configurational solutions. Still said, there are some alterations among the various configurational solutions that is vital for our interpretations.

Three different types of solutions are produced by running a Quine-McCluskey algorithm. This is the complex, parsimonious and intermediate solution (Ragin, 2008). The different types of solutions represent ways of handling limited diversity in the empirical cases and is produced by conducting a counterfactual analysis. A counterfactual analysis is a form of simplification procedure, distinguishing between "easy" and "difficult" counterfactuals (Fiss, 2011). The report of "only easy counterfactuals" refers to the intermediate solution and the report of "both easy and difficult counterfactuals" refers to the parsimonious solution (Fiss, 2011). The report of an intermediate solution is obtained by selecting a "standard analysis" in the fsQCA software (Ragin, 2008). The complex solution is without any

counterfactuals. The complex solution is reported in the results section. The reason is to uncover how all proposed causal conditions (i.e., SDT and well-being) are related to the outcome of interest (i.e., employee well-being). However, intermediate and parsimonious solutions are used to differentiate between more ("core") and less ("peripheral") important causal conditions. Those causal conditions that are both part of the intermediate and parsimonious solutions are viewed as core causal conditions, while those only being represented in the intermediate solution are viewed as peripheral (Park et al., 2020). This may be used for analysing whether all causal conditions are equally important or not.

5. Results

The test model can be expressed as a function: EWB=f(DCT, SRB, SRU, DMA, DSA, DCA, LWB, PWB). The fuzzy-set solution results in five configurational solutions. They are shown in Table 3, where the symbol of a full circle (●) shows the presence of a causal condition, and the symbol of crossed circles (⊕) indicates the negation of a causal condition. A core condition is illustrated by having a large symbol, while a peripheral condition is depicted with a small symbol. The absence of symbols shows the irrelevance ("don't care") of whether a condition is present or negated.

Table 3. Configurational solutions with presence of employee well-being (N=132).

Causal conditions	CS1	CS2	CS3	CS4	CS5
Self-determination Theory					
Competence					

DTC	●	●	●	●	●
Social relatedness					
SRB	●	●	●	⊕	⊕
SRU	●	●	●	⊕	●
Autonomy					
DMA	●	●		●	⊕
DSA		●	●	●	●
DCA		●		●	●
Well-being					
LWB	⊕		●		●
PWB	●		●	●	⊕
Raw coverage	0.32	0.44	0.41	0.23	0.22
Unique coverage	0.01	0.01	0.03	0.01	0.01
Consistency	0.91	0.94	0.91	0.93	0.92
Overall solution coverage			0.77		
Overall solution consistency			0.86		

Note: A full circle (●) depicts the presence of a causal condition. A crossed circle (⊕) shows the negation of a causal condition. Small or large symbols illustrate whether a causal condition is peripheral or core, respectively. Blank cells indicate "don't care" causal conditions.

Consistency values range from 0.91 to 0.96, suggesting reliable and consistent results of the pathways. The overall solution consistency is 0.86, and the overall solution coverage is 0.72. This indicates both accuracy and empirical importance when looking at all solutions. The unique coverage does not exceed 3% and may indicate there is no single "universal recipe" for promoting well-being at work.

Forty out of 256 theoretical possible combinations of causal conditions were empirically observed. This suggests limited diversity, which is common in fsQCA (Ragin, 2008). Upon further examination, a common denominator between the core causal conditions is that they are all present. This is also in line with SDT and well-being literature that argues that these are universal antecedent factors to employee well-being (Deci and Ryan, 2012).

When interpreting the results with a person-centered configurational approach, it is important to have a holistic perspective. This is opposed to a variable-centered approach that

would analyze each condition in isolation and independent from each other. For instance, CS1 has a need for competence, social relatedness, and autonomy. As they do have the need for social belongingness (SRB) as a core condition, we do see this type of employee as more attached to their colleagues. At the same time, the combination between competence and method autonomy may indicate that they do have a need to demonstrate competence and decide on their own how to conduct their job tasks.

Solutions CS1-CS2 and CS4-CS5 show that each dimension of SDT is represented. This indicates that feeling competence, social relatedness, and autonomy is important for employee well-being. However, compared to research on need satisfaction, we also see that there is a difference in need strength. For instance, both CS2 and CS4 represent an employee configuration with a preference for autonomy. While methodological and criteria-related autonomy are both important and present, there is slightly less importance for scheduling autonomy in both configurational solutions. While CS2 does have the need for social relatedness, there is rather a need for the absence of social relatedness (both SRU and SRB) among CS4. CS4's need to demonstrate competence in combination with autonomy may indicate that these employees are more nomadic in their work preferences. From a resource depletion perspective, this may be interpreted as some employees experiencing social relations as depleting their personal resources, with a coping strategy of withdrawing themselves from others and working alone (Zhang et al., 2017).

CS5 represents something of a conundrum, as the configurational solution does show the presence and absence of various subdimensions of social relatedness and autonomy. This is also somewhat in contradiction to SRB as "almost always necessary conditions". However, as previously mentioned we do think that it is a "trivial" necessary condition. The presence of conditions are core conditions, as opposed to the absence of conditions that are only peripheral. When looking at the presence of core conditions, they are directed towards feeling socially unique (SRU) and criterion-directed autonomy (DCA). This may indicate that employees in CS5 need to feel different from their colleagues, as well as determine on their own what their job objectives and evaluation of work should be conducted. We see this configurational solution as being more self-directed, as the attention is put on oneself and how they may differentiate themselves from colleagues at work.

CS3 is different in the sense of not having any specific core condition for achieving work-related well-being. One possible explanation is that having a job is better than not having a job (all else equal) (Grün et al., 2010). This means that the safety of having a job (such as income and social benefits) leads to well-being at work without a clear need strength

towards some of the dimensions of SDT. However, we do put a caution on making too much interpretation in this case. SRB is an almost always necessary condition (although trivial), and such conditions are sometimes dropped from the parsimonious solutions when running the fsQCA. Put differently, the parsimonious solution can become "too" parsimonious[4]. The consequence is that it is not possible to identify core conditions.

While there are some spill-over effects from life and psychological well-being and how it affects employee well-being, they are mostly not defined as core conditions (except for CS1). This indicates that the various dimensions of well-being is only peripheral related to employee well-being.

However, not all employees experience a connection between work and other domains of well-being. This may be explained by psychological detachment, which involves the ability to distance oneself from work when leaving work. This means that work and other domains of life are separate mental spaces (i.e., mental disengagement) (Garrosa-Hernández et al., 2013). This may be reflected in the results by the lack of relationship between employee well-being and the other domains of well-being, which is especially evident in CS2.

The tenet of causal asymmetry in configurational theory is especially shown by comparing Table 3 and Table 4. For instance, the presence of social relatedness (both SRB and SRU) is shown to lead to an absence of well-being in NC4. However, the presence of social relatedness is a core condition in CS1, CS2, and CS5. At the same time, we do find indications of a more typical symmetrical relationship, as the absence of competence is associated with the negation of employee well-being and vice versa.

Table 4 shows the results from causal conditions producing the negated outcome. Put differently, how causal conditions explain the absence of employee well-being.

Table 4. Configurational solution with negation of employee well-being (N=132).

Causal conditions	NC1	NC2	NC3	NC4
Self-determination theory				
Competence				

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[4] We do thank Peer C. Fiss for this comment.

DTC		⊕	⊕	⊕
Social relatedness				
SRB	⊕	⊕	⊕	●
SRU	⊕		⊕	●
Autonomy				
DMA	⊕		⊕	•
DSA	⊕	⊕	⊕	⊕
DCA	⊕	⊕		⊕
Well-being				
LWB		⊕		•
PWB	⊕	⊕	⊕	•
Raw coverage	0.42	0.38	0.41	0.21
Unique coverage	0.01	0.01	0.02	0.03
Consistency	0.95	0.92	0.95	0.94
Overall solution coverage		0.74		
Overall solution consistency		0.83		

The negation of employee well-being seems to be a consequence of the absence of the various dimensions of SDT and, to some extent, the absence of the other dimensions of well-being. This indicates causal symmetry. However, not all SDT dimensions are equally relevant or important. This suggests that there also exists equifinality in the negation of outcome. For instance, NC1 seems to emphasize competence at work as less important. However, if they feel socially excluded and unable to make job-related decisions, this creates an absence of well-being at work. NC4, on the other hand, seems to thrive in their own company as they do not prefer a strong presence of social relatedness.

5.1 Robustness checks

5.1.1 Predictive analysis

Predictive validity shows how well the model predicts the outcome of interest (Pappas and Woodside, 2021). This is based on the argument that a good model fit does not necessarily

equal good predictions (Pappas and Woodside, 2021). We followed the recommended procedure as outlined by Pappas and Woodside (2021) to determine predictive validity. We randomly divided the empirical cases into a random and holdout subsample. The same analysis in fsQCA we did initially was run with the random subsample. Thereafter, the holdout sample was used for predictive validity testing. We modelled one variable by computing every solution from the findings from the solution in the subsample. The new variable was then plotted in a XY plot against the employee well-being (i.e., outcome) in the holdout sample (Pappas and Woodside, 2021). This yielded two different values, with the highest one representing the consistency score and the other value representing the coverage score. We achieved a consistency score of 0.94 and a coverage score of 0.38. This indicates that the data are highly consistent (94%) and that our model consisting of solutions from the subsample accounts for 38% of the sum of the memberships in employee well-being. As there are no large deviations between the two samples, we see the solutions as valid in explaining the outcome.

5.1.2 Sensitivity analysis

Sensitivity analyses were performed by holding all parameters equal except for one change at a time from the baseline settings. These can be distinguished between changes in i) the calibration procedure, ii) changes in the consistency threshold, and iii) changes in the minimum number of empirical cases. In addition, the negation of the outcome was reported in the results section. This is carried out to verify whether a separate mechanism is involved in the presence versus negation of the outcome of interest. An alternative calibration procedure is used by setting full membership = 0.75, maximum ambiguity = 0.5, and full non-membership = 0.25 (Ragin, 2008). By doing so, we find fewer configurational solutions, but the overall solution coverage decreases to 0.39. This indicates a substantial loss in the empirical importance of the overall solutions compared to the original model specification. When decreasing the consistency threshold to 0.80, all PRI scores fall below 0.5. As such, a higher consistency threshold was kept, increasing consistency in configurational solutions. When increasing the minimum number of empirical cases observed in a configurational solution to 2 or more, there were only three configurational solutions. While this reduces the complexity regarding the number of configurational solutions, the solution coverage decreased to 0.43. The overall conclusion from the sensitivity analysis is that altering the original model specification decreases overall solution consistency and/or overall solution coverage.

5.1.3 Latent variable score approach

As we used mean scores from the Likert scale, measurement error may be inherent in the indicators (Rasoolimanesh et al., 2021). An alternative estimation technique is to utilize PLS-SEM. The benefit is that PLS-SEM accounts for measurement error, thus increasing the reliability and validity of the model estimates (Yuan et al., 2020). We derived fuzzy set scores based on the standardized PLS-SEM latent variable scores approach (Hair, 2014b). We used the recommended procedure as instructed by Rasoolimanesh et al. (2021). This meant that we first i) calibrated the latent variable scores for the conditions and outcome of interest. We used the same threshold as previously with full-set membership = 0.95, maximum ambiguity = 0.5, and full-set non-membership = 0.05. Thereafter, ii) we created a truth table including all possible configurations. Following our original procedure, we removed rows with a consistency of less than 0.9, compared to the suggested 0.80 level by Rasoolimanesh et al. (2021). The next step, iii) involved calculating the consistency and coverage of all possible configurations. We used complex solutions to identify the configurations. Then, iv) we estimated the configurational solutions, which in our case created an overall consistency of 0.85 and coverage of 0.74. This is above the suggested thresholds of consistency >0.8 and coverage >0.2 (Pappas and Woodside, 2021). In the last step, v) we randomly split the sample into two subsamples (as described in section "predictive analysis"). The XY plot showed a consistency of approximately 0.91 and a coverage score close to 0.48. This provides further support that our configurational solutions are stable across different estimation procedures.

6. Discussion

6.1 Main findings

Our initial research question was, "*How does digitalisation affect employee well-being in the operations workforce?*" Our findings suggest there are five empirical important empirical solutions for explaining the presence of employee well-being, as well as four important empirical solutions for the absence (negation) of employee well-being. Our study supports the notion that digitalization in the operations workforce may be a source of well-being. This is regarding how digitalization may enable and stimulate various basic psychological needs as proposed by SDT. Increased digitalization enables employees to demonstrate their competence in a way that is fitted to organizational needs. This creates opportunities for demonstrating they have the skills needed for success, thus facilitating both motivation and ensuring employability and promotability. While digitalization provides new means of creating or maintaining autonomy, people also have a fundamental need to experience a sense

of belonging and attachment to other people. This suggests that the social dimension is important to not lose sight of when implementing various digital initiatives.

There is no singular dimension of SDT that, on its own (i.e., necessary causal condition), creates well-being at work. This is in accordance with the characteristics of SDT (Ryan et al., 2021). The same result holds for the other dimensions of well-being. While we see the higher-order constructs of SDT as being represented in most of the configurational solutions, there is no singular recipe for generating employee well-being. There are various alterations within and between the higher-order constructs of SDT. This is in line with the tenet of equifinality. This suggests that there are within-differences between employees in the operations workforce. Furthermore, the presence of a condition in one configuration solution can give an opposite effect in a different configurational solution. This is in line with the tenet of causal asymmetry. While Van den Broeck et al. (2016) have previously demonstrated causal asymmetry concerning the need for competence, we use all dimensions of SDT, thus providing a broader assessment of need satisfaction.

The distinction between core, peripheral and "don't care" conditions suggests that not all subdimensions of SDT are of equal importance. Thus, we challenge the characteristics of universal needs between individuals (Vansteenkiste et al., 2020, Deci and Ryan, 2000, Ryan and Deci, 2000). One possible explanation builds on a substitutive logic. For instance, those employees who satisfy the need for competence do not need to satisfy social relatedness as well (as seen in CS4). The literature about SDT argues that need satisfaction is more important to study than need strength. This is based on the universality of needs (Vansteenkiste et al., 2020). However, as we find differences between importance of conditions in configurational solutions, it seems necessary to jointly assess need satisfaction and need strength. While Vansteenkiste et al. (2020) acknowledge that individual differences in need strength might exist, they argue that this is primarily socially learned behavior, and the underlying three basic psychological needs are still fundamental to well-being (Vansteenkiste et al., 2020). While it may be true that all three basic psychological needs are in general relevant for well-being in life, there seem to be different forces at play at work. This is in contrast to research such as that by Bartholomew et al. (2011) and Cockrell (2018), as they show that if all needs are not satisfied at work, it will lead to frustration and consequently dysfunctional work behavior. Our results instead shift the attention and question from how workplaces satisfy employee needs, to what constitutes the needs of employees.

Well-being at work seems to be less related to well-being in other domains of life. This is in contrast to Maloni et al. (2019), as we do not see indications of a clear causal

symmetry between the negation of employee well-being and negation of life well-being or psychological well-being. This suggests that well-being at work and in personal life is somewhat independent. This is the opposite of what is expected from the spill-over hypothesis of the interrelationship between the various well-being dimensions (Bowling et al., 2010). A possible explanation is based on studies about mental detachment between work and other spheres of life (Parker et al., 2021). It is neither important nor relevant how one evaluate one's life or psychological state regarding experiencing well-being at work. The ability to "connect" mentally just to the work itself seems to characterise employees with high work-related well-being. That being said, there is still a peripheral presence in most cases of life well-being and psychological well-being for those experiencing well-being at work, and the opposite in the negated outcome. This suggests that the spill-over hypothesis cannot be totally rejected, but is not pivotal for understanding employee well-being.

The increased level of digitalization does not excuse managers from engaging in human resource management (van Hoek et al., 2020). There are several new theories that encompass how managers in a digitalized workplace can engage in new ways of promoting each of the dimensions of SDT. However, on a more cautious note, we must not think of a specific dimension as an isolated "intervention" that will improve one variable in isolation from other variables (i.e., variable-centered approach). The person-centered approach argues that employees must be viewed as whole entities (Howard et al., 2016). As such, changes in one dimension of SDT may have repercussions on other dimensions of SDT.

Digital competence may be stimulated by emphasising the employees' "personal learning networks" (PLN) (Nussbaum-Beach & Hall, 2011). Developing competence is not necessarily so much about the content itself or formal education anymore, but rather knowing where, when, and how to connect when needed. This is due to the rapid technological innovations and need for lifelong learning. PLN can include everything from other knowledgeable individuals to the use of social media, co-authoring tools, collaborative tools, and more formal information management systems (Nussbaum-Beach and Hall, 2011).

Increased digitalisation may represent a challenge for employees with a strong need for social relatedness. Randel et al. (2018) developed the concept of "inclusive leadership" to promote social relatedness. Inclusive leadership refers to "the degree to which an employee perceives that he or she is an esteemed member of the work group through experiencing treatment that satisfies his or her needs for belongingness and uniqueness" (Randel et al., 2018). This puts inclusive leadership at the core of social relatedness in self-determination theory. The process of inclusive leadership is theorised to contribute to employee outcomes

such as creativity, job performance, and reduced turnover (i.e., increased well-being) (Randel et al., 2018). Social belongingness is facilitated by supporting employees as group members, ensuring justice and equity, and promoting shared decision-making (Randel et al., 2018). Managers act as role models or at least set precedence for work practices. For instance, role modelling can be in terms of learning new digital technology and being open and inclusive towards those who want to try out new solutions. Acting inclusively may lead to stronger social cohesion, thus making group members more likely to extend care and concern to their fellow group members (O'Reilly and Banki, 2016). Social uniqueness is facilitated by encouraging diverse contributions, respecting the individual, and helping group members fully contribute (Randel et al., 2018, Shore et al., 2011). For instance, mentoring is one opportunity for new and old colleagues to gain traction in new organisations or take on new job tasks or positions (O'Reilly and Banki, 2016). While mentoring colleagues has traditionally been carried out face-to-face, there are also opportunities to do so in a more hybrid manner. Larger organisations can access and utilise human resources across the world and connect with the most relevant and skilled mentor who is a good fit for the colleague (Gratton, 2021).

Digital autonomy can be promoted by self-management (Breevaart et al., 2014). Self-management means that employees are allowed to develop their own approach to conducting the job and actively shape the direction of their work that is aligned with their job responsibility (Breevaart et al., 2014). Flexible hours and personalised space refer to trusting the employee about when and how to do their job (within practical limits and job criteria). This also creates an opportunity to better balance work, family, and private needs (Eek and Axmon, 2013). While these appear to be easy initiatives, studies have shown that managers are often unwilling to give employees greater autonomy, and digitalization creates opportunities for controlling and monitoring employees (Wheatley, 2017, Delfino and van der Kolk, 2021). From an employee perspective, it is necessary to be assertive about needs for autonomy. Being assertive means setting boundaries and being clear about the need for decisions about the method and scheduling of job tasks (Bakker and van Wingerden, 2021). Criteria autonomy can be promoted by being reflexive, given opportunity to trial and failure of new solutions, and questioning the basic beliefs and assumptions of one's own work. This can lead to changes or modifications of how job tasks are executed. (Lancer, 2015). It is crucial to note that autonomy is not the same as going rogue. Aspects such as never being at work when others are, the use of non-standard software programs, altering job tasks, and deliveries to fit with personal preferences are just some examples where autonomy must be

realistically assessed. Put differently, being autonomous is not the same as being independent, but rather interdependent.

6.2 Practical implications

Our results show that there are individual differences concerning well-being at work. This creates a complex relationship between the dimensions of SDT and well-being. Going forward, talent management seems to be pivotal in attracting, developing, and retaining the operations workforce by facilitating well-being. Understanding what constitutes employees' well-being, can lead to understanding how to promote it as well.

We suggest that firms use the results to reflect on individual differences in what constitutes well-being at work. This can be based on the common characteristics reflected in the configurational solutions. Gagné and Deci (2005) argue that managers will not be able to change individual differences per se, so focusing on how to change the environment to promote need satisfaction is more advisable. We believe managers can create work conditions that promote employee well-being. Several general suggestions for how to do that is offered in the previous section.

At the same time, employees must be viewed holistically as changes in one condition may have consequences for the other condition. Looking at our results, CS1 is more orientated towards social attachment, as it is especially critical with social belongingness. For those employees, it may be necessary to provide arenas for stimulating the need for social belongingness. Perhaps one of the most essential things is to eliminate the feeling of being an "outsider". Building an inclusive organizational culture is not solely about inclusion when conducting professional collaboration, but ranges from facilitating diversity, offering managerial and collegial support, to supporting a healthy psycho-social work environment. Another crucial aspect is to show that the firm cares about the employee's needs. For instance, offering flexible work arrangements while also offering arenas for meeting colleagues either professionally or socially may be ways of recognizing how employees have different needs that are maintained at work. CS2 and CS4 may benefit from having a stronger emphasis on stimulating the need for autonomy. However, as competence is also important in this solution, we suggest that competence may be a source of autonomy. This makes it necessary to provide necessary skills training, education, and practice to make employees master their job roles. This puts the employee in a position to act in an autonomous manner. This is perhaps challenging from a managerial perspective, as it also means less controlling and monitoring of

employees in how they conduct their job tasks. However, there is a substantial difference between the two profiles, as CS4 seem to benefit from working solitary. This also requires work arrangements that may support this preference. This is perhaps a part of the home-office debate in a post-COVID era, as firms currently discuss new office policies regarding working from home and/or at the office.

Since employees have different need strengths, there is also a need to map the importance/strength within employees and whether other well-being dimensions are related to their well-being at work. It is not sufficient merely to map the presence of competence, social relatedness, and autonomy. One possibility is to use the same questions as self-determination but ask the employees to assess how important each statement is for promoting their well-being at work. The key benefit of adopting such a practice is focusing resources on things that matter most from an employee perspective. For instance, if it is important for a group of employees to have a work-family balance, there are several initiatives that the employer can take. They can offer digital work arrangements, implement family-friendly policies (paid time off policies etc.), and try to uncover what needs an employee needs to have satisfied.

A somewhat related question is what to do if one experiences the negation of well-being at work. For the most part, it seems beneficial to boost the satisfaction of needs (i.e., causal symmetry). However, there are also deviations, such as NC4, as they show a detrimental effect from too much emphasis on building social relationships. What is an important takeaway from this empirical finding is not to take for granted what constitutes well-being and what does not. It is easy to assume that "everyone" wants what is commonly held as beneficial to well-being. Managers need to resist the temptation of becoming normative and presumptuous about their employees' needs. However, it is imperative to note that well-being is a joint responsibility that warrants effort from both organisations, managers, and individuals.

6.3 Limitations and future research

This study has several limitations that need to be acknowledged. First, configurational methods with a person-centered approach do not offer a superior path to understand employee well-being, compared to variable-centered approaches (Ketchen et al., 2022). We merely suggest that different insights arise when applying different methodological approaches, and fsQCA provides a more nuanced understanding of SDT and well-being. However, as managers implicitly or explicitly commonly think in configurational terms, the configurational approaches may capture a more realistic assessment of people in real life

(Ketchen et al., 2022).

Second, several contextual contingencies may be relevant to study to get an even more nuanced understanding, such as micro (such as age, gender, education) or macro (for example, within or between organizations, industry, sector, or country/state) factors. Configurational solutions may also be combined with longitudinal research, in a similar vein as by Kadir and Broberg (2020). This may uncover how different well-being profiles of employees may experience and act before, during, and after digitalization stages or changes.

Third, we have not evaluated the importance of external incentives. We do not know how incentives interact with well-being at work, as opposed to need satisfaction (Cerasoli et al., 2014). This may provide a more nuanced understanding of how to manage well-being, as incentives may be an extrinsic source of well-being, as opposed to the intrinsic need for satisfaction.

Last, there is a research stream that focus on the relationship between employees and organizational performance (Cerasoli et al., 2014, Weibel et al., 2009, Leroy, 2021). From an outcome-perspective, does employees who experience well-being at work also perform extraordinarily? Performance is a broad concept that can be studied operationally or financially. An outcome-perspective may demonstrate if there is a win-win situation of promoting well-being for both employeer and employee.

6.4 Conclusion

This study departed from the research question; *how does digitalisation affect employee well-being in the operations workforce?* Our findings suggest there are five empirical important solutions for explaining the presence of employee well-being, as well as four important empirical solutions for the absence (negation) of employee well-being. While the higher-order constructs of SDT are essential ingredients for achieving well-being at work, there are also several differences in the configurational solutions. We do find both varied importance of SDT and well-being, as well as evidence of equifinality and causal asymmetry. This messiness in causal mechanisms is important to consider when managing employees at the individual level. Our findings add to the theoretical debate about need satisfaction versus need strength, as well as the interplay between work, family, and life. While digitalization offers new ways of working, communicating, and collaborating, we believe that operations managers will still have an essential role in fostering well-being among employees by stimulating their individual needs.

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