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Digitalization and Organizational Climate for Well-Being in Small European Firms: Does Collaboration Matter?

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Abstract

Despite growing interest in organizational well-being, digitalization, and collaboration, their interrelations remain insufficiently explored in the context of small enterprises. This study addresses this critical gap by investigating how digitalization influences the organizational climate for well-being, and what role collaboration plays in this relationship in small European enterprises. Small European enterprises that employ 10 to 50 people are vital to regional development and economic growth. However, they face unique resource constraints that directly affect how these enterprises implement digital tools and foster a climate for employee well-being, making them a critical context for understanding these dynamics. Drawing on Warr's vitamin model and some elements of the Job Demands–Resources framework, we conceptualize digitalization as a contextual resource that comprises data analytics, robotics, and computer and software use, and contributes to shaping organizational environment directly linked to employee well-being. Using data from the 2019 European Company Survey (N = 11,650), we analyze responses from managers of small enterprises, who are uniquely positioned to assess the enterprise-wide digitalization and collaborative practices. Employing multiple regression analysis, we find a positive relationship between digitalization and organizational climate for well-being. However, the influence of collaboration on this relationship is not uniformal and depends on the age and industry type an enterprise operates in. The study advances theoretical understanding of digitalization as a dynamic environmental factor and provides actionable insights for small enterprises aiming to foster organizational well-being through tailored digital strategies. It also underscores the need for longitudinal, context-sensitive organizational research.

Keywords: organizational well-being; digitalization; robots; collaboration; European SMEs; European Company Survey; entrepreneurship

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1. Introduction

In recent years, concerns about employee well-being have gained prominence across Europe, emphasizing the need to better understand how workplace conditions influence overall quality of life (Eurofound, 2023; OECD, 2024). Across the continent, employees spend a substantial portion of their waking hours at work—typically between 30 and 40 h per week—making it essential to understand how organizations can foster a climate that supports their well-being (Eurostat, 2025). Positive employee well-being is linked to increased commitment, productivity, and performance (Judge et al., 2001;

Veld & Alfes, 2017). Therefore, building a comprehensive understanding of what factors that shape organizational well-being is crucial for well-being research in entrepreneurship and for practice alike.

Meanwhile, digitalization has emerged as a defining force of the Fourth Industrial Revolution, reshaping business models, products, and processes through technologies such as cloud computing, mobile platforms, robotics, and data analytics (Alcácer & Cruz-Machado, 2019; Feliciano-Cestero et al., 2022; Soto-Acosta, 2020). The COVID-19 pandemic accelerated this shift, embedding digital tools like Zoom and Teams into daily workflows and reshaping work experiences. These technological changes are likely to influence how organizations create climates conducive to well-being. Hence, the impact of digitalization on well-being in organizations forms one of the trending discourses in the entrepreneurial well-being literature (e.g., Thurik et al., 2023). The question remains—is this impact positive or negative, and under what boundary conditions?

Enterprises are collaborative entities by definition—collaboration occurs both within enterprises (among employees, teams, and departments) and between enterprises (in partnerships, alliances, and networks with other organizations). Internal collaboration often drives operational processes and fosters a supportive work environment, while external collaboration can inspire innovation and value creation (Lorenzo-Afable et al., 2023; Stephan et al., 2016). Internally, collaboration plays a key role by ensuring social support, feedback, and relationship-building, which can reinforce well-being in increasingly digitalized work settings (Lesener et al., 2018; Gonzalez & De Melo, 2019). In this context, small enterprises (employing 10–50 employees) are especially relevant: small and medium-sized enterprises (SMEs) comprise 99% of EU enterprises (European Commission, n.d.) and face unique challenges in adopting digital and collaborative practices (Fabian et al., 2024).

Most of the research on digitalization to date has focused on the external or operational impact of digitalization (Lyngstadaas & Berg, 2022), with less attention on how it shapes internal organizational climates—particularly in small enterprises. Similarly, while collaboration is known to influence well-being (Sonnentag et al., 2023), its potential role in the digitalization–well-being relationship remains underexplored. Against this backdrop, we put forward the following research question: What is the relationship between digitalization and organizational climate for well-being within European small enterprises, and what role does collaboration play in this relationship? We build the theoretical background of the study on the existing frameworks of P. Warr's (1999) vitamin model and some elements of the Job Demands–Resources (JD-R) framework (Bakker & Demerouti, 2007), integrating digitalization into the theorizing. Namely, we conceptualize it as a contemporary determinant influencing environmental factors essential to well-being in small enterprises.

The study findings reveal that digitalization and collaboration positively affect the organizational climate for well-being in small enterprises. However, the role of collaboration as a theorized moderator of the relationship between digitalization and organizational climate for well-being is not uniformal. Namely, its moderating influence—contrary to expectations—can be negative and depends on the age of a small enterprise and the industry type the enterprise operates in. This finding challenges some of the theoretical assumptions we drew from the mainstream literature (e.g., Lesener et al., 2018; Ragu-Nathan et al., 2008; Zhu & Carless, 2018) and adds previously unknown nuances to it that are particularly relevant to small enterprise managers as well as researchers studying digitalization or organizational well-being.

The study advances theoretical understanding of digitalization as a context-dependent environmental factor and provides actionable insights for small enterprises aiming to foster well-being through tailored digital strategies. It underscores the need for longitudinal,

context-sensitive organizational research. Overall, we contribute to a more comprehensive understanding of how digitalization and collaboration shape workplace well-being.

2. Theoretical Framework

2.1. Organizational Climate for Well-Being

An organization's climate can significantly affect employee well-being (Burns & Machin, 2013; Pandey et al., 2024). When organizations value employee welfare and provide supportive environments, employees are more likely to perceive their well-being as a priority, which in turn fosters stronger organizational commitment (Takeuchi et al., 2009; Veld & Alfes, 2017). Organizational support is thus recognized as a foundational element for fostering both well-being and organizational loyalty.

According to P. B. Warr (1987), employee well-being encompasses the overall quality of an employee's experience and functioning at work. It is influenced by the organizational climate and can be promoted through intentional environmental design (Sonnentag et al., 2023; U.S. Department of Health and Human Services, 1999). Research by Johannsen et al. (1976) indicates that job satisfaction increases when employees work in a positive organizational climate. While managers cannot directly influence individual well-being, they can design environments that promote it (Gagné & Deci, 2005; Lyngstadaas & Berg, 2022).

P. Warr's (1999) vitamin model offers a conceptual framework identifying environmental characteristics that promote employee well-being. These include opportunities for personal control (autonomy, self-determination, participation in decision-making), opportunities for skill use (skill utilization, required skills), variety (location, tasks), environmental clarity (task feedback, absence of job insecurity, information about the future, role reasonability), opportunities for interpersonal contact (contact with others, social density, quantity of contact), and supportive supervision. Each of these factors contributes to creating a climate that enhances well-being. For example, opportunities for autonomy and decision-making support the vitamin of personal control, while strong coworker relationships reflect interpersonal contact (Humphrey et al., 2007). Borkowska and Czerw (2021) confirm the ongoing relevance of these vitamins in modern work environments.

Complementing the vitamin model, the Job Demands–Resources (JD-R) framework explains how the balance of job demands and resources impacts employee well-being (Bakker & Demerouti, 2007, 2024; Lesener et al., 2018). Job demands can lead to strain, while resources such as support and autonomy enhance engagement and buffer stress. These frameworks together offer a comprehensive understanding of how work conditions contribute to an organizational climate for well-being.

2.2. Digitalization in SMEs

Digitalization, a central driver of Industry 4.0, is transforming business processes through the adoption of technologies such as cloud computing, AI, and digital platforms (Alcácer & Cruz-Machado, 2019; Feliciano-Cestero et al., 2022; Soto-Acosta, 2020). For SMEs, embracing digitalization is not merely an option but a strategic necessity to remain competitive and efficient (Fabian et al., 2024; Fischer et al., 2020; Li et al., 2018).

From a well-being perspective, digitalization aligns with several of Warr's vitamins. Computers, data analytics, specialized software, and robots can enhance personal control by enabling flexible work arrangements, automating repetitive tasks, leveraging big data, and giving employees more autonomy. Employees gain more control over their work processes and how they allocate their time, and can make independent decisions based on data, thereby creating a climate where employees have a sense of personal control (Guimaraes & Paranjape, 2021; Nikolova et al., 2024; Xu, 2023). It promotes skill use and development through digital learning and generative AI, allowing employees to study at

their convenience, removing scheduling and travel barriers (Wallin et al., 2022; Chai et al., 2025). By automating tasks through the use of robots, an organization creates more time for employees to utilize digital learning to explore various work-related topics and develop new skills. This promotes personal growth by facilitating deeper and broader knowledge opportunities (Lyngstadaas & Berg, 2022).

Furthermore, digital communication tools help maintain interpersonal contact in hybrid or remote settings and improve communication. Digital tools such as chat apps, video calls, and E-mail lower communication barriers, making it easier to ask questions, conduct check-ins, and receive feedback. This not only expands the pool of interpersonal contact but also enables managers to provide more frequent and supportive supervision, even when employees work remotely (Lyngstadaas & Berg, 2022; Wang et al., 2021; Xu, 2023; Sonnentag et al., 2023). Digitalization also supports environmental clarity by improving access to information through software or centralized platforms such as Microsoft Teams and SharePoint (Castellacci & Tveito, 2017; Firstup, 2025; Hanley, 2025). These platforms facilitate clear communication of goals, expectations, and feedback, which is crucial for maintaining a well-defined and transparent work environment.

The McKinsey Global Institute predicts that workforce transitions will accelerate as digital technologies reshape job demand across industries. To support employee well-being, they stress the importance of integrating measures that promote well-being into organizational culture. For example, McKinsey mentions employee training and job development as key aspects; these align with Warr's concept of skill utilization and the JD-R framework's focus on enhancing job resources. Organizations can use digitalization to better match employee skills with changing job requirements, thereby encouraging improved organizational well-being. When supported by clear strategies, digitalization can positively influence the organizational climate for well-being (Hazan et al., 2024; Gallup, 2025).

2.3. Collaboration

Collaboration in the workplace involves coordinated efforts among individuals with complementary skills working toward shared goals (Katzenbach & Smith, 1993). Unlike external collaborations or user co-creation, internal collaboration centers on teamwork and collective problem-solving (Salas et al., 2015; Greer & Lei, 2011).

Within this study, we focus on internal collaboration in the form of teamwork. This form of collaboration refers to *the process by which team members work interdependently to accomplish a shared goal*. This means that goal-oriented collaboration involves relational/interpersonal aspects, which can be instrumental for shaping the organizational climate for well-being (Humphrey et al., 2007). Collaboration can enhance personal control by promoting collective decision-making and peer-based learning, complementing data-driven feedback with richer social insights (Gonzalez & De Melo, 2019; Zhu & Carless, 2018). These influences of collaboration may help create a workplace culture that is not only efficient but also empathetic and inclusive (Lorenzo-Afable et al., 2023; Stephan et al., 2016).

2.4. Study Hypotheses

Building on P. Warr's (1999) vitamin model and the JD-R framework (Bakker & Demerouti, 2007, 2024), this study investigates whether digitalization contributes to the development of an organizational climate that supports employee well-being (denoted as "organizational climate for well-being"), and whether collaboration amplifies this relationship.

Digitalization aligns with multiple "vitamins", particularly personal control, skill use, environmental clarity, and interpersonal contact, as discussed in Section 2.2. By enabling flexible work environments and expanding learning opportunities through computer use, automating tasks though the usage of robots, streamlining decision-making though data

analytics, and streamlining communication through specialized software and computer use, digitalization can enhance key organizational conditions that foster well-being (Guimaraes & Paranjape, 2021; Wallin et al., 2022; Castellacci & Tveito, 2017; Lyngstadaas & Berg, 2022). Within SMEs, where resources may be limited, these efficiencies are particularly valuable for shaping a supportive organizational climate. Therefore, we hypothesize that digitalization is positively associated with the organizational climate for well-being in small European enterprises.

H1. *Digitalization has a positive relationship with the organizational climate for well-being in small European enterprises.*

From the JD-R perspective, collaboration increases job resources by facilitating social support, informal feedback, and resilience (Humphrey et al., 2007; Ryan & Deci, 2001) that are rooted in interpersonal contacts among employees. P. Warr (1999), in turn, emphasizes the role of teamwork as a determinant of well-being. By combining these perspectives, collaboration can be viewed as a means to enhance job resources and fulfill psychological needs, thereby strengthening the organizational climate for well-being. Collaboration naturally implies teamwork, or internal collaboration within enterprises, through regular employee interactions, shared decision-making, and mutual support (Thissen et al., 2023). It can also contribute to stronger emotional ties and lower absenteeism, reinforcing commitment and morale (Akehurst et al., 2009; Mathieu & Zajac, 1990). Therefore, we expect that overall collaboration within small enterprises is positively associated with the organizational climate for well-being.

H2. *Collaboration has a positive relationship with the organizational climate for well-being in small European enterprises.*

However, the benefits of digitalization may depend on the social fabric of the workplace. Some accounts also hint that while digital tools can increase work efficiency, they may also weaken interpersonal relationships if not complemented by meaningful interaction (Bennett et al., 2021; Wang et al., 2021). This is where collaboration in the form of teamwork becomes essential. Collaborative practices provide opportunities for informal communication, team bonding, and collective learning—all of which contribute to perceived social support, and organizational coherence (Lesener et al., 2018; Ragu-Nathan et al., 2008).

Moreover, collaboration may help convert the structural flexibility provided by digital tools into an empowering and motivating environment. Through shared problem-solving, mutual accountability, and adaptive communication, collaboration may enhance digitalization's potential to serve as a well-being resource (Gonzalez & De Melo, 2019; Zhu & Carless, 2018). In this sense, collaboration may not only strengthen the impact of digitalization but ensure that it contributes to a more resilient and human-centered organizational climate. Therefore, we hypothesize a positive moderating effect of collaboration on the relationship between digitalization and organizational climate for well-being.

H3. *Collaboration positively moderates the relationship between digitalization and the organizational climate for well-being in small European enterprises.*

Figure 1 summarizes the study's conceptual model.

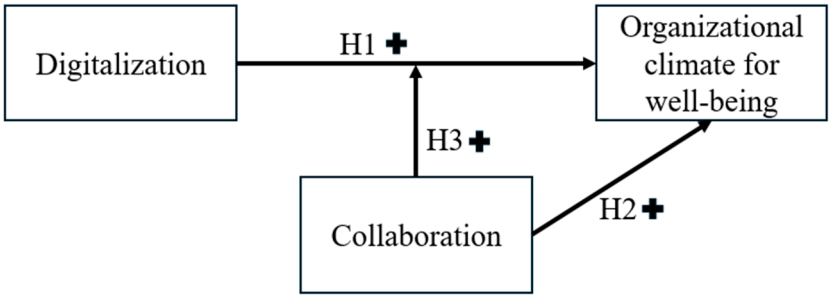


Figure 1. Conceptual model of the relationships between digitalization, collaboration, and organizational climate for well-being.

3. Methodology

3.1. Data and Sample

This study used the European Company Survey dataset (ECS) 2019 provided by the UK Data Service. The ECS is a survey conducted by the European Foundation for the Improvement of Living and Working Conditions (Eurofound, 2023) every four years, starting from 2004. The survey goals were to systematically collect, evaluate, and measure data on workplace policies and practices throughout Europe using a standardized approach and, to a lesser degree, track changes and trends over time.

The survey was administered between January and July 2019. The ECS 2019 covered over 21,000 enterprises with at least 10 employees across 28 EU Member States and 6 additional countries, covering both private and public sectors (Eurofound, 2023). It was the first large-scale, cross-national survey of enterprises to use a push-to-web methodology. The latter means that the enterprises were contacted via telephone to identify a management respondent and, where present, an employee representative respondent (i.e., a manager responsible for human resources) was subsequently asked to complete the questionnaire online (”push to web’) (Ipsos, 2020). Our study uses the data from European Member states (as of 2019).

The main topics of the ECS 2019 questionnaire were work organization, human resource management, skill use, skill strategies, digitalization, direct employee participation, social dialogue, and trust relations at the workplace (Eurofound, 2023; UK Data Service, n.d.). Our study draws upon 19% of the questions included in the survey which are directly relevant for the research model tested. The question types range from multiple-choice questions, to closed ”yes-no” questions, to open-ended questions.

The data containing the managers’ responses from small enterprises were used in the analyses, given the methodological focus on this population. Managers of small enterprises have a comprehensive view of the company and are well-informed about its operations. They also know the employees well and can gain a broader understanding of the organization’s processes, including potential training programs for well-being or similar initiatives. In medium and large organizations, in contrast, there are multiple managers, each responsible for their respective departments. These managers are very familiar with their own departments but have a less clear understanding of what happens in others due to the organizations’ size. Therefore, small enterprise managers wield greater influence in articulating their vision and conveying the company’s message to employees. As a result, they are better equipped to gauge what the company aims to communicate and what is happening across the firm in terms of digitalization and collaboration.

Before use, the dataset was cleaned of data errors, e.g., outliers, missing values, and irrelevant observations. As a result, out of a total of 13,650 responses from small enterprise managers, 11,650 were used in the analyses.

3.2. Measures

3.2.1. Dependent Variable

This study evaluates the *organizational climate for well-being* through six distinct questions that content-wise emphasize *relationships, opportunities for learning, and inclusion* (Eurofound & Cedefop, 2020). The responses were measured using three- to five-point Likert scales.

Conceptually, construction of the dependent variable relies on P. Warr (1999) vitamin model. This model identifies distinct environmental determinants that influence organizational well-being when provided in sufficient quantities. If an employee does not receive enough, or is exposed to excessive levels, of certain "vitamins," it can lead to diminished well-being.

Warr's model, in total, comprises ten determinants of the organizational climate. However, due to the survey limitations, four of them were omitted in the empirical part of this study, namely: externally generated goals, availability of money, physical security, and valued social position. Within the existing secondary data drawn from ECS 2019, there were no questions that were explicitly linked to these determinants.

The dimensions identified by P. Warr (1999) and used within the study include opportunity for personal control, opportunity for skill use, task variety, environmental clarity, opportunity for interpersonal contact, and supportive supervision. The six identified questions from the ECS questionnaire represent the organizational climate for well-being. These questions align with, but do not exactly replicate, the factors identified by P. Warr (1999) as environmental determinants of well-being in his vitamin model. Therefore, the selected survey items are treated as proxies for these environmental factors. Distinct parallels can be drawn between these variables and the survey questions related to the organizational climate for well-being.

The quality of the relationship between managers and employees (question 1) relates to the determinants of supportive supervision and opportunities for interpersonal contact. A positive relationship includes supportive, respectful, and frequent high-quality social interactions. Managers and employees support and help each other while also engaging in everyday conversations.

Making suggestions for improving (question 2) and *meetings on how work is organized* (question 3) are both related to opportunities for personal control. These determinants concern the input that employees have in decision-making regarding their work and the level of personal influence an employee has on the outcomes of their tasks. When asked for input or suggestions on how things are done within the company, including the organization of work, employees are likely to feel more control over how their tasks are structured; thus, it provides them with a certain degree of autonomy.

Communicating a strong mission and vision (question 4) is an environmental clarity determinant. A clear and shared purpose defines what the organization aims to achieve. This reduces uncertainty and provides insights about the future, leading to a well-defined direction and collective purpose for employees.

Finally, *offering engaging and stimulating work* (question 5) and *providing opportunities for training and development* (question 6) are linked to the opportunity to utilize skills and the variety of tasks. When employees are given stimulating work, they are typically challenged, engage in tasks that do not repeat constantly, and learn a range of new skills, enabling them to apply and expand their abilities. Providing opportunities for training and development allows employees to acquire new skills, creating additional chances to apply them across diverse tasks, thereby increasing task variety and reinforcing the skill-use "vitamin" (P. Warr, 1999; Borkowska & Czerw, 2021).

In this study, the organizational climate for well-being is a composite variable that is based on the six aforementioned questions. Exploratory factor analysis revealed that the six respective items load onto a single factor, indicating that all variables can be measured through a single construct. The analysis confirmed adequate data suitability (KMO = 0.805) and a highly significant Bartlett's test ($p < 0.001$) (Bernard et al., 2020). Sufficiently high Cronbach's alpha ($\alpha = 0.716$) suggested acceptable reliability and internal consistency (Zulkarnain et al., 2024).

3.2.2. Independent Variables

Previous literature defines *digitalization* as "the process of transforming parts or the entire firm's value-chain activities and business models into digital formats using emerging technologies, such as mobile and visual platforms, cloud computing, robotics, smartphones, artificial intelligence (AI), blockchain, additive manufacturing, 3-D printing, and Internet of Things (IoT)" (Soto-Acosta, 2020).

Dalenogare et al. (2018) examined the role of Industry 4.0 technologies in enhancing industrial performance, emphasizing the integration of these technologies within organizations to improve business outcomes. Their study operationalized Industry 4.0 technologies through measurements such as computer-aided design integrated with computer-aided manufacturing, integrated engineering systems, digital automation enhanced by sensors, flexible manufacturing lines, MESs (Manufacturing Execution Systems), SCADA (Supervisory Control and Data Acquisition) systems, big data analytics, digital product-service integration, additive manufacturing, and cloud computing services.

In the current study, digitalization is assessed through four survey questions that cover the following areas trending in the prior literature: *the use of digital products, data analytics, robotics, and specialized software*. These topics correspond with the examples of emerging technologies from Soto-Acosta (2020) and the operationalization by Dalenogare et al. (2018). The questions within the datasets do not encompass all topics presented by Dalenogare et al. (2018) and Soto-Acosta (2020); however, not all measurements need to be included for adequately assessing digitalization. A company could, for example, utilize only emerging technologies such as mobile and visual platforms, along with artificial intelligence. Thus, the measures selected for this study effectively capture core aspects relevant to the research focus.

The four distinct indicators of digitalization are analyzed separately due to their varied impacts on organizations. Computer use enhances flexibility and broadens access to information. Robots increase efficiency and transform physical workflows. Specialized software organizes tasks and streamlines processes. Data analytics informs decision-making and reveals future trends. Separate examination of each digitalization indicator also allows capturing their specific influence on the organizational climate for well-being. Furthermore, the factor analysis supported this reasoning, revealing two different statistical factors and suggesting the four indicators cannot be used to create a composite digitalization variable.

3.2.3. Moderator Variable

The dataset captures *collaboration* as a binary variable. The respondents are first provided with a definition of a team ("A team is a group of people working together with a shared responsibility for the execution of allocated tasks. Team members can come from the same unit or from different units across the establishment"). Then, the respondents answer whether such teams exist within their organization (Yes = 1, No = 0). Since this study focuses on the presence rather than the intensity of collaboration, and because no other questions measure this concept in the survey, a single-item-based variable is used to measure whether enterprises have collaborative work arrangements.

See Appendix A for more details on the questionnaire content.

3.2.4. Control Variables

Control variables are crucial components of a research study that help ensure that the key relationships being tested are not confounded by other influences (Nielsen & Raswant, 2018). One of the control variables used in this study is *the type of industry* that enterprises operate in. The measure is based on the NACE (Nomenclature of Economic Activities) sector codes reported by the managers.

Prior research shows that employees in public and non-profit organizations are more motivated than employees in private companies (Qu & Robichau, 2023). Similarly, employees in public and non-profit sectors report higher life satisfaction and are more likely to experience a strong sense of identity and person–organization fit (Qu & Robichau, 2023), which could result from a positive work environment where one is not just a number. By controlling for industry type, it is possible to more accurately identify which factors are driven by digitalization and which are related to the industry (Melville et al., 2004).

Within the dataset, there are twenty different NACE categories divided into three groups: *production, construction, and services*. For the analysis, dummy variables were created for these categories. Production was used a reference group.

The second control variable is *the part of Europe where the company is based*. The location of the company might be crucial because not all countries are equally digitalized and invested into creating a favorable organizational climate. According to Eurostat (2024), 44% of EU citizens lack basic digital skills. They also found that companies in Romania and Bulgaria have significantly lower levels of digital intensity compared to those in Finland, the Netherlands, and Sweden. Moreover, national cultures differ widely in their attitudes toward work, technology adoption, communication styles, and well-being norms (Kaasa et al., 2014).

In total, the dataset encompasses 32 different countries, all situated within the EU and the UK. Dummy variables were created to code country locations into *Northern, Eastern, Southern, and Western Europe*; the latter serves as a reference group.

The third control variable included in the study is *an enterprise's age.* Older firms have established routines and may not adjust programs, processes, and strategies adequately to respond to changing environmental conditions (liability of aging and obsolescence) (Soto-Simeone et al., 2020; Coad et al., 2017). These dynamics can influence how digital initiatives are implemented in an enterprise, as well as how employees perceive these changes. The variable was measured based on how long an enterprise had been operating, reported by the managers. The data were further categorized into four distinct groups: 10 years or less, 11 to 20 years, 21 to 30 years, and more than 30 years.

See Appendix B for details on the control variable statistics.

3.3. Method of Analysis

To test the study hypotheses, hierarchical linear regression analysis was used, comprising multiple linear regressions, where variables are introduced sequentially (from controls to moderators) to track changes in variance explained. Moderation regression was also used, as this analytical method fits well the proposed conceptual model (Bevans, 2023).

As highlighted above, digitalization involves transforming parts or the entire enterprise's value chain activities and business model into digital formats using emerging technologies (Soto-Acosta, 2020). This definition indicates that digitalization is not a standardized concept. Every activity, from inbound logistics to HR, can be digitized in its own way, at different paces, and with various technologies. Each digitalization indicator can transform the organizational well-being uniquely. Therefore, in this study, the association

of digitalization with organizational climate for well-being is examined using four distinct digitalization indicators. To test the second hypothesis, a moderation regression was used to determine whether and how collaboration influences the baseline relationship.

4. Results

4.1. Descriptive Statistics

Table 1 presents descriptive statistics based on a sample of 11,650 managers of small enterprises from 28 countries across the European Union and the United Kingdom. The dependent variable, organizational climate for well-being, ranges from 1.83 to 4, with a mean value of 3.02 (SD = 0.45), indicating that most organizations report a positive organizational climate for well-being. In terms of the digitalization indicators, software usage is evenly divided (mean = 0.51, SD = 0.50). In contrast, robot use is significantly lower (mean = 0.07, SD = 0.25), and a greater number of managers in small businesses reported not using data analytics (mean = 0.42, SD = 0.49). Computer use exhibits a broader range (2 to 7), with an average of 4.45 (SD = 1.95), suggesting varied usage, yet the most common category is that all employees use computers daily. Collaboration is popular, with nearly 70% of respondents reporting it (mean = 0.69, SD = 0.46).

Table 1. Descriptive statistics.

	Minimum	Maximum	Mean	St. Deviation
Organizational climate for well-being	1.83	4	3.02	0.45
Digitalization:				
Software use	0	1	0.51	0.50
Robot use	0	1	0.06	0.25
Data analytics	0	1	0.42	0.49
Computer use	2	7	4.45	1.95
Collaboration	0	1	0.69	0.46
Age of an enterprise	1	4	2.74	1.07
Part of Europe:				
Northern Europe	0	1	0.19	0.39
Eastern Europe	0	1	0.36	0.48
Southern Europe	0	1	0.22	0.41
Western European *	0	1	0.24	0.42
Industry type:				
Construction	0	1	0.11	0.31
Service	0	1	0.68	0.47
Production *	0	1	0.22	0.41

Note: * Reference group.

Zooming into the control variables, the age of an enterprise has a mean of 2.74 (SD = 1.07), indicating variation within the dataset. Regarding the geographical dummy variables, the largest respondent group comes from Eastern Europe (4145 respondents, mean = 0.36, SD = 0.48), followed by Western Europe (2755 respondents, mean = 0.24, SD = 0.42), Southern Europe (2510 respondents, mean = 0.22, SD = 0.41), and Northern Europe (2240 respondents, mean = 0.19, SD = 0.39). Industry-wise, the majority of respondents are from the service sector (7931 respondents, mean = 0.68, SD = 0.47), while fewer respondents are from production (2418 respondents, mean = 0.21, SD = 0.41) and construc-

tion (1301 respondents, mean = 0.11, SD = 0.31). The dummy variables for production and Western Europe serve as reference groups for further analysis. The number of observations is constant across all the variable observations (N = 11,650).

Table 2 shows a correlation matrix between the dependent and independent variables. The correlation coefficients do not exceed 0.7 (Kalnins, 2018), indicating that the chance of multicollinearity issues is slim. Although Voss (2005) states that partial multicollinearity among control variables is almost entirely harmless and does not introduce any biases, all control variables are tested for multicollinearity to ensure that no strong multicollinearity is present. Regarding the latter, the rule of thumb is that if the variance inflation factor (VIF) exceeds four, it indicates moderate multicollinearity; if it exceeds ten, it indicates strong multicollinearity (Gokmen et al., 2020). The VIF test results showed that the VIF ranged from 1.062 (for robots) to 1.761 (for Eastern Europe). Therefore, no strong multicollinearity was found between the variables.

Table 2. Correlation table.

Variables	1	2	3	4	5	6	7	8	9	10	11	12
1. Climate for well-being	-											
2. Software	0.144 **	-										
3. Robots	0.029 **	0.063 **	-									
4. Data analytics	0.187 **	0.211 **	0.090 **	-								
5. Computer use	0.245 **	0.113 **	−0.012	0.196 **	-							
6. Collaboration presence	0.184 **	0.133 **	0.031 **	0.189 **	0.166 **	-						
7. Org. age	−0.028 **	0.034 **	0.034 **	−0.029 **	0.036 **	−0.052 **	-					
8. Northern Europe	0.209 **	0.003	0.024 **	−0.033 **	0.131 **	0.032 **	0.151 **	-				
9. Eastern Europe	−0.164 **	−0.125 **	−0.059 **	−0.037 **	−0.149 **	−0.052 **	−0.290 **	−0.363 **	-			
10. Southern Europe	−0.021 *	0.124 **	0.045 **	0.110 **	−0.034 **	0.012	0.055 **	−0.256 **	−0.389 **	-		
11. Industry Construction	−0.046 **	−0.035 **	−0.068 **	−0.126 **	−0.225 **	−0.027 **	−0.034 **	0.001	0.041 **	−0.053 **	-	
12. Industry Service	0.147 **	0.054 **	−0.133 **	0.096 **	0.378 **	0.085 **	−0.039 **	0.081 **	−0.076 **	−0.039 **	−0.518 **	-

** Correlation is significant at the 0.01 level (two-tailed) * Correlation is significant at the 0.05 level (two-tailed).

4.2. Regression Analysis Results

Table 3 displays results of the regression analysis. Model 1 captures the effect of the control variables (firm age, industry type, and country). In Model 2, digitalization variables are added—software use, robot use, data analytics use, and computer use. Model 3 introduces collaboration. Lastly, Model 4 tests the interaction effects (digitalization × collaboration) to evaluate whether the strength of each digitalization–well-being relationship varies with the level of collaboration.

In the first model, the relationship between the dependent variable and control variables is examined to assess how the age of an organization, industry type, and country influence the organizational climate for well-being, while controlling for the effects of controls. The control variables account for 7.5% of the variance in the organizational climate for well-being (R^2 = 0.075, $p < 0.01$). The age of the organization consistently shows a negative association across all models (B = −0.037 to B = −0.033, $p < 0.001$), suggesting that younger organizations tend to report a higher organizational climate for well-being. The control variables of the European regions display different outcomes, with Northern Europe demonstrating significantly higher organizational climate (B = 0.178, $p < 0.001$) compared to Western Europe across all the models, while Eastern Europe has a lower organizational climate for well-being compared to Western Europe (B = −0.102, $p < 0.001$). Southern Europe, while showing no effects in Model 1, becomes and remains significant in Models 2 and 3. Different industry groups show varying impacts, with the service industry presenting a positive association (B = 0.065, $p < 0.001$), followed by construction (B = 0.061, $p < 0.001$), compared to production as the baseline.

Table 3. Multiple linear regression results.

	Model 1		Model 2		Model 3		Model 4		95% CI	
	B	**SE**	**B**	**SE**	**B**	**SE**	**B**	**SE**	**L.b.**	**H.b.**
Constant	2.944 ***	0.012	2.879 ***	0.013	2.818 ***	0.014	2.821 ***	0.015	2.791	2.850
Main Effect										
Software			0.079 ***	0.008	0.071 ***	0.008	0.079 ***	0.015	0.050	0.108
Robots			0.038 *	0.016	0.033 *	0.016	−0.001	0.032	−0.063	0.061
Data analytics			0.126 ***	0.008	0.111 ***	0.008	0.108 ***	0.016	0.077	0.139
Computers			0.072 ***	0.004	0.067 ***	0.004	0.078 ***	0.008	0.062	0.093
Collaboration					0.106 ***	0.009	0.105 ***	0.013	0.080	0.130
Interaction term										
Collab × soft							−0.011	0.017	−0.045	0.023
Collab × robot							0.045	0.036	−0.026	0.117
Collab × data							0.004	0.019	−0.032	0.041
Collab × comp							−0.015	0.009	−0.033	0.002
Control variables										
Org. age	−0.037 ***	0.004	−0.036 ***	0.004	−0.033 ***	0.004	−0.033 ***	0.004	−0.041	−0.025
North Europe	0.183 ***	0.012	0.177 ***	0.012	0.175 ***	0.012	0.175 ***	0.012	0.152	0.199
East Europe	−0.122 ***	0.011	−0.094 ***	0.011	−0.090 ***	0.011	−0.091 ***	0.011	−0.112	−0.070
South Europe	−0.022	0.012	−0.036 **	0.012	−0.034 **	0.012	−0.034 **	0.012	−0.057	−0.011
Construction	0.033 *	0.015	0.069 ***	0.015	0.062 ***	0.015	0.061 ***	0.015	0.032	0.090
Service	0.128 ***	0.010	0.070 ***	0.011	0.065 ***	0.011	0.065 ***	0.011	0.044	0.085
R-squared	0.075		0.137		0.148		0.149			
R-sq.change	0.075 ***		0.062 ***		0.012 ***		0.001			

Notes: B—Beta coefficient, SE—standard error; CI—confidence interval, L.b., H.b.—higher and lower bounds of a confidence interval; European Region West and Industry Production are reference groups; *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$; N = 11,650.

To test the first hypothesis, Model 2 adds the digitalization variables. The R-squared value of Model 2 is 0.137 and is significant at the 0.001 level, representing a 6.2% increase (changed $R^2 = 0.062$). All four digitalization variables show significant association with the organizational climate for well-being in this model. The use of data analytics has the largest effect, with a Beta coefficient of 0.126 ($p < 0.001$), suggesting that an increased use of data analytics is associated with an improved organizational climate for well-being. The same holds true for software use (B = 0.079, $p < 0.001$), computer use (B = 0.072, $p < 0.001$), and robot use (B = 0.038, $p < 0.05$). Notably, the use of robots has the smallest positive effect in comparison to other digitalization indicators. Therefore, Hypothesis 1 finds support.

Model 3 tests the association of collaboration with the dependent variable, while all four digitalization indicators remain positive and significant at the 99% and 95% level. Collaboration itself also shows a strong and positive independent effect (B = 0.106, $p < 0.001$), suggesting that enterprises that reported using teamwork for joint goal achievement tended to score higher on the organizational climate for well-being. The model's explanatory power increases to 14.8%, up from 13.7% in Model 2. Therefore, Hypothesis 2 is supported.

In Model 4, all four interaction terms between collaboration and the digitalization indicators are introduced, resulting in a 0.012 increase in R^2. The overall model explains 14.9% of the variance in the organizational climate for well-being ($R^2 = 0.115$, $p < 0.01$), leaving 85.1% of the variance accounted for by factors outside of our analysis. Furthermore, the interaction coefficients for collaboration × software use (B = −0.011, $p < 0.523$), collaboration × robot use (B = 0.045, $p < 0.211$), collaboration × data analytics (B = 0.004, $p < 0.813$),

and collaboration × computer use (B = −0.015, $p < 0.086$) are all non-significant, indicating no moderation effect present.

However, given the significant effects observed among the control variables, we conducted supplementary analyses in which regression models were stratified by enterprise age, region, and industry type. These analyses produced some unexpected findings regarding the testing of H3, particularly in relation to firm age and industry. While regional controls were significant in the main analysis, they did not yield additional meaningful insights for testing H3.

4.3. Supplementary Analysis: Age of Enterprise

First, the sample was divided by enterprises' age.

Following the classification of young firms by Coad et al. (2015), the sample was split into two groups: enterprises younger and older than 10 years (since being founded). The interaction effects between collaboration and digitalization indicators were not statistically significant in either group, except for a negative moderating influence of collaboration on the relationship between data analytics and the dependent variable (B = −0.133, $p < 0.001$).

Figure 2 illustrates this interaction effect, suggesting that enterprises with low data analytics use but high collaboration report higher levels of organizational climate for well-being. However, when data analytics is used, the presence or absence of collaboration appears to make little difference to the outcome. Overall, collaboration does not enhance the baseline relationship—it might even buffer or dilute it slightly. This could occur due to tensions between team-based decision-making and more data-driven approaches. In older enterprises, on the contrary, collaboration did not enhance or diminish the impact of digital technologies on the organizational climate for well-being. Table 4 shows the first supplementary analysis' results.

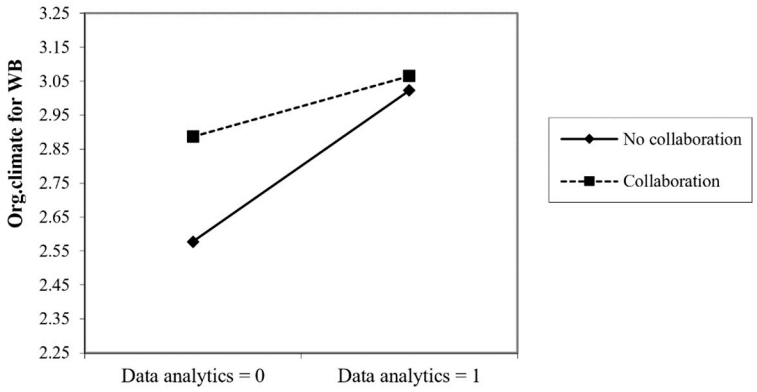


Figure 2. Interaction effect of collaboration and data analytics in young enterprises.

Table 4. Regression models based on enterprises' age.

	Model 1 Enterprises Younger Than 10 Years		**Model 2 Enterprises Older Than 10 Years**	
	B	**SE**	**B**	**SE**
Constant	2.853 ***	0.045	2.824 ***	0.016
Main effect				
Software	0.067	0.040	0.079 ***	0.016
Robots	0.021	0.117	−0.002	0.033
Data analytics	0.222 ***	0.044	0.090 ***	0.017

Table 4. *Cont.*

	Model 1 Enterprises Younger Than 10 Years		**Model 2 Enterprises Older Than 10 Years**	
Computers	0.043 *	0.021	0.082 ***	0.008
Collaboration	0.176 ***	0.035	0.096 ***	0.014
Interaction term				
Collab × soft	0.006	0.047	−0.013	0.019
Collab × robot	−0.020	0.126	0.055	0.038
Collab × data	−0.133 **	0.050	0.028	0.020
Collab × comp	0.006	0.024	−0.015	0.010
Control variables				
North Europe	0.105 **	0.037	0.181 ***	0.013
East Europe	−0.115 ***	0.039	−0.720 ***	0.011
South Europe	−0.068 *	0.033	−0.026 *	0.013
Construction	0.065	0.040	0.067 ***	0.016
Service	0.062 *	0.030	0.068 ***	0.011
R-squared	0.130		0.150	
N	1849		9801	

Notes: B—Beta coefficient, SE—standard error; European Region West and Industry Production are reference groups; *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

4.4. Supplementary Analysis: Type of Industry

Table 5 shows the second supplementary analysis results, where the sample was divided by the industry type (see the respective results for construction, production, and services). It reveals that the effect of collaboration within enterprises on the baseline relationship tested can vary depending on the industry of operations, and pertains specifically to software use. Moreover, this effect is not uniformly positive, contrary to the earlier theoretical assumptions.

Figures 3 and 4 plot the moderation effects.

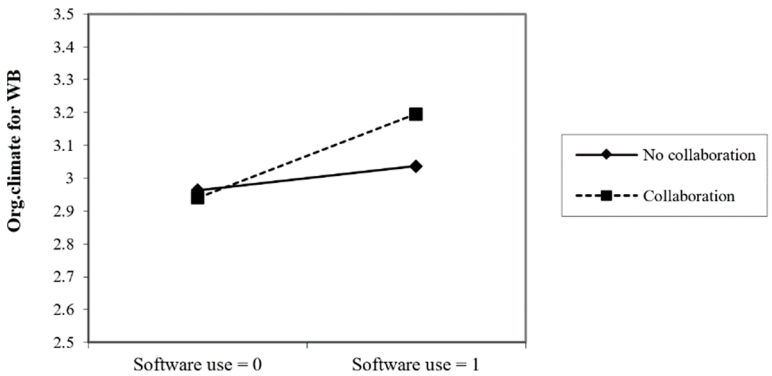


Figure 3. Interaction effect of collaboration and software use in production enterprises.

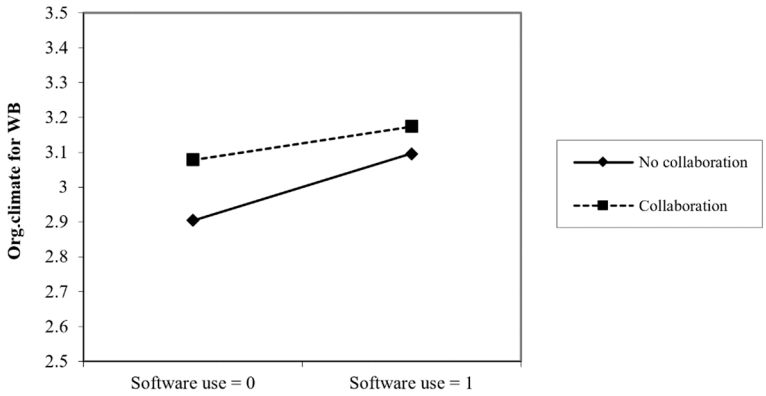


Figure 4. Interaction effect of collaboration and software use in service enterprises.

Table 5. Regression models based on industry type.

	Model 1 Construction		**Model 2 Production**		**Model 3 Services**	
	B	**SE**	**B**	**SE**	**B**	**SE**
Constant	2.946 ***	0.041	2.829 ***	0.031	2.873 ***	0.015
Main effect						
Software	0.072	0.041	0.037	0.029	0.096 ***	0.019
Robots	0.106	0.149	−0.005	0.040	−0.014	0.058
Data analytics	0.064	0.058	0.128 ***	0.031	0.103 ***	0.020
Computers	0.101 ***	0.029	0.080 ***	0.021	0.078 ***	0.009
Collaboration	0.036	0.043	0.068 *	0.014	0.126 ***	0.016
Interaction term						
Collab × soft	0.025	0.050	0.091 *	0.036	−0.048 *	0.022
Collab × robot	−0.158	0.184	0.053	0.049	0.064	0.064
Collab × data	0.055	0.066	−0.049	0.038	0.017	0.017
Collab × comp	−0.062	0.034	−0.010	0.025	−0.018	0.011
Control variables						
Org. age	−0.032 *	0.013	−0.045 ***	0.009	−0.045 ***	0.009
North Europe	0.109 **	0.035	0.186 ***	0.031	0.186 ***	0.031
East Europe	−0.116 ***	0.032	−0.080 ***	0.025	−0.080 ***	0.025
South Europe	−0.076 *	0.038	−0.007	0.026	−0.007	0.026
R-squared	0.096		0.130		0.137	
N	1301		2418		7931	

Notes: B—Beta coefficient, SE—standard error; European Region West is a reference group; *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

Figure 3 shows that collaboration appears to moderate the relationship between software use and organizational climate for well-being—amplifying the positive impact of software use *in production enterprises ($B = 0.091$, $p < 0.013$)*. This suggests that collaborative environments enhance the benefits of software adoption, possibly by improving communication, social support, and shared understanding of digital tools.

However, Figure 4 shows a small negative interaction between software use and collaboration on the dependent variable *in services enterprises ($B = -0.048$, $p < 0.027$)*. While both software use and collaboration individually relate positively to the organizational climate

for well-being, in the absence of collaboration, software use is associated with a steeper increase in organizational well-being. The latter suggests that collaboration dampens the positive effect of software use on the organizational climate for well-being in the services enterprises. Possibly, collaboration services industry enterprises may already address some of the same well-being determinants (e.g., interpersonal support, clarity), thereby reducing the marginal benefit of software use. Alternatively, the simultaneous presence of digital tools and collaborative dynamics may introduce coordination complexities that slightly offset their individual benefits.

Based on the supplementary analyses, we conclude that the influence of collaboration on the relationship between digitalization and the organizational climate for well-being is not universally positive and it may also differ depending on the industry of operations. Moreover, the moderation evidence pertains to the use of software and data analytics only rather than to all the digitalization indicators. Therefore, the discovered moderation effects appear highly limited and context-dependent, and should be interpreted cautiously.

5. Discussion and Conclusions

This study contributes to the growing literature on the organizational climate for well-being by examining the relationship between digitalization and the organizational climate for well-being in European small enterprises (e.g., Wallin et al., 2022; Castellacci & Tveito, 2017; Lyngstadaas & Berg, 2022), and by examining the role of collaboration in this dynamic. Using multiple indicators of digitalization—including software use, data analytics, robot use, and computer use—the study found consistent evidence supporting a positive relationship between digitalization and a favorable organizational climate for well-being. While collaboration itself showed a positive effect on well-being, its role as a moderator in the digitalization–well-being relationship was not uniformal. The moderating influence of collaboration appeared to vary depending on the age and industry sector of a small enterprise with meaningful results pertaining to the use of software and data analytics. We elaborate on these insights below.

5.1. Theoretical Contributions

First, the study provides strong empirical support for the proposition that digitalization positively influences the organizational climate for well-being in small European firms. All indicators of digitalization showed significant positive associations. This finding extends the work of P. Warr (1999) by illustrating that different forms of digitalization (computer and software use, data analytics, and robotics) can support the "vitamins" of a healthy work environment, including personal control, skill use, variety, interpersonal contact, and environmental clarity (Borkowska & Czerw, 2021; Lyngstadaas & Berg, 2022; Sonnentag et al., 2023; Wallin et al., 2022). Therefore, digitalization also acts as a structural job resource that can enable or enhance multiple aspects of the organizational context that support well-being, in line with the resource-based aspect of the JD-R framework (Bakker & Demerouti, 2007, 2024). The results broadly support the theoretical assertion that job resources can stimulate personal growth, learning, and employee development all together, forming the organizational climate for well-being.

The results of this study provide a more nuanced understanding of digitalization's theorized influence on organizational well-being, showing the strongest effect of data analytics in the sample of 11,650 enterprises alongside positive effects of other digitalization indicators. The use of robots discussed actively by practitioners and visioners in our study exhibits the weakest positive effect in the overall sample. Furthermore, detailed results from supplementary analysis indicate that the use of robots is more important for well-being in younger than in older enterprises (regardless of industry type). While, statistically, the use

of robots is rather rare—6.7% in older enterprises and 5.6% in younger enterprises—the latter group can be more open to adopting innovations and investing financial resources into modern technologies. Most enterprises (around 70%) operate in the services industry, where the adoption of robots might be less common (Harper & Virk, 2010). Furthermore, robots are large machines designed to automate, simplify, or enhance task efficiency (Soto-Acosta, 2020; Harper & Virk, 2010). This can potentially lead to increased happiness due to more manageable and possibly less physically demanding tasks. However, it could also reduce employees' task variety and job security (environmental clarity) (Lyngstadaas & Berg, 2022), which may play against the adoption of robots, especially in older enterprises that have established work routines.

Second, the study challenges the general theoretical assumptions about collaboration as a moderator of the relationship between digitalization and organizational climate for well-being (Lesener et al., 2018; Ragu-Nathan et al., 2008; Zhu & Carless, 2018). Although collaboration was positively and consistently associated with organizational well-being directly (across all industries, among older and younger enterprises), its expected positive moderating effect pertained only to the use of software in production industry enterprises. Indeed, platforms like Microsoft Teams and SharePoint, for example, not only support communication but also help clarify expectations, contributing to environmental clarity (Castellacci & Tveito, 2017; Hanley, 2025). Simultaneously, the moderating role of collaboration was negative for the effects of software use in service enterprises and of data analytics in younger enterprises. This underscores the complexity and contingency inherent in collaboration's moderating role, indicating that the beneficial impact of collaboration can depend on the specific dimension or form of digitalization as well as contextual factors. In service firms, where interpersonal interaction and relational coordination are crucial, software use coupled with collaboration may increase coordination burdens/interactions and hinder relational experiences (Parker & Grote, 2020; Dąbrowska et al., 2022). While enterprises may adopt digital collaboration tools to enhance well-being, employees might instead experience technostress or a diminished sense of connection (Thurik et al., 2023), potentially lowering their perception of the organizational climate for well-being.

Similarly, in younger firms, limited structural maturity and less developed routines may hinder the effective integration of complex digital tools such as data analytics. Young firms often lack established processes, digital infrastructures, or clearly defined roles to absorb and act on analytical insights (Bianchini & Michalkova, 2019). In such environments, collaboration can increase information overload and cognitive strain, especially when combined with evolving digital practices (Tarafdar et al., 2019). According to Trittin-Ulbrich et al. (2021), digitalization embeds analytics into everyday interactions, affecting routine tasks and decisions. In less mature young firms, this can raise uncertainty and overload, leading to job strain, particularly when frequent collaboration is involved. Instead of boosting well-being, collaboration paired with complex analytics may heighten overload, uncertainty, and job stress, thereby weakening the perceived organizational climate for well-being (Coad, 2016).

Overall, while, theoretically and empirically, we conclude on the positive direct relationship between various digitalization indicators and organizational climate for well-being, when other factors like collaboration and enterprise characteristics (e.g., age and industry type) come into play simultaneously, adverse or unintended effects become likely. This speaks to prior studies critically discussing digitalization as an antecedent of ill-being, though predominantly at the individual level (e.g., Califf et al., 2020; Tarafdar et al., 2019; Thurik et al., 2023). In the context of our study, this means that the impact of collaboration on the baseline relationship might depend on the specific form or aspect of digitalization, alongside characteristics of an enterprise. Furthermore, potential negative effects of digital-

ization on organizational well-being in combination with other factors might be similarly non-uniformal to the positive effects our study put forward and examined.

The age of an enterprise and the industry it operates in appeared to be critical contextual factors to consider when studying the impact of collaboration on the relationship between digitalization and organizational climate for well-being. BarNir et al. (2003) highlight that enterprises differ in their approach to digitalizing business processes depending on their age. Younger enterprises usually show a stronger inclination toward adopting internet-enabled technologies and respond more readily to digital innovations. These differences suggest that enterprises may (and should) develop distinct digitalization routines, potentially leading to varied impacts on the organizational climate for well-being. Moreover, older enterprises tend to have different liabilities than younger ones and exhibit different intra-organizational behavior. They typically demonstrate higher levels of accountability but may be less agile and responsive, often due to rigid rules and established routines that are challenging to modify (Coad, 2016). Likewise, enterprises operating in different industries tend to have varying needs for and levels of digital development. Some industry sectors, like software development (in production) or driving and delivery services (in services), usually require less collaboration among employees, while other sectors, like heavy civil construction (in construction), might find it more challenging to create an organizational climate that promotes well-being. Therefore, the enhanced understanding of industry-specific digitalization factors contributing to well-being that our study builds is crucial (Melville et al., 2004)—especially those relating to the varying moderation effects of collaboration.

Overall, the results suggest treating the boundary condition for the effectiveness of combined organizational resources (like digitalization and collaboration) critically (given that the combination of collaboration and data analytics in younger firms, as well as the combination of collaboration and software use in service industry enterprises, reversed the expected positive effect on well-being). Referring back to P. Warr (1999), certain environmental factors may exhibit curvilinear or threshold effects (which we could not capture empirically, as noted further in the Limitations section). When collaboration and data-driven decision-making are overused or clash, they can create conflicting demands and erode the climate for well-being (Giermindl et al., 2021). This challenges simplistic notions of "more is better" and emphasizes the need for contextual and nuanced application of workplace practices.

Additionally, two dimensions of digitalization—use of robots and computers—showed no moderation by collaboration across different industries and enterprise ages. This suggests that robotics and computer use and collaboration function as parallel and independent contributors to well-being, rather than synergistic enablers. The insight aligns with findings from Lesener et al. (2018) and Humphrey et al. (2007), who emphasize the direct importance of social support and team cohesion for well-being but do not necessarily link these factors to enhanced digital synergies. It also encourages a re-examination of how workplace resources interact in models like the JD-R framework, where resources may not always amplify one another's effects (Bakker & Demerouti, 2007). Instead, collaboration and some forms of digitalization may represent distinct resource pathways—social versus technological—that need to be balanced carefully rather than combined indiscriminately.

5.2. Practical Implications

The study offers actionable insights for managers in small enterprises. First, it underscores the value of digital tools in creating an organizational climate that supports employee well-being. Tools that enhance autonomy, communication, and clarity—such as

data analytics platforms, learning software, and internal communication systems—can be strategically implemented to foster a more positive work environment.

Second, while collaboration remains important, organizations should be cautious in assuming it will always enhance the effects of digitalization. In some contexts, particularly in younger enterprises and service industry enterprises, collaboration may create additional demands that reduce the effectiveness of digitalization strategies for organizational well-being. Managers should, therefore, balance collaborative practices with clear digital strategies to avoid potential overload or role conflict.

Third, the study highlights significant geographical differences in workplace well-being. Enterprises in Northern Europe reported higher well-being, likely due to a combination of social, cultural, and policy factors. This finding aligns with the World Happiness Report of 2024, which ranks Finland, Denmark, Sweden, and Iceland among the top seven; the United Kingdom is the only country ranked lower, at number 23 (Helliwell et al., 2025). Thus, geographical location is one of the key considerations when researching organizational climate for well-being. Understanding contextual influences can help managers and policymakers tailor strategies for well-being enhancement based on regional strengths and challenges.

The insights from the supplementary analysis mainly suggest that managers should align their digital strategies not only with enterprises' objectives but also with the age, industry type, and collaborative culture of their organization, in view of the consistent direct effect of collaboration on the organizational well-being.

5.3. Limitations and Future Research

This study has several limitations. First, its cross-sectional design limits causal inference. Future research should employ a longitudinal design to track changes in digitalization and collaboration over time and assess their impact on organizational well-being.

Second, this study primarily relies on binary indicators to measure digitalization and collaboration, which limits insight into the depth, quality, and intensity of the variables. Relying on binary measures can also distort moderation effects, as binary variables do not capture threshold levels or non-linear patterns crucial for understanding how collaboration influences the impact of digitalization. Overall, three of the four digitalization indicators and collaboration are measured as binary variables, making it impossible to reflect their inherent complexities. Future research should use continuous or detailed scales that measure the degree of implementation, quality, frequency, and intensity of digitalization efforts and collaboration. For example, measuring the number of hours per week employees spend on collaborative practices or the number of digital tools they use regularly could be insightful. Adding new digitalization indicators like artificial intelligence (AI), blockchain, and the intensity of collaborative practices would broaden the scope and relevance of future studies.

Third, a further limitation of this study is the use of data from the 2019 wave of the ECS. As digital technologies—particularly AI—have evolved rapidly in recent years, some practices related to digitalization may have changed since the time of data collection. For example, the diffusion of AI-enabled tools has accelerated since 2020, potentially reshaping digital work environments in ways not captured by the dataset. However, the ECS 2019 remains a high-quality, large-scale, and representative dataset that continues to provide valuable insights, particularly regarding foundational digitalization practices such as software adoption, data analytics, and remote collaboration tools. These technologies were already well-established by 2019 and remain highly relevant today. In this context, the use of secondary data offers a pragmatic and efficient approach to studying broader trends, especially in the absence of more recent representative data with comparable scope.

Fourth, common method bias and acquiescence bias risks are important to mention. Acquiescence bias occurs when respondents tend to agree with positively framed statements, regardless of their actual experiences (Baxter et al., 2015), while common method bias arises when independent and dependent variables are sourced from the same origin using the same measurement method (Kock et al., 2021). According to Podsakoff et al. (2003), common method bias can be mitigated by measuring the dependent and independent variables in different ways, which can also reduce acquiescence bias. Ensuring participant anonymity and introducing a time lag between the independent and dependent variables can also help mitigate this bias. In the ECS 2019, the questions about well-being, digitalization, collaboration topics were far apart from each other in the questionnaire; the survey was conducted anonymously (Eurofound & Cedefop, 2020). This helped minimize the risk of common method and acquiescence bias. Furthermore, Harman's single factor test conducted using principal component analysis (Podsakoff et al., 2003) showed that the largest component in the dataset represented only 17 percent of all the items, which is well below the critical threshold of 50 percent. This suggests that CMB does not materially affect our results, even if present to a certain degree. Nevertheless, future research should incorporate multi-informant data and utilize a variety of question styles, including mixed positive and negative stems. By further reducing the said biases, it becomes possible to make a more accurate assessment of the organizational climate for well-being. Including multiple informants, such as managers, employees, and HR personnel, allows for capturing different perspectives on the same phenomenon. For example, when measuring collaboration or the impact of digital tools on well-being, managers might focus on implementation and efficiency, while employees may emphasize usability and workload effects. These different viewpoints offer a fuller and more reliable picture of how digitalization and collaboration are experienced within the organization.

To further advance research on organizational well-being, future studies should apply the full vitamin model proposed by P. Warr (1999). While the present study focused on selected elements of the model and relied on indirect proxies to capture Warr's environmental determinants, examining the complete set using more closely aligned and validated indicators could offer a more comprehensive understanding of how digital tools influence the organizational climate for well-being.

Finally, using qualitative methods like case studies, focus groups, or semi-structured interviews can give deeper insights into employees' experiences and management's viewpoints. While quantitative analyses are useful for finding broad patterns and relationships, qualitative insights show how digitalization tools and collaborative practices are integrated into daily organizational life. By combining both methods, future research can offer a more complete and context-aware understanding of the relationship between digitalization and collaboration, as well as their combined effect on the organizational climate for well-being.

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Appendix A. Questions on the Organizational Climate for Well-Being, Digitalization, and Collaboration

Organizational Climate for Well-Being

Question 1. How would you describe the relations between management and employees in this establishment in general?

- Very bad
- Bad
- Neither good nor bad
- Good
- Very good

Question 2. To be evaluated positively, how important is it that employees at this establishment show the following behaviour?

- Making suggestions for improving the way things are done in the company?
    - Not at all important
    - Not very important
    - Fairly important
    - Very important

Question 3. Which of the following practices are used to involve employees in this establishment in how work is organized?

- (B) Meetings open to all employees at the establishment
    - Yes, on a regular basis
    - Yes, on an irregular basis
    - No

Questions 4, 5, 6. How often are the following practices used to motivate and retain employees at this establishment?

- (Q4) Communicating a strong mission and vision, providing meaning to our work
    - Very often
    - Fairly often
    - Not very often
    - Never
- (Q5) Providing interesting and stimulating work
    - Very often
    - Fairly often
    - Not very often

- Never

- (Q6) Providing opportunities for training and development
  - Very often
  - Fairly often
  - Not very often
  - Never

Digitalization

1. How many employees in this establishment use personal computers or laptops to carry out their daily tasks? Your best estimate is good enough.

- None at all
- Less than 20%
- 20–39%
- 40% to 59%
- 60–79%
- 80–99%
- All

2. Since the beginning of 2016, did this establishment purchase any software that was specifically developed or customized to meet the needs of the establishment?

- Yes
- No

3. Robots are programmable machines that are capable of carrying out a complex series of actions automatically, which may include the interaction with people. Does this establishment use robots?

- Yes
- No

4. Does this establishment use data analytics to improve the processes of production or service delivery?

- Yes
- No

Collaboration

A team is a group of people working together with a shared responsibility for the execution of allocated tasks. Team members can come from the same unit or from different units across the establishment.

Do you have any teams fitting this definition in this establishment? Tick one box only.

- Yes
- No

Appendix B. Descriptive Statistical Information on Control Variables

Table A1 presents the distribution of enterprises across one-digit NACE sectors. The dataset includes three different industry types: construction, production, and service. Of these, the service type is the most common. With 7931 respondents (68.1%), this group is three times larger than the production group and six times larger than the construction group.

Table A1. Industry groups.

Industry Group	Frequency
Construction	1301 (11.2%)
Production	2418 (20.8%)
Service	7931 (68.1%)
Total	11,650 (100%)

Table A2 summarizes the distribution of enterprises by country code and region. Within this dataset, only countries in the European Union and the United Kingdom participated. This means that not all countries based in Europe are represented (e.g., Norway and Switzerland). The original variable is transformed into a grouped variable that distinguishes between European regions. Eastern Europe is represented the most with 4145 (35.6%) respondents, while Northern Europe is represented the least (2240, 19.2%).

Table A2. Number of enterprises per European region and countries by region.

Variable Name	Include Country	Frequency
Northern Europe	Denmark, Finland, Sweden, Ireland, United Kingdom	2240 (19.2%)
Eastern Europe	Bulgaria, Romania, Czechia, Slovakia, Hungary, Poland, Estonia, Latvia, Lithuania, Croatia, Slovenia	4145 (35.6%)
Southern Europe	Spain, Portugal, Italy, Greece, Cyprus, Malta	2510 (21.5%)
Western Europe	Belgium, France, Netherlands, Luxembourg, Germany, Austria	2755 (23.6%)
Total		11,650 (100%)

Within this dataset, the age of the establishments is divided into four categories. Table A3 shows that companies older than thirty years (3711, 31.3%) are the most represented. This indicates that 68.7% of the dataset consists of companies younger than thirty years. Companies younger than ten years are the least represented, at only 15.9%.

Table A3. Age group.

Age Group	Frequency
10 years or less	1896 (15.9%)
11 to 20 years	3050 (25.6%)
21 to 30 years	3277 (27.2%)
More than 30 years	3711 (31.3%)
Total	11,650 (100%)

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