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Moving beyond conventional resistance and resistors: an integrative review of employee resistance to digital transformation

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ABSTRACT

Despite widespread organizational interest in digital technologies (DT), digital transformation projects often fail largely due to employee resistance. However, research on this resistance is fragmented and lacks integration, providing only partial explanations of the phenomenon. To address this gap, this integrative review aims to identify barriers to DT adoption in the workplace. Sixty-three papers met the eligibility criteria and underwent rigorous analysis. The factors thus identified reveal that resistance originates from workers' perceived job vulnerability. This explanation, however, is limited because of the assumptions it makes concerning the functions of technologies and the resources provided by jobs. By shifting the conceptualization of digital technologies from neutral tools to agents with causal powers and acknowledging the multifaceted nature of job resources, this review proposes a reconceptualization of resistance. Drawing from theories of social conflict, it integrates previous work to develop a three-stage model of resistance that reflects how perceived threats to resources influence employees' perceptions, emotional responses, and subsequent actions in the workplace. Building on this model, we propose a comprehensive framework that uses four pathways to explain how resistance may unfold in the workplace. Furthermore, we propose several research directions to guide future investigations. In light of these findings, this integrative review also presents various theoretical and managerial implications.

1. Introduction

Digital transformation is an incipient phenomenon in most industries, which is driven by the implementation of digital technologies (DT) that will usher in the Industry 4.0 era in the workplace (Hanelt et al., 2021). These technologies differ from other types of information technology in three respects. First, they facilitate 'the combination and connectivity of innumerable, dispersed information, communication and computing technologies' (Bharadwaj et al., 2013, p. 472). Second, these technologies facilitate a more encompassing and far-reaching transformation (Guenzi & Nijssen, 2021; Kellogg et al., 2020). Compared with the introduction of an IT system, DT can establish an overarching digital infrastructure containing cyber-physical systems in which humans and machines are perpetually connected (Hanelt et al., 2021; Hofmann & Rüsch, 2017; Vial, 2019), thereby linking the physical world with the digital world and enforcing human–machine interactions (Pereira et al., 2023).

Third, it is important to acknowledge that digital technologies share with earlier automation the capacity to replace human roles (Faizal et al., 2022; Hanelt et al., 2021; Pereira et al., 2023). However, these novel technologies not only replace the tangible aspects of human work but extend to intellectual functions such as problem-solving, decision-making, and even elements of creativity. Early automation primarily took over repetitive, physically demanding tasks, but these evolving digital technologies are beginning to perform cognitive and creative functions with human-like intelligence that were once considered uniquely human (Robert et al., 2020). As a result, these technologies are also transforming

interpersonal dynamics, particularly in the workplace. For example, research has increasingly highlighted that these technological tools can function as supervisors, capable of overseeing employee performance, distributing tasks, and making autonomous decisions about rewards and evaluations with a degree of human-like intelligence (Kensbock & Stöckman, 2021; Tong et al., 2021). By situating digital technologies within this broader history of automation, we aim to underscore the continuous and the expanding scope of how technology influences the workforce and human expertise. Finally, these technologies are implemented at every organisational level; thus, all employees, regardless of their previous qualifications, must be equipped with the necessary skills and learn new digital behaviours (Faizal et al., 2022; Hanelt et al., 2021; Rožman et al., 2023). For these reasons, DT are considered to be 'game-changing' (Sebastian et al., 2020, 197). The adoption of new technologies is a complex process that necessitates a deep understanding of various factors, including employee reactions (Frick et al., 2021; Vial, 2019). In fact, approximately 70% to 95% of digital transformation efforts fail (Bonnet, 2022). The failure rates of digital transformation projects are higher than those of other change initiatives (Wade & Shan, 2020), and one significant factor that contributes to these failures is employee resistance (Frick et al., 2021; Vial, 2019).

With regard to the importance of employee resistance to DT, many studies have suggested that employees' perceived judgements concerning these technologies prevent them from employing these technologies (Al-Sulami et al., 2024; Singh & Hess, 2017). However, this scattered evidence must be conceptualized in a unified, integrated way that can systematically explain how resistance emerges and what forms it takes. To address this gap, we conducted an integrated review of previous studies (Snyder, 2019; Torraco, 2005) to provide a comprehensive and systematic understanding of workers' resistance to these technologies.

The results of this review reveal that resistance can predominantly be attributed to workers' perceived job vulnerability, which may be due to their lack of the skills required to use DT or their fear of being replaced by such technologies. Adoption theories (Davis, 1989; Davis & Venkatesh, 1996; Venkatesh et al., 2003) have been used to understand this notion of perceived job vulnerability. These adoption theories assume that DT are neutral artefacts that are rationally assessed through functional judgements regarding their usefulness and ease of use. Resistance is said to emerge when these judgements are negative, which can be attributed to a lack of the skills necessary to understand and use these technologies on the part of workers (Jain et al., 2022; Kamoonpuri & Sengar, 2023). These theories exhibit an implicit pro-change bias: because DT are conceptualized as aids for performing work tasks, employee resistance is implicitly viewed as a brake on progress (Rivard & Lapointe, 2012; Shirish & Batuekueno, 2021). This stream of research has proposed that reskilling and upskilling can be used as strategies to overcome resistance (Rivard & Lapointe, 2012; Shirish & Batuekueno, 2021); namely, when employees receive greater training, they are likely to realize the value of DT and acquire the ability to use such technologies. In this context, technologies are believed to complement employees, thus overlooking the possibility that they may eventually take over employee tasks. Other studies have not drawn from adoption theories but nevertheless complement the account pertaining to perceived job vulnerability. This stream of research has depicted DT as agents with causal powers (Mosseri et al., 2023; Toshav-Eichner & Bareket-Bojmel, 2022) that will ultimately usurp human jobs. Humans thus compete with DT for jobs. Indeed, this view of DT as job robbers is common in the media, which portrays DT as being responsible for massive job losses that may not be recovered (Kelly, 2023; Nam, 2019). Only a minority of the papers have taken other impacts of technologies on workers' ability to address threats beyond the level of job vulnerability into account.

This dominant understanding of resistance as resulting from job vulnerability has certain limitations that warrant exploration. First, this perspective tends to oversimplify the intricate variety of reasons underlying resistance to digital transformation by reducing them to the fear of job loss (Granulo et al., 2019; Hötte et al., 2023), thereby neglecting the psychological, social, and ethical dimensions that contribute to employees' rejection of technology adoption. For example, an exclusive focus on skill inadequacy overlooks cases in which resistance arises due to concerns regarding the ethical implications of technology, such as privacy violations (Kellogg et al., 2020; Malik et al., 2022; Schneider & Sting, 2020). Second, this perspective fails to acknowledge all the other functions that these technologies may have. This perspective views digital technologies (DT) not only as tools designed to assist humans but also as systems with the potential to replace human roles, thereby overlooking other roles that these

technologies may play, such as disciplining workers or isolating them from their coworkers (Jacob et al., 2023; Konuk et al., 2023; Mosseri et al., 2023).

We extend the theorization of resistance by revising the assumptions underlying the job vulnerability account. First, we argue that adoption theories are ill-equipped to explain employee resistance. As our review demonstrates, DT are not perceived by workers as neutral artefacts to be domesticated but rather as menacing agents (Newlands, 2021; Schneider & Sting, 2020). Social conflict theories thus provide more suitable explanations of resistance than do adoption theories, as the former may capture this agonistic contest between workers and DT. Specifically, we draw from intergroup threat theory (ITT; Stephan et al., 2016) and propose the notion of threat as an encompassing explanation for the barriers to DT reported in previous studies.

Second, we acknowledge that 'work as employment constitutes a large part of our daily lives and serves a function beyond making a living' (Arat & Waring, 2022, p. 59). On the basis of this understanding, we challenge the dominant view of threats to material resources encapsulated in the explanation that appeals to job vulnerability. From this perspective, resistance occurs when employees' source of income is jeopardized, either because employees cannot perform the tasks that they are assigned or because these tasks are to be performed by DT. However, jobs also provide immaterial resources to employees (such as self-esteem, social relations, identity, status, autonomy, and development), which may be threatened by the introduction of DT (Schein & Rauschnabel, 2023; Schneider & Sting, 2020; Schuster et al., 2023). Threats to these immaterial resources are overlooked by the dominant conceptualizations of resistance. Third, we accept the claim that these distinct threats depend on the function that DT is to play in the workplace: DT can help individuals perform job-related tasks, often by replacing their coworkers (e.g. cobots); they can serve as substitutes for various work positions (e.g. through automatization); or they can monitor workers and extract their situated knowledge (e.g. through algorithms and artificial intelligence).

By challenging these assumptions, we offer a conceptualization of employee resistance that views it as a three-stage process, in which context judgements regarding threats to employee resources activate negative emotions that, in turn, render individuals likely to engage in passive or active resistant actions. Moreover, we identify four pathways of resistance that reveal the different ways in which resistance can unfold depending on the particular resource that is under threat and the particular emotion that is activated. Although these pathways are not intended to provide an exhaustive explanation of resistance, they reflect the wider variety of emotions that employees experience vis-à-vis DT—anxiety, stress, frustration or anger (Beaudry & Pinsonneault, 2010)—and encompass the different behavioural manifestations of resistance that have been reported in previous studies.

The proposed framework makes three key contributions. First, it enhances our understanding of human–technology interactions by acknowledging employees' perceptions of technologies as entities that exhibit distinct characteristics and intentions, unlike the common view of such technologies as neutral tools. This viewpoint, which is rooted in social conflict theories, sheds light on how technologies shape social structures and relationships. Second, our framework extends ITT to encompass human–technology interactions. While ITT traditionally addresses human outgroups, we propose that DT similarly compete for employees' resources. Furthermore, by introducing the appraisal emotion action framework, we also connect appraisals with emotions, which then lead to actions within the technological context. Finally, in a departure from traditional views, we strengthen the assumption that resistance can be viewed as productive (Ettlinger, 2018) rather than merely as a dysfunctional response. Instead of being inherently negative, employee resistance helps employees protect their resources from adverse consequences. In this case, resistance is a way to safeguard various resources, including both tangible to intangible resources. This research also challenges monolithic models of resistance and pro-change bias (Dent & Goldberg, 1999), thereby broadening our understanding of resistance to DT. Ultimately, our proposed reconceptualization of resistance in terms of conflicts over resources opens new lines of inquiry. The focus of this paper is on the dynamics underlying individual resistance, which entails personal acts of defiance against DT. While collective resistance is discussed below and plays a crucial role in organizational contexts, this study is specifically limited to individual behaviours. The majority of the papers analysed in this research focused on acts of individual resistance, an orientation which influenced the direction of this study.

The objective of this paper is thus to provide a comprehensive and integrative framework for understanding individual employee resistance to DT in the workplace. It seeks to bridge and integrate extant perspectives on this topic by proposing a unified model based on the notion of threat. The four pathways we identify offer insights into why employees may perceive DT as threatening. Furthermore, this research helps dispel the pejorative view of nonadopters and advocates for nuanced interventions that extend beyond training, such as upskilling or reskilling. Finally, the study also identifies promising avenues for future research that can enhance our understanding of resistors in the workplace.

The remainder of this paper is structured as follows: Section 2 provides an overview of the existing literature on resistance, particularly with regard to different types of resistance behaviour. In Section 3, we delineate the research methodology, including the search strategy, data sources, coding, extraction, selection criteria and analysis. Section 4 presents the results, first by explaining the dominant perspective in the literature on resistance to DT and then by exploring the limitations of each perspective. This approach aims to help orient researchers and provide a conceptual device that can guide further enquiry. The analysis of the principal literature then helps us develop an integrated framework for employee resistance to DT in Section 5. This integration leads to the four pathways that provide a nuanced explanation of the motives underlying resistant behaviour among workers. In Section 6, we propose a research agenda that may guide future empirical studies, particularly with respect to key areas such as research on productive resistance and collective resistance efforts. Finally, in Section 7, we conclude the study by outlining the theoretical contributions, managerial implications and limitations of the paper.

2. The notion of resistance to DT

Resistance is defined as a multidimensional construct that includes cognitive, affective, and behavioural dimensions (Erwin & Garman, 2010; Oreg, 2006; Peiperl, 2005; Piderit, 2000). The cognitive dimension refers to the individual's appraisals of innovations and the changes to which such innovation may lead; specifically, the cognitive dimension of resistance entails the perceived risks or threats that employees perceive with regard to DT. Threats include physical risks to oneself or the loss of resources as well as other intangible or nonphysical risks, such as violations of one's traditions, norms, or beliefs (Kleijnen et al., 2009; Stephan et al., 2016). The affective dimension of resistance refers to the emotions that people experience in response to perceived threats (Brief & Weiss, 2002). For example, individuals may experience fear with regard to adopting new work habits (Al-Abdallah et al., 2023) or their potential inability to perform novel tasks (Mansour et al., 2022). These emotions are experienced at both the individual and group levels (Niedenthal & Brauer, 2012).

Ultimately, the behavioural dimension refers to actions that employees take based on the appraisals and emotions elicited. In the majority of studies on information systems and technology, resistance refers to the rejection of novel technologies, such that users intend to prevent the introduction and usage of technologies (Kim & Kankanhalli, 2009). However, scholarship on resistance to technologies has reported that resistance can be understood more accurately as a continuum extending from passive to active resistance (see Table 1). Resistance to DT may result in passive individual actions, such as nonwork (Symon, 2005), withdrawal of labour or turnover intention (Symon, 2005), or as active behaviours, such as sabotage or cyberloafing. Scholars have also acknowledged a type of resistance efforts known as 'decaf resistance' (Contu, 2008), which may take the form of a balancing act between activity and passivity. Decaf resistance may be viewed as neither passive nor fully active. It involves deliberate actions that target the technology in question; however, these actions are framed as accidental, such as spilling

Table 1. Forms of behavioural resistance.

Resistance	Active		Passive	
	Individual	Collective	Individual	Collective
	Turnover	Voicing discontent	Nonwork, absenteeism,	Return to established routines
	Overt		Covert	
	Individual	Collective	Individual	Collective
	Sabotage	Public displays of resistance	Cyberloafing, manipulating technology	Anonymous groups of resistance

coffee on a computer (Mumby et al., 2017). This approach reflects a balanced act of resistance that lies somewhere on a spectrum between direct confrontation and subtle subversion.

Furthermore, resistance does not necessarily result in overt disengagement behaviours; rather, it can also take the form of covert actions taken while manipulating technology (Knights & McCabe, 1998) or that of the obfuscation of data for the worker's own benefit (Newlands, 2021). Resistance can also take discursive forms, such as cynicism (Fleming & Spicer, 2003), scepticism (Fleming & Sewell, 2002) or humour (Collinson, 2002). Finally, resistance can result in individual or collective actions (Mumby et al., 2017). Relevant individual actions may include knowledge hiding (Arias-Pérez & Vélez-Jaramillo, 2022), while corresponding collective actions may include public displays of opposition (Mumby et al., 2017). Specifically, collective resistance to DT has become ubiquitous. Collective resistance occurs through activism, campaigns, boycotts/strikes and the use of social media (Grohmann, 2021; Salamon, 2020; 2023). Collective resistance is channelled through larger social movements such as virtual unions (Salamon, 2020; 2023). The starting point for any resistant behaviour is the identification of grievances (Bonini & Treré, 2024; Grohmann, 2021; Salamon, 2020; 2023). Individuals share the challenges they face or their grievances in a group setting focused on issues related to their working conditions, such as in the cases of drivers and food couriers (Bonini & Treré, 2024). As individuals come together, they establish a sense of collective identity, which is pivotal with respect to collective resistant action (Grohmann, 2021; Salamon, 2020; 2023). Workers collectively mobilize each other through online communication, as this approach helps them connect with like-minded individuals, thus fostering a sense of community and solidarity (Salamon, 2020; 2023).

Paradoxically, to resist DT, workers can use the very same technologies, an approach which is known as digital activism. Digital activism is a component of this collective resistance to DT. Social media is used as a 'safe' space to support these activist activities (Grohmann, 2021; Salamon, 2023). These platforms facilitate workers' struggles by connecting people with shared experiences. Many workers learn from their fellow digital activists how to use the technology in question to their advantage (Bonini & Treré, 2024; Grohmann, 2021 Newlands, 2021). For example, individuals share their resistant behaviour or recommendations through communication channels such as Telegram or WhatsApp, such as information regarding how to hack or manipulate an algorithm most effectively (Grohmann, 2021; Newlands, 2021; Plantin, 2021; Qadri and D'Ignazio). By using these tactics, workers aim to reappropriate the technology itself as a tool for their resistance efforts, thereby undermining its original purpose. In so doing, they transform these instruments into tools for their own defiance, thus effectively domesticating and subverting them. Digital activism thus plays a crucial role in amplifying the voices of workers. Accordingly, employee voice is a means that can help individuals empower both themselves and others. It serves as a mechanism to oppose the technology in question by enabling individuals to voice their challenges collectively while simultaneously advocating for their rights (Grohmann, 2021; Newlands, 2021; Salamon, 2020). These individual voices are positioned in a collective realm, thus helping increase employees' visibility and solidarity by establishing group narratives of resistance (Salamon, 2023). These group narratives among individual workers hold the 'collective' together by creating ties of affection, and digital activism subsequently cultivates these ties (Newlands, 2021; Qadri & D'Ignazio, 2022).

These arguments demonstrate that resistance to DT may not necessarily be detrimental. Instead, these technologies can serve as valuable tools that workers can use to regain power and protect their resources. By employing DT to support their resistance efforts, workers can effectively turn these instruments to their own advantage. This process has been termed productive resistance (Ettlinger, 2018), thereby acknowledging the various forms and motivations underlying productive resistance in digital contexts.

This article aims first to provide an overview of the various forms of resistance associated with digital transformation (DT). More significantly, this work presents a conceptualization of resistance grounded in cognitive threat appraisals, drawing on integrated threat theory, which posits those perceptions of DT as a threat. These perceived threats subsequently elicit emotional responses such as fear, frustration, and anger. These emotions, in turn, motivate specific types of resistance behaviors. As noted by scholars (Erwin & Garman, 2010; Oreg & Michel, 2023), the emotional drivers of resistance have often been overlooked within the resistance scholarship. Recognizing the emotional foundation of resistance is essential, as emotions play a critical role in shaping how employees respond to organizational changes. Accordingly, this study investigates the types of threats employees perceive, the

emotions elicited by these perceived threats, and the actions they take in response, along with the functions of the technologies involved (e.g. replacement or identity erosion). This approach helps in identifying the cognitive appraisals and emotional responses, demonstrating how specific perceived threats (such as job replacement or identity erosion) lead to distinct emotional and behavioral outcomes. We seek to understand not only what triggers resistance but also why certain emotions lead to particular resistance behaviors. This understanding enables us to go beyond a general overview of forms of resistance and instead provide targeted insights into how organizations might recognize and address the underlying emotional drivers of resistance. In doing so, we aim to highlight the significance of catering to employees' emotional well-being, thereby creating more holistic and tailored strategies that consider both cognitive and emotional reactions to DT. This paper is therefore guided by the following research questions:

1. How do individuals appraise, feel and behave towards DT?
2. What behavioural forms does resistance take?
3. How do these elements interact to explain resistance?

3. Method

To answer these research questions, an integrative literature review was conducted to obtain a synthesis of the state of the art regarding this topic (Tranfield et al., 2003) and to integrate previous studies on employee rejection of digital transformation into a unified theory of resistance (Snyder, 2019; Torraco, 2005). Using the three-stage procedure developed by Tranfield et al. (2003), which includes planning, execution, and reporting (see Table 2), we systematically integrated previous studies on employee rejection of digital transformation into a unified theory of resistance (Snyder, 2019; Torraco, 2005).

This systematic literature review (SLR) was conducted using the PRISMA (Preferred Reporting Items for Systematic Review and Meta-Analysis) guidelines (Figure 1 PRISMA) to investigate employee resistance to digital transformation (Denyer & Tranfield, 2009). Following the systematic approach outlined by Tranfield et al. (2003), relevant studies were identified and examined, ensuring the review met standards of reliability, verifiability, and reproducibility (Denyer & Tranfield, 2009). The PRISMA framework offered a solid structure for both executing and documenting the review, allowing for a thorough evaluation of existing empirical evidence and exploration of individual-level resistance to digital transformation, while also identifying potential areas for future research. The following sections provide in-depth explanations of the review methodology, including the criteria used for study selection, inclusion and exclusion decisions, data extraction methods, and the coding framework employed to systematically analyze the findings.

Table 2. Planning, execution, coding and analysis.

Planning	• Identifying the technologies pertinent to digital transformation
	• First group of keywords regarding digital technologies
	• Second group of keywords regarding resistance
Execution	• Search conducted in Scopus and Web of Science databases
	• Articles published in peer reviewed journals up to November 2023
	• Titles and Abstracts (n = 707) screened
	• Duplicated Records or irrelevant titles/abstracts excluded
	• Full-text articles assessed for eligibility (n = 174)
	• Final Sample of 63 papers
Coding	• Two authors independently coded papers
	• Codes such as type of technology, emotions or behavioral manifestations of resistance
	• Grouping Studies to identify patterns
	• Pattern matching led to establishing three streams and recodifying the papers accordingly
Analysis	• Iterative process between coded papers and literature
	• Integrating and mapping emerging constructs
	• Framework development
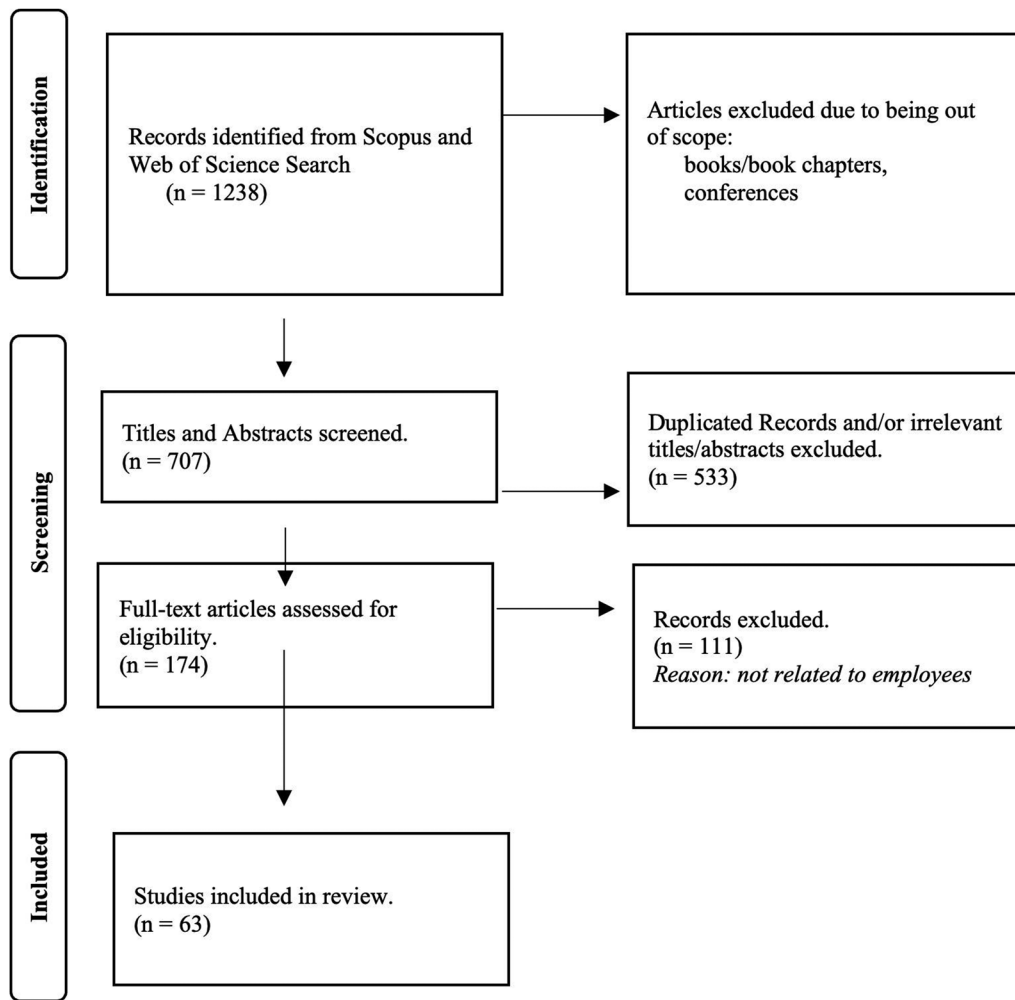
Figure 1. Prisma diagram.

3.1 Planning

Digital transformation and Industry 4.0 are overarching umbrella terms for many technologies that both have been and are being introduced to the workplace, many of which involve the integration of technologies into manufacturing or automatization processes (Neumann et al., 2021). No agreement has yet been reached regarding what technologies are included in Industry 4.0 (Hofmann & Rüsch, 2017; Vial, 2019). Furthermore, these technologies can be defined at different levels of abstraction, i.e. at a high level of abstraction, such as robotic process automation, or at a more granular level, such as specific predictive algorithms or artificial intelligence interfaces. We chose to define these technologies at a higher level of abstraction and relied on the categories provided by Frank et al. (2019) and Vial (2019): artificial intelligence (AI), algorithms, blockchain, cloud computing, big data, the Internet of Things (IoT), cobots, additive manufacturing, semantic technologies, automatization, and virtual or augmented reality. These technologies are the most germane to the digital transformation process (Gebhardt et al., 2022; Hofmann & Rüsch, 2017; Neumann et al., 2021; Santana & Cobo, 2020). This pool of technologies represented the first group of keywords used in the search.

The second group of keywords captured employee rejection or resistance through the inclusion of terms that have typically been treated as interchangeable with resistance, such as opposition or barrier (Kleijnen et al., 2009; Talke & Heidenreich, 2014). Furthermore, we included keywords such as technostress, fear or vulnerability because, even if these terms are not interchangeable with the term resistance, they have frequently been cited as related to that notion (Brougham & Haar, 2020; Coupe, 2019; Dengler & Gundert, 2021). Accordingly, our search string was as follows: *TITLE-ABS-KEY ((worker OR workforce OR employee) AND (automation "OR "robotic*" "OR "artificial intelligence" OR "algorithm "OR "bigdata"*

"OR "blockchain" "OR" "IoT" "OR "cloud computing" "OR "Internet of Things" "OR "augmented reality" "OR "additive manufacturing "OR "virtual reality""OR "digital"twin" "OR "cyber-physical system" "OR "robot" "OR "semantic technologies" "OR "smart manufact*" "OR "digital transformation" "OR "industry 4.0" "OR "digital disruption" "OR "technology disruption") AND (barrier* OR resistance OR rejection OR opposition OR insecurity OR technostress OR vulnerability OR fear OR anger OR frustration OR anxiety OR sadness OR threat)).

3.2 Execution

Searches were conducted in the Scopus and Web of Science databases, which are the most extensive databases containing peer-reviewed journals (Carvalho et al., 2013). The search was limited to articles that had been published in peer-reviewed journals as of November 2023. This search yielded 1,238 journal articles. The titles and abstracts of these articles were read to identify papers that met the following inclusion criteria: (1) published as English-language journal articles; (2) focused on the chosen technologies; (3) focused on employee rejection, opposition, withdrawal or nonuse of DT; and (4) examined the cognitive (appraisals of DT) or emotional or behavioural dimensions of resistance in the context of digital transformation within organizational settings. Both qualitative and quantitative papers were included (Pittaway et al., 2004; Tranfield et al., 2003). We excluded (1) conference papers and book chapters; (2) articles that did not focus on perceptions, vulnerability, job insecurity or rejection/resistance on the part of workers; (3) articles that did not focus on workers (e.g. consumer resistance); (4) articles that used technology as an educational tool (e.g. those in which technology was used for training rather than performing job tasks); and (5) articles that examined organisational or managerial perspectives on digital transformation, as opposed to employee perceptions. At this stage, the titles and abstracts of these articles were screened to identify potentially relevant articles; this process was conducted independently by the two authors, and the initial intercoder reliability was 95%. Any disagreements were resolved through discussions among the authors (Tranfield et al., 2003). The abstract screening process started with a manual review of each potential article, which took into account all articles that focused on resistance to DT. Articles were chosen on the basis of their conceptualization of resistance within an empirical context. The chosen papers were expected to yield valuable insights into the complex dynamics underlying employee resistance to digital transformation and to provide implications regarding ways of effectively addressing and managing resistance within contemporary workplaces. This process led to the identification of a total of 174 papers for further evaluation. In the following stage, these papers were read in full. Upon review (with an initial intercoder reliability of 93%), 111 papers did not meet the inclusion criteria. This process resulted in a final sample of 63 papers.

3.3 Reporting and coding

The coding process employed in this research formed part of the reporting stage outlined in Tranfield et al. (2003) three-stage procedure and encompassed a comprehensive examination of various dimensions related to threat perception and employee resistance to digital transformation (DT). During this stage, the authors independently coded the articles, ensuring a systematic and rigorous analysis of the data to identify key themes and patterns in the literature. The intercoder reliability based on a sample of 10 articles was 91%. Any differences in coding between the authors were resolved through discussion until consensus was reached. This process involved reexamining the coding scheme, rereading the articles, and discussing any discrepancies. Throughout the coding process, the authors maintained ongoing communication to ensure that any new issues or ambiguities that arose were promptly addressed. Regular meetings were held to ensure consistency throughout this process and to address any emerging discrepancies.

A set of inductively identified codes was established, which focused on methodological details as well as key thematic elements, including the technology under investigation, the type of workers involved, industry-specifics information, appraisals of or judgments regarding the technology in question, the emotions experienced by employees, behavioural manifestations of resistance, and the outcomes of the resistance efforts in question. We grouped all studies that focused on emotions, all papers that examined appraisals, and all papers that investigated behavioural manifestations. This process aimed to synthesize

the findings across the articles with the goal of identifying common patterns in employee resistance to DT. Through the pattern matching process, three streams then emerged, and we recoded the papers in accordance with these three streams. This recoding process facilitated a nuanced exploration of the links among perceived threats, emotional responses, and the behavioural manifestations of resistance. Specifically, within the cognitive dimension of coding, threat perceptions were scrutinized on the basis of judgements regarding the corresponding impacts on job resources, roles, or personal threats to the individual. Furthermore, we also coded the role of technology and its functions, such as whether it was intended to replace or substitute for peers.

Through an iterative process that involved drawing from ITT and appraisal-based theories of emotions as well as revisiting the papers revealed in the search, a conceptual framework was developed with the goals of integrating and mapping the emerging constructs. The development of this framework drew inspiration from previously proposed perspectives on threats to resources. By integrating these previous perspectives and mapping the various forms of resistance, different pathways of resistance were identified.

4. Findings

The findings of this review offer important insights into the characteristics and scope of existing studies on employee resistance to digital transformation. To provide a clear and structured overview, we begin by describing the key attributes of the studies included in this review. Following this, we present a categorization of the findings into three distinct streams, each representing a unique perspective on the factors driving resistance to digital transformation. These streams are discussed in detail to offer a nuanced understanding of the underlying dynamics shaping employee resistance.

4.1 Description of studies

Most of the articles included in this review were published between 2020 and 2022. A focus on white-collar workers was dominant (accounting for 50% of the papers), while 18% of the papers focused on blue-collar workers, and the remainder emphasized a combination of these two categories. A total of 39% of the papers employed a quantitative approach, while 49% a qualitative approach, and 11% relied on a mixed method approach (Figure 2). A total of 29% of the papers analysed studied AI/algorithms, while 25% studied robotics (cobots, robotization or robotic process automation), 10% investigated automation, and 5% focused on big data/blockchain technology, as illustrated in Figure 3. The remaining papers (31% of the total) did not specify any technology and focused on all digital technologies. In terms of industry, 39% of the studies investigated DT technologies in service industries—hospitality services (restaurants, hotels), healthcare, or finance. A total of 21% of the papers examined manufacturing settings, such as the automotive industry, while the remaining studies did not specify a particular industry.

The coding process helped us categorize the extant perspectives into three streams. The initial perspective, which was observed in 38% of the articles, defines resistance in terms of responses to job insecurity or anticipated future job displacement. The second perspective, which was evident in 33% of the papers under review, characterizes resistance as resulting from a mismatch between workers and technology, in which context inadequate employee skills impede assessments of the technology's utility and usability. The third perspective, which was found in 29% of the included studies, emphasizes the impacts of these technologies on identities and social relationships. Each of these perspectives is discussed in sequence, and a summary is provided in Table 3.

4.2. Resistance as a reaction to anticipated job loss

This stream conceptualizes resistance as a reaction to anticipated job loss (Arias-Perez and Vélez-Jaramillo, 2022; Brougham & Haar, 2020; Goethals & Ziegelmayer, 2022). Indeed, one of the most frequently cited reasons for employee resistance lies in their perceptions of job insecurity (Chigbu & Nekhwevha, 2021; Ding, 2021; Hampel et al., 2022; Ivanov et al., 2020; Koo et al., 2021;). This account entails that DT threatens the material resources of workers (Jacob et al., 2023; Li, 2023; Toshav-Eichner & Bareket-Bojmel,

Distribution of Studies across methodologies
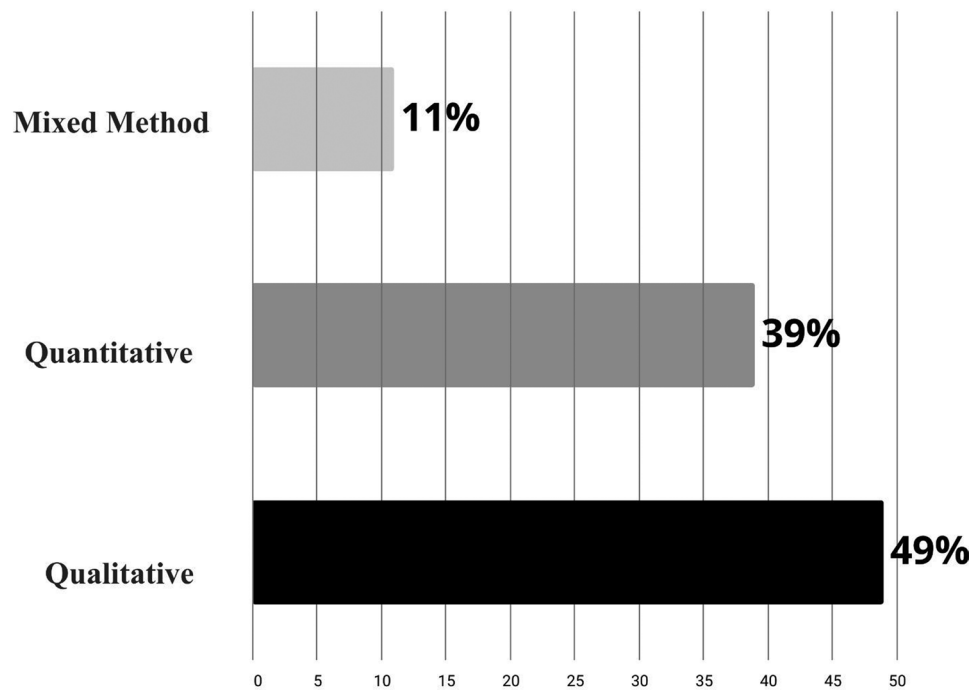
Figure 2. Distribution of studies across methodologies.

Type of Digital Technologies
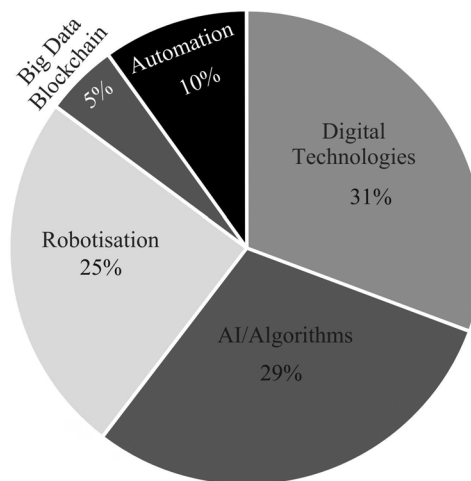
Figure 3. Distribution of digital technologies.

2022), including both low-skilled workers in low-paying jobs and highly qualified, white-collar employees (Dwivedi et al., 2017; Granulo et al., 2019; Vorobeva et al., 2022).

This perceived threat activates feelings of fear of uncertainty in employees (Ågnes, 2022; Brougham & Haar, 2020; Kim et al., 2022; Li, 2023; Toshav-Eichner & Bareket-Bojmel, 2022; Vorobeva et al., 2022). Additionally, it activates suspicion and distrust (Ågnes, 2022) because employees feel that their psychological contract has been violated (Hampel et al., 2022; Molino et al., 2021; Toshav-Eichner & Bareket-Bojmel, 2022). Finally, this stream indicates that resistance takes passive forms similar to withdrawal (Brougham & Haar, 2020; Koo et al., 2021), namely, decreased job involvement, increased turnover intention

Table 3. Three perspectives of employee resistance.

Perspective	Resistance as job insecurity	Resistance as misalignment	Resistance as loss of professional identities and social relations
Reasons for resistance	Perceived future job loss	Lack of skills and inertia limit perceived usefulness and ease of use	Perceived erosion of power, professional identities, and social relations
Emotions acknowledged	Fear	Anxiety Technostress	Anger, Fear, Frustration, Sadness
Behavioural manifestations	Passive: withdrawal	Passive: non use	Active: covert and overt attacks to technology
Underlying assumptions	Jobs as material resources Extrinsic view of DT: replace human labour	Jobs as tasks to be fulfilled Technology as neutral artifacts that aid in task pursuit	Jobs as a source of nonmaterial resources: self-esteem, social recognition and relations. DT as disciplining devices and substitutes for co-workers
Studies	Ågnes, 2022; Arias-Perez and Vélez-Jaramillo, 2022; Bhattacharyya, 2024; Brougham & Haar, 2020; Chigbu & Nekhwevha, 2021; Ding, 2021; Dwivedi et al., 2017; Granulo et al., 2019; Hampel et al., 2022; Ivanov et al., 2020; Jacob et al., 2023; Kim et al., 2022; Koo et al., 2021; Goethals & Ziegelmayer, 2022; Li, 2023; Molino et al., 2021; Nazareno & Schiff, 2021; Papadopoulos et al., 2022; Presbitero & Teng-Calleja, 2023; Priyadarshi & Premchandran, 2022; Stieglitz et al., 2023; Toshav-Eichner & Bareket-Bojmel, 2022; Vorobeva et al., 2022; Xu et al., 2023	Birkel et al., 2019; Costin et al., 2012; Cranefield et al., 2023; Frick et al., 2021; Flechsig et al., 2022; Jang et al., 2024; Kar et al., 2021; Kim & Kankanhalli, 2009; Lambrechts et al., 2021; Ligarski et al., 2021; Malik et al., 2022; Mete & Eyel, 2021; Nnaji & Karakhan, 2020; Pfeiffer, 2016; Shahbaz et al., 2019; Shahbaz et al., 2021; Shirish & Batuekueno, 2021; Sholler, 2020; Song, 2021; Szalavetz, 2022; Vallas, 1998;	Arat & Waring, 2022; Carvalho et al., 2022; Hornung & Smolnik, 2022; Klimkeit & Reihlen, 2022; Lammi, 2021; Lu et al., 2020; Mayer & Velkova, 2023; Meissner et al., 2021; Mirbabaie et al., 2022; Mosseri et al., 2023; Newlands, 2021; Plantin, 2021; Qadri & D'Ignazio, 2022; Schein & Rauschnabel, 2023; Schneider & Sting, 2020; Strich et al., 2021; Van Oort, 2019; Wu et al., 2023

(Papadopoulos et al., 2022; Presbitero & Teng-Calleja, 2023; Priyadarshi & Premchandran, 2022) or decreased performance (Li, 2023; Stieglitz et al., 2023; Toshav-Eichner & Bareket-Bojmel, 2022; Xu et al., 2023).

4.3 Resistance as a misalignment between workers and technology

The second perspective draws from adoption theories such as the Technology Acceptance Model (Davis, 1989; Davis & Venkatesh, 1996) or the Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003). Status quo scholarship (Samuelson & Zeckhauser, 1988) also informs this approach. This perspective conceptualizes resistance as nonuse or reluctance to use DT resulting from functional barriers that are interpreted as misalignments among employee skills, technology, and existing, routinized practices. Employees' lack of skills is identified as the main reason for employees' reluctance to use DT (Costin et al., 2012; Mete & Eyel, 2021; Nnaji & Karakhan, 2020; Shahbaz et al., 2019, 2021; Szalavetz, 2022). This reluctance results in passive resistance that involves a simple return to old approaches instead of continued use of these novel technologies (Cranefield et al., 2023; Sholler, 2020; Szalavetz, 2022). Studies conducted from this perspective have implicitly depicted DT as neutral artefacts that are rationally assessed through functional judgements regarding their usefulness and ease of use. Some studies have also linked the skill gap with anticipated job loss, as they have acknowledged that employees perceive that their expertise and skills will be rendered obsolete by DT (Pfeiffer, 2016). This misalignment leads to technostress, which refers to the stress or anxiety generated by the requirement for employees to improve their ability to use the technologies in question (Birkel et al., 2019 Ligarski et al., 2021; Nnaji & Karakhan, 2020; Szalavetz, 2022). This anxiety is exacerbated when employees believe that their coworkers have superior technological skills because if they are unable to upskill or reskill, they may be displaced (Flechsig et al., 2022; Kar et al., 2021; Ligarski et al., 2021). Additionally, employees may experience fear in this context since their perceived inability to change their routines and practices (Flechsig et al., 2022; Nnaji & Karakhan, 2020; Vallas, 1998) or acquire new skills and knowledge (Ligarski et al., 2021; Szalavetz, 2022) negatively impacts their present (or future) employability (Song, 2021).

In addition, employees' lack of skills is also posited to cause a discrepancy between the capabilities of the technology in question and the expectations or needs of the individual (Jang et al., 2024; Malik et al., 2022). Indeed, employees view these technologies as unreliable (Lambrechts et al., 2021; Ligarski et al., 2021; Malik et al., 2022) or as otherwise failing to meet their expectations (Lambrechts et al., 2021; Ligarski et al., 2021; Malik et al., 2022; Szalavetz, 2022); thus, they consider such technologies to be valueless.

In summary, according to this perspective, resistance emerges when the judgements made by employees regarding the usefulness and ease-of-use of DT are negative, which can be attributed to workers' lack of the skills necessary to understand and use these technologies. These judgements activate feelings of fear, stress or anxiety. Resistance results in nonuse or passive resistance: namely, employees intend not to use the technology in question or return to their 'old ways of doing' things (Marakas & Hornik, 1996).

4.4 Resistance as a reaction to eroded identities and social relations

The third perspective defines resistance as a reaction to losses in perceived identity or social relationships. This approach emphasizes the fact that DT not only affect task pursuit but also negatively impact employees' recognition and validation by reducing their power or fundamentally changing their professional roles and work culture (Lammi, 2021; Qadri & D'Ignazio, 2022; Schneider & Sting, 2020; Van Oort, 2019). Resistance emerges because employees believe that the introduction of these technologies will reduce their power and autonomy within the organization (Lu et al., 2020; Mosseri et al., 2023). Employees perceive that their decision-making is curtailed and that their agency is restrained (Mosseri et al., 2023), as they cannot make independent decisions or obtain the autonomy they need to continue working in their accustomed manner (Lammi, 2021; Mirbabaie et al., 2022; Molino et al., 2021). DT technologies are not perceived as inanimate tools under human control; rather, they are viewed as intelligent and autonomous agencies that can make decisions for humans (Newlands, 2021; Strich et al., 2021). Moreover, employees perceive a loss of control over processes and outputs since these technologies become producers (Lammi, 2021; Strich et al., 2021). This perceived loss of autonomy is more evident when surveillance technologies are introduced to monitor how workers perform their tasks and their performance. The use of video surveillance, which can even involve monitoring the micromovements of workers and extracting subjective information regarding employees (Mosseri et al., 2023; Van Oort, 2019), curtails their freedom (Schneider & Sting, 2020).

A second group of studies conducted from this perspective has reported that DT technologies negatively affect workers' professional identity (Klimkeit & Reihlen, 2022; Mirbabaie et al., 2022; Schneider & Sting, 2020), as these technologies change workers' organisational or professional roles, thereby often decreasing their value. For example, according to Schneider and Sting (2020), before the introduction of novel technologies, some employees conceptualized their professional identity in terms of being 'a creative thinker' or a 'freelance artist'. However, after the introduction of such technologies, their perceived professional identity changed: their new work tasks were not consistent with creativity, thus leading to an erosion of their perceived professional identity. In other cases, the introduction of these technologies may render workers' roles obsolete (Klimkeit & Reihlen, 2022; Schneider & Sting, 2020). This shift, in turn, devalues workers' identity: since one's professional identity is based on one's knowledge and skills (Arat & Waring, 2022; Klimkeit & Reihlen, 2022), when this knowledge becomes less necessary or is overridden by technologies, employees perceive that their esteem or status decreases. As some studies have reported, employees acknowledge experiencing disappointment because 'old-established, decades-surviving dexterities are less and less appreciated and needed' (Schneider & Sting, 2020, p. 419). This devaluation is exacerbated when DT extract employees' tacit knowledge, which is the basis of their role and, consequently, of their social status (Schneider & Sting, 2020).

Finally, studies have identified the disappearance of teamwork and personal relations in the workplace following the introduction of DT (Carvalho et al., 2022; Lammi, 2021) as a reason for resistance. These technologies decrease the opportunities available to workers to socialize in the workplace (Mayer & Velkova, 2023; Van Oort, 2019) and jeopardize teamwork since workers work with technologies and are thus isolated from their colleagues (Lammi, 2021; Mayer & Velkova, 2023; Schneider & Sting, 2020).

Studies conducted from this perspective have emphasized the negative emotional experiences of employees, notably fear (Mirbabaie et al., 2022), anger (Hornung & Smolnik, 2022; Lammi, 2021; Schneider & Sting, 2020; Song, 2021) and frustration (Hornung & Smolnik, 2022; Mirbabaie et al., 2022). The perceived loss of power, identity and relationships that occurs in this situation may even lead to acute levels of suffering among employees, including suicidal thoughts (Hornung & Smolnik, 2022). Studies in this stream have expanded the resistance actions identified from the previous two perspectives, conceptualizing resistance in terms of taking overt, active forms such as sabotage or cyberloafing (Mumby et al., 2017; Thanem & Elraz, 2022), voicing discontent (Mumby et al., 2017) or ridiculing technologies (Ackroyd & Thompson, 1999), or taking covert or disguised resistance actions while manipulating technology (Knights & McCabe, 1998; Newlands, 2021). Studies in this stream have also acknowledged that employees face a broader range of threats that extend beyond the level of mere job vulnerability, including the loss of identity or human interactions.

4.5 Limitations of these perspectives

Despite the considerable progress that has been made in our understanding of resistance, these perspectives offer only partial conceptualizations of employee resistance to digital transformations. Moreover, several assumptions hinder the quest to obtain a comprehensive understanding of resistance and 'resistors'. First, the first and second perspectives implicitly view jobs as a source of material resources (e.g. remuneration or salary), thereby overlooking the fact that jobs provide other immaterial or symbolic resources that can support recognition among workers (Arat & Waring, 2022). Indeed, work is associated with a much broader meaning for individuals, such as by satisfying their personal aspirations or interests and facilitating social relationships (Le Lay & Lemozy, 2023). Evidence indicating that jobs are more than a source of income can be found in the famous 'lottery question' studies, which have revealed that individuals would continue working despite winning the lottery (Anuradha et al., 2014). Only studies in the third stream have recognized that employees perceive various threats beyond the levels of job insecurity and financial stability.

The three perspectives also differ in terms of their portrayal of technologies. The adoption theories used in the second perspective depict DT as neutral tools for performing work tasks, thus highlighting their advantages, such as those pertaining to efficiency and productivity gains (Talke & Heidenreich, 2014). However, this portrayal overlooks the fact that technologies may substitute for employees or even managers, as they can make decisions for employees or monitor their performance and report it to management (Malik et al., 2022; Mosseri et al., 2023; Schneider & Sting, 2020). In contrast, the first perspective portrays technologies as job robbers, whereas the third perspective emphasizes the disciplinary role of technology (Malik et al., 2022; Mosseri et al., 2023; Sholler, 2020). Because the account of resistance provided by each stream is intrinsically tied to one of these functions, the explanation provided by each stream does not hold when one considers other functions of technologies.

The three perspectives also differ in terms of the evaluation processes they attribute to employees. Whereas from the second perspective, employees are assumed to assess DT rationally, the first and third streams focus on a more emotional decision-making process, in which fear and anger play crucial roles. In summary, none of these perspectives provide a complete explanation of why resistance emerges and what forms it takes. A conceptual integration that can account for the different judgements regarding technology, emotions and behavioural manifestations of resistance is warranted, as explained in the following.

5. Resistance as a response to perceived threats: an integrated framework for employee resistance to DT

As explained, previous conceptualizations have offered only partial understandings of employee resistance to DT. Bridging these three streams would provide a unified and cogent theorization that could explain the continuum of resistance ranging from passive to active and take into account the distinct functions of DT. Furthermore, the proposed conceptualization not only integrates these three streams but also reconfigures extant studies, thus presenting them in a new light (MacInnis, 2011), as it facilitates

two shifts in the focus of such research. First, we shift from viewing jobs as a source of material resources to depicting jobs as sources of other resources, such as social recognition or personal growth (Arat & Waring, 2022). Second, consistent with employees' judgements (Lammi, 2021; Schneider & Sting, 2020), we shift from viewing technology as a neutral tool that helps employees perform work tasks to portraying it as an agentic group that is able to perform other functions (such as replacing, disciplining or substituting for coworkers). By shifting our understanding of how employees confer meaning on their jobs and how DT affects them, we can explore the fuzzy and complex nature of resistance.

On the basis of these assumptions, we propose to investigate resistance as a form of social conflict. Intergroup conflict theories are appropriate foundations for resistance because they are in line with employees' perceptions of DT as constituting representatives of a powerful outgroup that, because of the various functions of such technologies, compete with humans over scarce resources (Huang & Rust, 2018; Vanman & Kappas, 2019). Specifically, we draw from ITT to provide an overarching explanation of resistance to DT.

ITT was proposed to explain prejudice towards and animosity against outgroups. This theory originated in the field of social psychology and is based on social identity theory (Riek et al., 2006; Stephan et al., 2016), which postulates that an individual's social identity is established by the groups to which that person belongs (Worchel et al., 1998). Employees also build their identities on their professional roles and social groups (Pratt et al., 2006). A central assumption of this theory is that individuals view their own group as positively distinct from other outgroups (Huang et al., 2021). Social conflicts are then said to occur when outgroups are perceived as threats (Stephan et al., 2016); accordingly, ingroups respond by derogating, attacking, or distancing themselves from the outgroup (Fasce et al., 2023).

Members of a group tend to perceive the outgroup as a menace when they believe that their own resources or worldviews are jeopardized (Tausch et al., 2009). The threats posed by outgroups can be categorized into two dimensions. First, threats can be divided into realistic threats (i.e. those that target the group's power or economic resources) and symbolic threats (i.e. those that target the group's values, norms, or worldview). Both types of threats can harm the ingroup insofar as they entail a loss of resources, whether material or sociocultural. Second, threats can be individual or collective. An individual threat affects only the individual herself, such as by harming her personal security or job. In contrast, collective threats entail a threat to the group, such as a threat to the human identity or uniqueness of the group (Stephan et al., 2016).

These perceived threats elicit a variety of negative emotions, such as anger, fear, and disgust (Landmann et al., 2019; Stephan et al., 2016; Stephan & Stephan, 2013), insofar as the threatening outgroup is viewed as detrimental to individual or collective well-being (Landmann et al., 2019). Although ITT acknowledges the fact that perceived threats mobilize emotions, the specific links between appraisals of threat and the emotions thus experienced have not yet been examined systematically. However, appraisal-based approaches to emotions have demonstrated that emotion(s) depend not only on the perceived threat in question but also on the corresponding assessment of control and the certainty of acting upon such threat (Lazarus, 1991; Lerner et al., 2015). For instance, both anger and fear are negative emotions elicited by contexts that are perceived as impediments to one's goals; however, anger is associated with appraisals of high certainty and control over the impediment, whereas fear is associated with appraisals of low certainty and control (Lerner et al., 2015).

These emotions, in turn, condition the behaviour of individuals, as they motivate those individuals to protect the ingroup in response to a threatening outgroup (Hodson & Costello, 2007; Stephan et al., 2009; Stephan & Stephan, 2017). Specific emotions stimulate distinct behavioural dispositions or action tendencies (Frijda, 2007). To illustrate this point, fear is often associated with withdrawal or submissive behaviours, whereas anger usually motivates attacks (Frijda, 2007). Because the actions taken against the outgroup are motivated by the specific emotions experienced with regard to that outgroup, emotions are identified as a mediating mechanism in responses to threats.

ITT provides the foundational axioms for attempts to conceptualize resistance to digital transformation. We argue that workers' relationships with DT are similar to intergroup relationships (Huang & Rust, 2018; Vanman & Kappas, 2019). Because employees perceive that they are in competition with these technologies, they may evaluate such technologies as potential threats to their material or intangible resources (Huang & Rust, 2018; Vanman & Kappas, 2019; Yogeeswaran et al., 2016), insofar as these

technologies can replace and/or control humans (Kellogg et al., 2020; Modliński et al., 2023), erode their identities and social relations, and work more effectively than humans can (Huang et al., 2021; Yogeeswaran et al., 2016; Złotowski et al., 2015, 2017).

In light of previous studies based on ITT, we conceptualize employee resistance as a social conflict process that features three components: a judgement regarding a threat, an emotion generated by this judgement, and a behavioural response elicited by this emotion. Employee resistance to digital transformation emerges when workers judge that these technologies pose a threat to their material resources, such as their present or future employability, or to their intangible or sociocultural resources, such as their professional identity. Depending on the perceived threat in question and the corresponding perceptions of control, different emotions are mobilized. In turn, these emotions guide action, thus leading employees to engage in passive resistance (nonuse) or active resistance (sabotaging or boycotting technology).

To explain how these three components combine to explain resistance, we identify four pathways of resistance: *burdening*, *diminishing*, *disempowering*, and *isolating*. These pathways are analytical abstractions based on previous studies, although they may coexist within the lived experiences of workers. Moreover, this list does not exhaust the possible pathways of resistance; rather, these pathways are offered as examples of how resistance may unfold. These four pathways are distinguished on the basis of the function played by DT, the resource being threatened and the emotions and forms of resistance that such perceptions generate (Figure 4). The proposed pathways serve multiple purposes. First, the distinct pathways proposed in this research provide a nuanced understanding of the various dimensions of employee resistance to technology adoption. This understanding can help organizations identify the specific concerns and challenges faced by employees. Furthermore, organizations may use these proposed pathways to tailor their approaches to technology adoption, thereby promoting smoother transitions.

5.1. Burdening pathway

This pathway of resistance emerges when employees judge that DT will replace them. Such replacement poses a material threat or a threat to employees' source of income by jeopardizing their present and future employability. Employees perceive themselves as 'deskilled' (Koo et al., 2021; Pfeiffer, 2016; Plantin, 2021) and thus experience uncertainty concerning their present employability (e.g. possible layoffs),
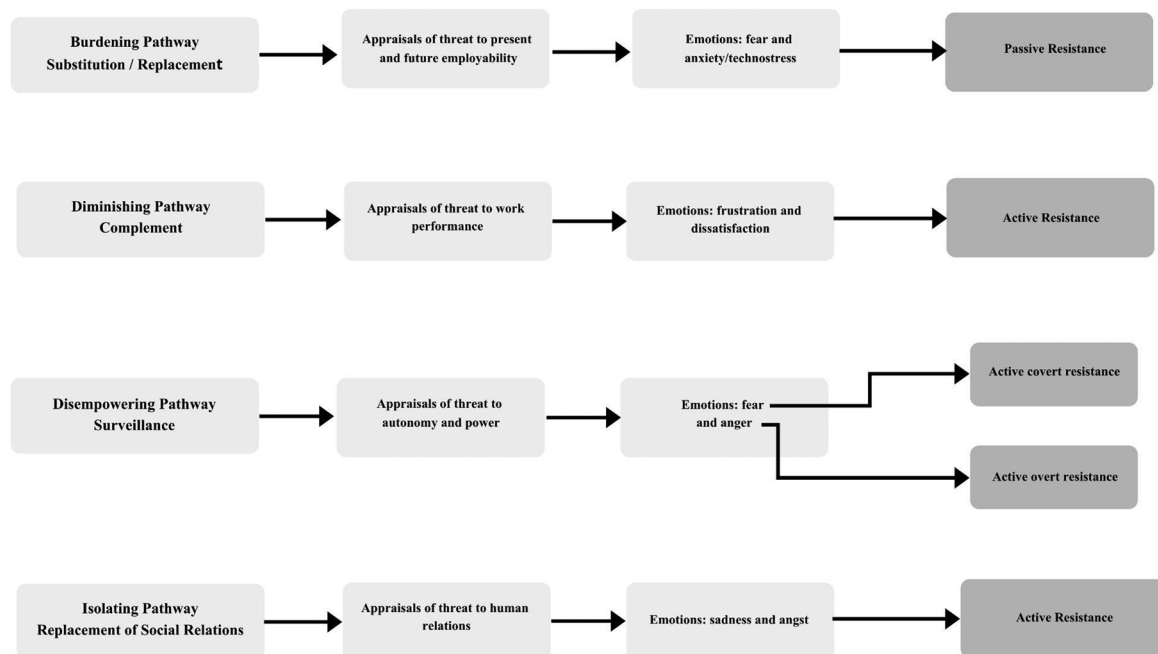

Figure 4. Pathways of resistance.

which may also be transposed to the future (e.g. difficulties finding jobs or the need to take jobs with worse working conditions).

Appraisals of future uncertainty (Nazareno & Schiff, 2021; Toshav-Eichner & Bareket-Bojmel, 2022; Vorobeva et al., 2022) generate fear. Workers also fear that they will be required to strive to emulate robots, i.e. to play the role of exemplary model workers who never become sick or take vacation time (Ågnes, 2022; Molino et al., 2021), and they are concerned that their work will become a robotic experience that entails even more demanding requirements (Mete & Eyel, 2021). Fear may emerge alongside anxiety or 'technostress' (Fleischer & Wanckel, 2024; Malik et al., 2022; Meissner et al., 2021), which represent negative emotions that arise due to employees' perceived inadequacy with respect to these technologies. In turn, such technostress also has secondary adverse outcomes, such as increased difficulty concentrating and paying attention (Lu et al., 2020; Meissner et al., 2021). This situation leads to a vicious cycle of negative emotions that makes it burdensome for employees to learn new skills.

Passive resistance is the most common behavioural manifestation observed in this pathway, as studies have reported various consequences such as more turnover intentions, higher rates of absenteeism, and withdrawal states such as decreased commitment at work (Brougham & Haar, 2020; Koo et al., 2021; Nazareno & Schiff, 2021; Priyadarshi & Premchandran, 2022). Furthermore, employees may also resist this (re)upskilling process because it demands cognitive resources and is viewed as a 'burden' that can exacerbate their stress.

5.2 Diminishing pathway

The diminishing pathway emerges when employees perceive a threat to their work performance. Employees must work with technologies that are nonetheless appraised as obstacles to task pursuit, thus decreasing the quality of employees' work or their productivity (Chigbu & Nekhwevha, 2021; Ding, 2021; Nazareno & Schiff, 2021); these technologies are thus viewed as valueless or suboptimal in comparison to the routines or procedures previously used by employees (Ågnes, 2022; Ding, 2021; Lammi, 2021; Ligarski et al., 2021). This limited performance, in turn, compromises workers' professional prestige and negatively affects their salaries; moreover, sustained reduced performance can motivate redundancies. Accordingly, this path represents a primary threat to material resources and a secondary threat to immaterial resources such as self-esteem.

This perceived threat elicits emotions such as frustration and dissatisfaction (Ågnes, 2022; Chigbu & Nekhwevha, 2021; Hornung & Smolnik, 2022; Jacob et al., 2023; Klimkeit & Reihlen, 2022; Lu et al., 2020). These emotions are typically experienced when workers view technologies as impediments to their goals and appraise the situation at hand as unfair or illegitimate but are nevertheless forced to continue using such technologies (González-Gómez & Hudson, 2023). Strong and sustained frustration becomes a psychosocial work stressor (Schneider & Sting, 2020), resulting in emotional exhaustion and increased overall distress (Presbitero & Teng-Calleja, 2023). Frustration may lead to withdrawal or aggression (González-Gómez & Hudson, 2023). Depending on the organisational context at hand, employees may underutilize such technologies (Shahbaz et al., 2019, 2021) or voice discontent regarding a specific technology (Arias-Pérez & Vélez-Jaramillo, 2022; Chigbu & Nekhwevha, 2021; Schneider & Sting, 2020).

5.3 Disempowering pathway

This pathway originates in appraisals of DT as a threat to employees' agency or identity, which can jeopardize symbolic resources such as self-esteem or social status. This path is linked to the disciplinary function of DT: workers perceive these DT as powerful superhuman machines that deprive workers of their human uniqueness and freedom, since such technologies can make decisions that supersede those of humans (Toshav-Eichner & Bareket-Bojmel, 2022). This situation is the case with regard to AI or algorithms that are perceived as autonomous decision-makers (Hampel et al., 2022; Mayer & Velkova, 2023; Song, 2021; Stieglitz et al., 2023; Wu et al., 2023), thus reducing employees' power in the workplace. Since AI makes decisions for employees, it erodes workers' skills and expertise, thus leading to a devaluation of their professional identity (Chigbu & Nekhwevha, 2021; Kim et al., 2022; Mayer & Velkova, 2023; Pfeiffer, 2016; Stieglitz et al., 2023; Strich et al., 2021). A similar threat is perceived in the context of

surveillance technologies that not only continually monitor employees' behaviour and performance (Hornung & Smolnik, 2022; Lammi, 2021; Nazareno & Schiff, 2021; Newlands, 2021; Qadri & D'Ignazio, 2022; Schneider & Sting, 2020) but also extract employees' tacit, situated knowledge (Nazareno & Schiff, 2021; Van Oort, 2019), thus depriving them of the resources on which their status is based. Similarly, several studies have shown that workers view their professional identity and personal distinctiveness as being threatened in this context (Hampel et al., 2022; Lu et al., 2020; Mayer & Velkova, 2023; Mirbabaie et al., 2022; Mosseri et al., 2023; Schneider & Sting, 2020), thus leading to a loss of professional recognition and perceived power (Lammi, 2021; Mirbabaie et al., 2022; Stieglitz et al., 2023). This disidentification with one's professional identity can spill over to the organization: a separation between the employee's identity and the occupational identity and the corresponding values (Mirbabaie et al., 2022; Schneider & Sting, 2020; Stieglitz et al., 2023; Strich et al., 2021) can lead to decreased commitment in the workplace (Strich et al., 2021; Van Oort, 2019)

This perception of powerlessness elicits emotions of fear or anger. Fear is experienced when workers anticipate a potential devaluation of their position but perceive that they have only limited control over or ability to change the situation (Molino et al., 2021; Vorobeva et al., 2022). Because the motivational goal of fear is to escape harm (Frijda et al., 1989), fear is more likely to drive covert forms of resistance, such as 'pulling the plug' (Newlands, 2021; Sholler, 2020; Van Oort, 2019). Anger occurs when employees perceive that they can revert or cope with the threats posed by these technologies (Ding, 2021; Hampel et al., 2022). The motivational goal of anger is to eliminate harm (Smith & Ellsworth, 1985); thus, anger is implicated in responses that are characterized by overt resistance, such as protests (Newlands, 2021; Qadri & D'Ignazio, 2022). Other resistance-related actions driven by anger focus on rectifying the perceived power imbalance. In this case, workers engage in a paradoxical form of resistance by using the technology itself as a tool in their efforts to subvert its disciplinary function (Newlands, 2021; Qadri & D'Ignazio, 2022). While technological surveillance is designed to optimize worker performance, workers counter these controls by employing location-masking tools and other manipulative strategies (Newlands, 2021; Qadri & D'Ignazio, 2022). Such manipulation illustrates how workers can turn the very technologies that are intended to monitor and control them into instruments for their own benefit, effectively exploiting and circumventing the system's constraints and thereby maintaining a sense of control over and competence in their work (Newlands, 2021; Strich et al., 2021; Van Oort, 2019). Thus, the technology in question is used for employees' own benefit and becomes a key element in their resistance efforts. In addition, employees may also engage in 'decaf' resistance (Contu, 2008). For example, individuals may take selfies or admire themselves in mirrors in fitting rooms and thereby choose not to work (Van Oort, 2019), or they may clock in before starting to work, thus increasing their number of paid hours (Van Oort, 2019). Although these actions subtly subvert the technology without requiring direct confrontation, they effectively undermine control and surveillance.

5.4 Isolating pathway

This pathway is the result of appraisals of technologies as a threat to human relations in the workplace, which can negatively affect the immaterial resources of employees (Carvalho et al., 2022; Lammi, 2021; Schneider & Sting, 2020). Employees report that the introduction of DT erodes socialization, teamwork and even experience sharing (Lammi, 2021; Papadopoulos et al., 2022; Pfeiffer, 2016; Plantin, 2021). This threat is more likely to occur following the introduction of robotization or automatization when coworkers are replaced by cobots (Birkel et al., 2019; Hornung & Smolnik, 2022; Lammi, 2021; Schneider & Sting, 2020). As teamwork is displaced, employees lose opportunities to engage in communication and mundane emotional sharing with their peers (Hornung & Smolnik, 2022; Lammi, 2021; Schneider & Sting, 2020). This limited socialization is accompanied by perceptions of depersonalization in the workplace (Lu et al., 2020).

This perceived isolation generates emotions such as sadness or angst (Carvalho et al., 2022; Granulo et al., 2019; Hornung & Smolnik, 2022; Papadopoulos et al., 2022; Pillai et al., 2024). In fact, this situation may even lead to depression, which can potentially spill over into employees' private lives (Malik et al., 2022; Nazareno & Schiff, 2021; Presbitero & Teng-Calleja, 2023). Resistance to isolation takes the form of actions aimed at regaining companionship and socialization, such as creating WhatsApp groups to voice

discontent or share insights regarding technological 'hacks' (Newlands, 2021; Plantin, 2021; Qadri & D'Ignazio, 2022), convincing other colleagues of the technology's deficiencies (Sholler, 2020) or breaking rules concerning the number and length of breaks (Plantin, 2021; Van Oort, 2019). Furthermore, other studies have shown that employees withhold important information concerning technologies from engineers to persuade their managers of the deficiencies of these technologies and the benefits of restoring teamwork (Arias-Pérez & Vélez-Jaramillo, 2022; Lammi, 2021). Finally, colleagues who support digital transformation processes may be humiliated or harassed by employees (Arias-Pérez & Vélez-Jaramillo, 2022; Song, 2021).

6. Future research agenda on resistance to digital transformation

The findings of this review reveal that resistance to digital transformation can be understood through specific pathways identified using intergroup conflict theories. Based on the findings of this review, we now elaborate on future research directions to address the key gaps identified and build on the proposed model of resistance to digital transformation. A comprehensive list of specific future recommendations is proposed in Table 4. Building on these findings, the proposed model highlights specific pathways of resistance but underscores the need for further exploration of the individual, organizational, and contextual factors that influence the prevalence of each pathway. These factors include characteristics of the specific technology being implemented, as well as variations in employee roles, organizational dynamics, and broader contextual elements. Understanding these factors will provide a more comprehensive framework for addressing resistance to digital transformation. Empirical confirmation could also extend the technologies under examination and consider different types of employees, thus accounting for whether the proposed pathways can also explain the resistance exhibited by managers, entrepreneurs, or freelance workers.

Table 4. Future recommendations.

Recommendation for Future Research	Proposed Research Focus	Potential Insights
Exploring the Boundary Conditions of the Explicated Resistance Pathways	Identify and evaluate the factors influencing when, where, and for whom each resistance pathway occurs.	Understand how technology attributes, employee roles, organizational dynamics, and broader contextual factors influence the different pathways.
Incorporating Emotional Dimensions	Examine the role of emotions on resistance, with particular emphasis on the interplay of various emotional states and their corresponding resistance outcomes.	Enhances understanding of the emotional connections to resistance actions.
Impact of Pathways on Employee Outcomes	Investigate how the explicated pathways in this review affect employee well-being, performance, and organizational commitment.	Explores individual and organizational consequences of the pathways.
Productive Resistance	Investigate scenarios in which resistance results in positive outcomes and examine resistance longitudinally through extended temporal studies.	Provides insight into 'productive' resistance and its long-term dynamics.
Group-Based Emotions and Collective Resistance	Analyze group-level emotions, such as emotional contagion, emotional sharing, and collective rumination, to understand emotional climates driving resistance.	Explores how emotions can mobilize or escalate resistance efforts leading to collective resistance.
Evolution of Individual to Collective Resistance	Examine how individual resistance acts evolve into collective movements and the mechanisms driving collective action.	Understand how individuals can become a catalyst for collective resistance acts.
Virtual Unions and Digital Activism	Explore virtual unions, hashtag campaigns used by workers across industries for organizing and resisting exploitation.	Understand how digital activism and virtual unions act as enablers of resistance
Outcomes of Digital Activism	Analyze successful digital activism campaigns that resulted in policy changes or improved work environments.	Explore the mobilizing collective action and how it drives positive organizational or societal change.
Comparative Studies of Digital Activism	Compare digital activism strategies across industries, regions, and cultural contexts to identify variations and patterns.	Understand differences in strategies within gig economy sectors and across geographical areas.
Long-Term Evolution of Digital Activism	Explore how digital activism evolves over time and adapts to technological advancements and platform regulations.	Provides insights into the sustainability and adaptability of resistance tactics in digital contexts.

Our analysis of the mechanisms underlying the relationships among perceived threats, emotions, and resistance-related actions reveals that more work is necessary to test the three-stage process proposed here. A discussion of these relationships is not found in intergroup-threat theory, which primarily focuses on the cognitive processes that govern how individuals perceive material or intangible threats. Moreover, although this theory acknowledges that appraisals of threat activate negative emotions, its ultimate focus is on how threat perceptions impact attitudes or stereotypes towards outgroups rather than an explicit investigation of the mechanisms that link the perceptions and emotional reactions of individuals with the outcomes to which they may lead. More work is also necessary to integrate emotional dimensions into existing theories of employee resistance to DT. For example, previous work on this topic has failed to examine the emotional complexity—the 'simultaneous or sequential experience of at least two different emotional states during the same emotional episode' (Rothman & Melwani, 2017, p. 260)—that is typically experienced when individuals make sense of complex events, such as the introduction of these technologies. It is unclear whether and how these different emotions combine to either promote or impede resistance. Research on consumer innovation adoption (Valor et al., 2022) has revealed that hope can neutralize the action tendencies associated with anxiety, which typically involve paralysis and withdrawal; in contrast, some emotions (e.g. guilt) may override others (e.g. curiosity), which is consistent with a hierarchical ordering of emotions. An examination of such combinations of emotions can expand our understanding of the links between emotions and resistance-related actions.

Additionally, our understanding of the individual, organizational, and social consequences of each pathway remains incomplete. In particular, it is unclear whether each of these pathways differentially impacts employees' well-being, performance, and organizational commitment. Since previous research has indicated that resistance spills over into employees' private lives, future research could expand our understanding of these consequences and examine other repercussions in employees' home lives, such as how resistance affects child development and children's career choices.

Further studies could investigate the question of when resistance is also productive in further detail (Courpasson et al., 2012). Whereas ITT considers avoidance and attack to represent dominant reactions against threats (Stephan et al., 2016), we acknowledge that resistance may also be productive by encouraging greater creativity within teams or reducing prejudice towards colleagues (Jackson et al., 2020; Wang et al., 2022). This possibility is consistent with previous research that has indicated that anger mobilizes energy in individuals and thus leads to similar levels of creativity as does happiness (Baas et al., 2011; Miron-Spektor et al., 2011). Indeed, some studies have reported that employees respond to technology-induced threats by engaging in adaptive and creative forms of resistance. For example, some employees facing job threats invest in self-development, such as by engaging in upskilling or reskilling activities outside the workplace (Jacob et al., 2023; Li, 2023; Mayer & Velkova, 2023; Mosseri et al., 2023). This research has suggested that emotions such as anger, fear, or irritation may drive creativity and/or encourage actions other than withdrawal or attack. Understanding when employees utilize technology as a catalyst to create new professional identities or enhance their expertise would provide a more balanced view of workers' responses to perceived threats.

Longitudinal studies could also enrich our knowledge of how resistance occurs. The majority of the studies examined in this research were cross-sectional, thus precluding an examination of how resistance evolves and changes over time and whether and how these changes are modulated by organisational actions and contextual events. Moreover, cross-sectional studies do not adequately capture or describe the dynamic interactions that usually occur among various manifestations of resistance, ranging from the introduction of such technologies to the relatively more stable and steady states of implementation and habituation. Increasing experience with technologies may alter the perceived threat they convey, thus causing the manifestations, strengths, and levels of resistance to change accordingly over time (Isabella, 1990). Similarly, different resistance actions may shape the future pathways of resistance. For example, emotional venting may help decrease negative emotions (Nils & Rimé, 2012); employees who express discontent may then be more likely to compensate for their negative affective experiences and progressively engage in fewer resistance-related actions. Finally, organisations treat workers' resistance differently; thus, identifying the relationships between organisational strategies and resistance pathways can expand our processual understanding of resistance. A processual approach would also help reveal the mechanisms underlying the process by which individuals' perceptions and, especially, emotions crystallize

to form group cognitions and emotions (or fail to do so). Examining group-level emotions is fundamental, as group-based emotions support collective actions (Niedenthal & Brauer, 2012). A focus on emotional contagion (Barsade, 2002; Barsade & Gibson, 1998; Niedenthal & Brauer, 2012; Sullins, 1991), emotional sharing or collective rumination (Bryant-Davis & Ocampo, 2005; Piening et al., 2020) could help us understand the formation of emotional climates and their influence on resistance. Additionally, examining individual and group processes of emotional regulation (Hochschild, 1979) may contribute to such a processual understanding of employee resistance.

As shown in the review, previous studies on this topic have focused on the individual perspective, thereby overlooking the collective dimension of resistance. Accordingly, one potential area for future research is to explore the connection between individual efforts and the development of collective resistance. Future research could examine the relationships among individual acts of resistance and the ways in which these acts can lead to a collective series of interactions that ultimately evolves into a larger movement of collective resistance. Another rich area of inquiry would be to investigate the mechanisms underlying collective action, such as in the context of food delivery drivers (Bonini & Treré, 2024; Grohmann, 2021; Newlands, 2021; Qadri & D'Ignazio, 2022). The focus of such research could be on how the specific strategies and tactics used in this situation may be applied in other contexts. 'Everyday' or 'decaf' resistance tactics, such as subverting algorithms, could also be another factor relevant to research on how individuals mobilize collective resistance behaviours, thus leading to digital activism. The potential for digital activism to support collective resistance could thus be explored in future research, particularly with regard to the dynamic relationships between worker resistance and the ways in which digital platforms facilitate the coordination of collective actions.

Research studies (Salamon, 2023; Salamon & Saunders, 2024) have also demonstrated the crucial influence of social media and online platforms in shaping labor resistance, as these platforms provide both tools and spaces for workers to resist thereby revealing strategies that could be applied across diverse employment sectors to understand and mitigate labor-related challenges. Accordingly, future research on virtual unions and hashtag campaigns should extend beyond the media and gig economy sectors (Grohmann, 2021) to explore their applications across a wider array of industries, sectors and occupations where digital tools facilitate worker's collective organizing and resistance. Moreover, recent research has demonstrated how social media platforms, particularly through the use of hashtag campaigns, help workers to generate visibility around labor issues in traditionally less transparent sectors, such as the arts and nonprofit organizations (Patrick-Thomson & Kranert, 2021; Salamon & Saunders, 2024; Südkamp & Dempsey, 2021). Additionally, studies on freelance journalists have shown that social media and hashtag campaigns empower workers to reveal and challenge exploitative labor practices, as seen in campaigns to resist rights-grabbing contracts in journalism (Salamon, 2016). Then, examining hashtag-driven mobilization across a diverse range of industries and sectors could therefore reveal new patterns of digital resistance and yield valuable insights into how digital tools support collective action, visibility, and worker solidarity in various employment contexts. Additionally, the effectiveness of various digital strategies, such as campaigns or virtual unions, could be assessed, and the ways in which these strategies empower workers' voices in the context of collective resistance could be explored. Moreover, the study of these digital platforms and the role they play in fostering solidarity among dispersed freelance workers (Bonini & Treré, 2024; Grohmann, 2021; Newlands, 2021) could also help improve our understanding of how these groups facilitate a shared identity and promote collective resistance efforts to combat exploitation.

Another alternative direction for future research involves examining case studies in which digital activism has resulted in significant employee victories, such as policy changes or improved working conditions. In this case, a potential area of emphasis could be the manner in which digital activism increases employees' concerns, particularly with respect to the role of influencers and advocacy organizations in shaping public opinion. Recent studies demonstrate how social media platforms serve as tools for creators to engage in digital resistance, opposing unfair labor practices while simultaneously molding public perceptions and industry norms (Cunningham & Craig, 2019; Salamon & Saunders, 2024). Further, these platforms also facilitate the dissemination of information to a multitude of diverse individuals and groups through social media. Examining these dynamics will offer valuable insight into how online platforms shape both individual and collective facets of labor resistance and thus contribute to evolving workplace

concerns across industries and occupations. Long-term studies on digital activism movements could thus provide information concerning how digital activism movements evolve over time and adapt to digital changes and platform policies. Ultimately, comparative case studies could shed light on how digital activism efforts vary across different types of gig economies, regions, and cultures. By investigating these issues, future research could refine our understanding of the relationship between digital activism and collective resistance, thereby providing helpful information for efforts to enhance the working conditions of employees.

7. Conclusion

7.1 Implications

This paper reviews extant studies on the antecedents and consequences of employee resistance to DT. The results reveal that these previous perspectives have been fragmented; namely, each of them has offered only a partial explanation of the phenomenon. This fragmentation is largely due to underlying assumptions regarding the resources that jobs provide and the functions that DT may offer. Our model integrates these perspectives, thereby offering a holistic conceptualization of resistance. Moreover, we offer a revised perspective on the reasons for resistance by reevaluating the notion of job significance to employees and by differentiating among the various functions that DT may offer. Dominant paradigms have viewed jobs as sources of financial income or as ways of fulfilling economic needs; we expand this notion by focusing on nonmonetary aspects of jobs and taking into account four functions of technologies: as replacements for employees, as complements or aids for workers, as monitoring and disciplinary devices or as substitutes for coworkers. This conceptualization of resistance as a reaction to the perceived threats to the material and intangible resources of employees that result from the functions of these technologies facilitates the integration of previous studies into an overarching, parsimonious framework. This integrative framework serves as a promising theoretical reference for research on human–technology interactions, as it enhances the theoretical depth of our understanding of resistance to DT. By specifying the relationships among threat types, emotions and resistant actions, this expanded view captures resistance within organizations, thereby moving beyond a narrow focus on job loss.

7.2 Theoretical implications

The proposed framework contributes to separate streams of literature. First, it contributes to the literature on human–technology interactions by highlighting employees' perceptions of technologies as entities with intentions and agency. In contrast to the prevailing notion of technologies as neutral tools aimed at enhancing productivity, our framework emphasizes the agonistic dynamic that characterizes the relationships between humans and nonhuman elements and emphasizes the ways in which DT can influence organizational structures and interpersonal relationships. Our model argues that resistance can be explained more accurately by social conflict theories than by adoption theories; the latter theories are ill equipped to capture the rivalry between employees and DT that serves as the foundation of their resistance.

Second, our framework extends the application of ITT to the realm of human–technology interactions. While previous research on ITT has focused primarily on anthropomorphic entities that are perceived as outgroup members, we propose that DT can also be appraised as members of an outgroup that compete for employees' resources. Additionally, this theory does not clarify the connections among threat appraisals, emotional reactions, and subsequent outcomes, as its primary goal is to explain stereotyping processes. We rectify this omission by identifying four pathways that highlight the directional links among appraisals, emotions and actions and defend the mediating role played by emotions in the process of resistance to digital transformation. Finally, whereas this theory considers only two possible reactions to perceived threats (namely, withdrawal or attack), we reveal that threat appraisals may also drive productive resistance or actions related to self-transformation.

Finally, the proposed conceptualization corrects the traditional monolithic model of resistance (Dent & Goldberg, 1999), which views resistance as a dysfunctional cognitive process that must be eliminated.

In a hypothetical scenario devoid of resistance, employees would unquestioningly accept even detrimental organizational transformations. We argue that employee resistance can be functional, such as by helping maintain group cohesion and defend employees' professional identities. Employees do not resist the organization or the technology itself but rather the adverse consequences that DT may have with regard to their resources. By challenging a view of resistance that conceptualizes it as inherently dysfunctional, we broaden the discussion regarding resistance to DT by identifying such resistance as a reaction against technological authority and control over tangible and intangible resources.

7.3 Managerial implications

This integrative framework has practical implications for organizations. The pathways that we identified highlight specific interventions that organizations can use to address potential resistance to digital transformation on the part of employees. Many studies have proposed to address such resistance by investing in upskilling or reskilling (Jaiswal et al., 2022) or by training workers (Kraus et al., 2023). However, as the *burdening* pathway reveals, upskilling programs may not prevent resistance entirely unless they are able to mitigate the corresponding perceived stress. Training-based interventions could then help attenuate workers' perceived stress and thus decrease their resistance. One strategy that could make such training less burdensome involves the adoption of gamified approaches (Kumar & Raghavendran, 2015). In light of the positive effects of gamified learning in the workplace, employees can familiarize themselves with the technology in a playful way, thus mitigating the perceived burden and stress they face, enhancing their confidence and well-being, and increasing their commitment during the transition process (Kumar & Raghavendran, 2015). The literature has even reported that gamification positively impacts employees' perceptions of organizational change (Jacob et al., 2022).

Other research has suggested that nurturing a learning transformation in which the psychological safety of employees is guaranteed (Newman et al., 2017) can alleviate the *burdening* pathway, as psychological safety in the workplace encourages employees to learn and upskill by establishing an environment in which they feel safe to take risks, communicate openly, and embrace a culture of continuous learning. This safety net can promote innovation, creativity, and a supportive atmosphere, thereby empowering employees to pursue skill development actively. Furthermore, this approach can acknowledge and adapt to various types of learning personalities (Normadhi et al., 2019). This process could thus help nurture confident learners and make upskilling or reskilling less stressful for employees. Organizations could also include persona-based incentive strategies in which individuals who play a crucial role and contribute to the transformation process are rewarded. For instance, every employee could become a champion of change and thus receive bonuses that are proportionate to their efforts to help their colleagues cope with these new technologies. In this context, core team members could also be rewarded visibly, such as in newsletters or at meetings.

The *diminishing* pathway focuses on threats to workers' performance. Managers can establish formal groups that enable various employees to exchange information with the goal of addressing problems with the technologies being implemented (Birkel et al., 2019; Chigbu & Nekhwevha, 2021). Within these groups, frustration can be vented, as employees can expose the deficiencies that they observe as well as the corresponding implications for their performance. Moreover, these groups can help relevant actors identify obstacles to task pursuit, and in response, management could proactively develop appropriate interventions or make improvements to the technology or work environment to address the issue of uncertainty in the coadaption process (Nazareno & Schiff, 2021).

The negative effects of increasing the use of surveillance technologies, as reflected in the *disempowering* pathway, highlight the need for better corporate regulation of surveillance technologies that are perceived as respectful of employees and their privacy (Granulo et al., 2019; Malik et al., 2022; Schneider & Sting, 2020). Organizations could implement a framework that can establish a balance with regard to the power and control of these technologies with the goals of ensuring transparency and enhancing employee trust.

Finally, organizations may seek to address the problem of *isolation* by creating social networks and offering opportunities for socialization in the workplace (Ding, 2021; Lammi, 2021). For example, management may implement mentoring programs to connect employees who are proficient at using these technologies with those who need the most help. These networks could convey valuable information

while simultaneously providing formal support and personalized training to employees in need. Furthermore, these networks could also include less formal socialization activities that could facilitate group cohesion and increase intergroup relationships in the workplace.

Our framework also highlights the need for interpersonal emotional regulation strategies that can be used to manage the negative emotions associated with the four resistance pathways. Team leaders can manage their subordinates' emotions and thereby influence their performance (Kafetsios et al., 2012). Specifically, interpersonal emotional regulation strategies have been reported to change the affective tone of teams and to promote greater innovation (Madrid et al., 2019). In turn, the implementation of these interventions may require nurturing the socioemotional competencies of the individuals who are responsible for managing digital transformation processes (Kafetsios et al., 2012).

7.4 Limitations

Like all reviews, this study exhibits certain limitations. One limitation of this study is that only the Scopus and Web of Science databases were consulted when identifying research papers. Although these databases have been recognized as the largest and most frequently utilized multidisciplinary databases in previous studies, future reviews could expand the scope of this search to encompass other sources of empirical evidence. Another limitation pertains to the restricted DT that we used as keywords. This approach might have excluded relevant studies, and future studies could broaden their search terms by identifying a wider range of related technologies. Furthermore, we included only studies that were published in English, which may have introduced language bias and caused us to overlook valuable research published in other languages. This limitation could result in a lack of representation of non-English-speaking regions or communities, which may impact the comprehensiveness of the findings of this research. Finally, another limitation of this review is its exclusive focus on individual resistance efforts, which prevents us from obtaining a full understanding of how these personal actions lead to collective resistance. Accordingly, a more comprehensive analysis is necessary to examine how personal resistance efforts contribute to and shape collective resistance.

Authors contribution

Veronika Cieslak was involved in the conception, design, writing of the original draft, analysis, and interpretation. Carmen Valor was involved in reviewing and editing, analysis, and revising it critically for intellectual content. Both authors read and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

Disclosure statement

The authors report there are no competing interests to declare.

Data

Obtaining the data

The articles for this integrative review were derived from a thorough search of pertinent academic databases, including Scopus and Web of Science. Predefined keywords and specific inclusion criteria were used to obtain the necessary articles.

Nature of the data

The content of this integrative review comprises articles and data that have been previously published in academic journals.

Source of the data

The articles were derived from academic databases, in particular Web of Science and Scopus. Only data that was published in journal articles was used in this integrative review.

Size of the data

In total, sixty-three articles were incorporated in this integrative review.

Accessibility of the data

The articles and data derived from these articles in this integrative review are available through academic databases.

Rights and permissions

The integrative review was conducted in compliance with applicable copyright laws and licensing agreements. All articles were properly cited and acknowledged to maintain academic integrity.

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Data availability statement

Data are available on reasonable request from the corresponding author (Veronika Cieslak).

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