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Artificial intelligence and work design: implications for frontline service employees and future research

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Abstract

Purpose – We examine the impact of artificial intelligence (AI) on the work characteristics of frontline service employees and consider implications for their roles and future research.

Design/methodology/approach – This conceptual paper draws on insights from prior empirical research on AI in service work. Grounded in socio-technical systems theory, we utilize a five-pronged conceptualization of AI in conjunction with the SMART (Stimulating, Mastery, Autonomous, Relational, Tolerable) Work Design Model to examine the impact of AI on work characteristics.

Findings – We present evidence from five service sectors: education, finance, healthcare, hospitality and retail. We show that the impact of AI varies across the five higher-level categories of SMART work design and across sectors, revealing context-dependent and technology-specific effects.

Practical implications – Organizations can optimize service work through top-down redesign and bottom-up crafting, jointly optimizing AI's characteristics and SMART work characteristics to improve both employee well-being and organizational performance.

Originality/value – We show the value of SMART work design as a lens to differentiate AI impact on service work and develop a conceptual model of a socio-technical AI–work design system. This model illustrates a dynamic co-design process between AI and work characteristics, with each shaping the other.

Keywords Artificial intelligence, Service work, Work design, Technology, Future of work

Paper type Conceptual paper

1. Introduction

Artificial intelligence (AI) is rapidly transforming service work through automation and augmentation (Robinson *et al.*, 2020). We define AI as "machines that exhibit aspects of HI [human intelligence]. AI is distinct from general information technology in that it involves technologies that can learn, connect and adapt" (Huang and Rust, 2021, p. 31). Today's AI systems are based on machine learning, and their functions range from robotics to natural language processing, machine vision, and speech recognition (Collins *et al.*, 2021).

Machine-learning-based AI is differentiated from previous generations of technologies by three unique characteristics: it is autonomous, learning and inscrutable (Berente *et al.*, 2021).

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Indeed, AI systems exhibit a growing capacity to act without human intervention (autonomy), they can learn and improve inductively from data (learning), and due to their technical complexity, their workings tend to be unintelligible to most, if not all, human users (inscrutability). Further, recent advances in large language models (LLMs) have given rise to generative AI (GenAI) systems (e.g. ChatGPT) with two additional distinguishing characteristics: generativity, which refers to the system's ability to transform patterns in data into outputs that resemble products of humans' intellectual or artistic work (as opposed to providing mere predictions or clusters); and versatility, reflecting the general-purpose nature of GenAI systems (as opposed to being limited only to highly specific tasks) (Bommasani *et al.*, 2022; Eloundou *et al.*, 2023). Owing to these unique characteristics, AI is reshaping the way in which services are designed and delivered and how employees experience their work. Therefore, understanding these shifts is crucial to enhancing service quality, employees' experiences and organizational performance.

Service work, which incorporates the design and delivery of service (Groth *et al.*, 2019), benefits from AI in the form of cost savings, standardization, quality control or personalization, leading to improved customer experiences (Huang and Rust, 2021). At the same time, AI may reinforce bias and privacy concerns and lead to the dehumanization of work and job replacements (Coombs *et al.*, 2020). Given AI's autonomous capabilities and ability to learn and improve, it may remove the uniqueness of the "human" aspect of service encounters between frontline service employees (FLEs) and customers (Bujold *et al.*, 2024; Huang and Rust, 2018). FLEs are those workers who are – physically or virtually – at the "frontline," engaging directly with customers (Singh *et al.*, 2017). These workers have traditionally been acknowledged as key actors in the service ecosystem, performing a boundary-spanning role between organizations and customers (Subramony *et al.*, 2021).

An emerging line of empirical research considers the technology's effects on FLEs across various service domains (e.g. Chan and Tsi, 2024; Perez *et al.*, 2022). For instance, AI has been found to enable FLEs to increase their productivity and efficiency, which can enhance their satisfaction with using AI as part of the service encounter; however, this does not necessarily translate into higher job satisfaction (Nguyen and Malik, 2022). Concerns have also been raised about the potential threat AI poses to employees' role identity (Strich *et al.*, 2021). Beyond these individual perspectives, a comprehensive perspective on how AI transforms service work in practice is still lacking (Larivière *et al.*, 2017; Ostrom *et al.*, 2021). In particular, researchers have yet to holistically examine how the unique characteristics of AI (i.e. autonomous, learning, inscrutable, generative and versatile) affect the way in which service work is designed and performed (Bankins *et al.*, 2024b), a gap highlighted as a critical priority in service work given its impact on well-being and performance (Ostrom *et al.*, 2021; Subramony *et al.*, 2023). This underscores the need for researchers to explore how work can and should be designed to optimize the alignment between the technology, FLEs and their organizational environment.

Work design is defined as "the content and organization of one's work tasks, activities, relationships and responsibilities" (Parker, 2014, p. 662). It is usually considered in terms of "work characteristics," that is, features of the job that influence how the job is experienced by the worker and shape outcomes such as motivation, well-being and performance. The SMART Work Design Model provides a contemporary perspective on work design, highlighting five key characteristics: Stimulating, Mastery, Autonomous, Relational and Tolerable demands (Parker and Knight, 2024). Indeed, previous research has established that well-designed work offers task variety, allows the development of mastery, enables job autonomy, provides social support and has moderate demands – all of which are positive for workers' well-being and performance (see meta-analyses by Humphrey *et al.*, 2007; Lesener *et al.*, 2019; Nahrgang *et al.*, 2011). Poor work design, on the other hand, refers to jobs that are low in positive work characteristics and high in job demands such as workload and role conflict. Such jobs lead to stress, burnout, absenteeism and poor performance (Demerouti *et al.*, 2001; Lesener *et al.*, 2019; Nahrgang *et al.*, 2011). Understanding how AI impacts work characteristics can help

develop theory and inform interventions to design AI–human integrated service work to optimize individual and organizational outcomes. Addressing this need, we pose the following research question: How does AI impact the work characteristics of FLEs?

In this conceptual paper, we approach this question by viewing service organizations as socio-technical systems. Underpinned by socio-technical systems theory (Emery and Trist, 1965), we argue that when examining the impact of AI on work characteristics, it is essential to consider both the technical and social dimensions (Guest *et al.*, 2022). To this end, we capture the technical dimension in terms of the AI system and its defining characteristics of autonomy, learning, inscrutability, generativity and versatility (Berente *et al.*, 2021; Bommasani *et al.*, 2022; Eloundou *et al.*, 2023), while broadly examining the human or social dimension through five work characteristics of the SMART Work Design Model (Stimulating, Mastery, Autonomous, Relational and Tolerable; Parker and Knight, 2024). We leverage these frameworks as an organizing structure to illustrate how AI distinctively shapes FLEs' work characteristics across key service domains.

Our theoretical contribution lies in integrating key concepts from AI, work design and service work literatures. Specifically, we show the value of SMART work design as a lens to differentiate AI's impact on service work and develop a conceptual model of a socio-technical AI–work design system. This model illustrates a dynamic co-design process between AI and work characteristics, with each shaping the other. By foregrounding work design in discussions of AI integration, we aim to develop theory and inform strategies for AI-augmented, human-centered work environments. From a practical perspective, a better understanding of the social and technical aspects of evolving frontline service work roles will allow organizations to optimize service work design, fostering employee well-being and enhancing organizational performance, as well as enable service firms to mitigate an emerging narrative that they may have a binary choice between investment in AI or employee retention (Bock *et al.*, 2020).

2. Service organizations as socio-technical work systems

Organizations are considered socio-technical work systems (Emery and Trist, 1965), highlighting the interrelatedness of social and technical aspects of work and the need for organizations to optimize both aspects for improved individual and organizational outcomes (Sarker *et al.*, 2019). Early work in the manufacturing sector often focused on either the social aspects (e.g. organizational behavior or management) or on the technical aspects (e.g. computer science or software engineering). In contrast, contemporary efforts to investigate socio-technical systems in the service sector have focused on greater integration of both aspects (Guest *et al.*, 2022). In the context of digital technologies, including AI, the value of a socio-technical systems perspective has been reiterated in organizational studies (Warhurst and Knox, 2022).

A socio-technical work system is underpinned by several principles. First, the principle of organizational choice states that organizations always have a choice in their design of work and that systems should aim for both individual well-being and organizational performance – a perspective that is also central in foundational strategic human resource management studies (Beer *et al.*, 1984). Though AI's unique characteristics (Berente *et al.*, 2021; Bommasani *et al.*, 2022; Eloundou *et al.*, 2023) may incentivize certain types of work designs (e.g. reduced autonomy), these are always a product of conscious choices of managers, who may intervene and modify algorithms. Indeed, Bowen (2016), a seminal FLE scholar (Bowen and Schneider, 1985; Schneider *et al.*, 1980), shows how organizations can choose to react to technological disruption by considering new roles for service workers – differentiator, innovator, coordinator and enabler (with two others added more recently, market researcher and experience enhancer; Bowen, 2024) – which evolve and vary depending on the context, and which have inspired further rethinking about changes to the employee–customer interface (Larivière *et al.*, 2017; van Riel *et al.*, 2025). For example, FLEs supported by AI may add value by providing

differentiated service experiences, sparking innovation through creativity, assisting customers during service delivery and coordinating complex relationships within the service ecosystem (Bowen, 2016).

Second, organizations should be viewed as open systems. This means that organizations are not operating in a vacuum but function as governed systems that must be adaptable to social and technical changes shaping work (Weber and Waeger, 2017). FLE roles (Bowen, 2024) and careers (Bankins *et al.*, 2024a) are likely to evolve over time, whether through strategic organizational design choices or spontaneous behavioral responses by employees who use AI or are impacted by it. Further advances in AI technology stemming from the organization's external environment will shape this evolution, as will the introduction of relevant legislation that aims to regulate AI use or otherwise impact service work.

Third, the principle of joint optimization reiterates the need for equal attention to social and technical aspects, recognizing that compromises may be needed to achieve optimal individual and organizational outcomes (Guest *et al.*, 2022). While AI's impact on service work has received some attention (e.g. Liu *et al.*, 2024; Strich *et al.*, 2021), most studies treat the technology as a black box, without theoretically distinguishing AI from previous generations of technology (Berente *et al.*, 2021). A more nuanced view of the technology's impacts would consider how much autonomy AI has to act and make decisions, how it can improve dynamically based on data, and whether its outputs are intelligible to its users. Moreover, GenAI's unique ability to process natural language across various contexts is likely to alter the way in which service organizations interact with their customers, inviting researchers to specifically consider the technology's generative and versatile nature. Such AI systems' autonomy and generativity can help offload customer interactions to chatbots, while their versatility allows AI to support a wide range of service interfaces, ranging from customer interaction to demand forecasting and workforce management (compared to, e.g. self-checkouts, which can support only one function).

Fourth, workers have physical, psychological and social needs that need to be met through the offering of "quality work" (Warhurst and Knox, 2022), which encompasses a combination of fair terms of employment and effective work design (Parker, 2014). Conceptualizing work design in terms of specific work characteristics can help elucidate the human or social dimension of AI's impact on service work, with a focus on human-centered design. Assuming a balanced socio-technical approach, in the following section, we discuss the social dimension through the lens of the SMART model in conjunction with AI's unique technological characteristics.

3. Artificial intelligence and SMART work design

The SMART Work Design Model (Parker and Knight, 2024) was developed from decades of research on work design (for reviews, see Parker, 2014; Parker *et al.*, 2017). It proposes that well-designed work exhibits five higher-order categories of characteristics: stimulating, mastery, autonomous, relational and tolerable.

First, stimulating work refers to work that is motivating and challenging, driving a sense of meaning and purpose. Stimulating work characteristics include skill and task variety, and opportunities to use problem-solving and information-processing skills. Ideally, AI systems take over repetitive tasks, allowing human employees to focus on the more stimulating parts of their work (Davenport and Ronanki, 2018). However, these systems also imply standardization of processes, which could render employees' tasks more mechanical and boring. Moreover, an LLM-based AI system's ability to generate fluent writing and art can take over the most creative areas of work, leaving humans in the less-stimulating role of clerks and curators. Subramony and Rosenbaum (2024) argue that for service work to be dignified and developmentally rich, it must be stimulating, offering opportunities for growth, engagement and meaningful contribution, particularly for marginalized workers.

Second, mastery of one's work emerges from an understanding of one's role and how it fits into the wider organization, as well as from constructive feedback from managers and peers. Mastery work characteristics include role clarity, feedback and task identity; the latter can be strengthened by completing a process as opposed to an isolated task, which is important for developing meaningful work. The learning abilities of AI systems (see Berente *et al.*, 2021) indicate that deploying these systems may disrupt employees' sense of mastery, as they need to redefine their expertise in light of AI systems' capabilities. Inappropriately designed AI systems have been shown to disrupt mastery in service delivery (Akbarighatar *et al.*, 2026), and early evidence shows that GenAI systems in particular may threaten the development of mastery (Kosmyna *et al.*, 2025). Drawing on self-determination theory, Hong and Ahn (2023) demonstrate that perceived competence, closely tied to mastery, is a key driver of intrinsic motivation in service employees. Their findings indicate that when individuals feel capable and skilled, they are more likely to engage meaningfully and derive satisfaction from their work.

Third, autonomous work focuses on the level of control workers have over when and where they work, how they choose to go about their work and the influence they have over decision-making. Autonomous work characteristics include scheduling autonomy, work methods autonomy and decision-making autonomy. Autonomous workers have a greater sense of responsibility in their work and are more motivated. However, modern AI systems can reduce employees' sense of agency (Berente *et al.*, 2021). Researchers have found that empowering service workers through autonomous work leads to enhanced adaptability, innovation and service delivery, and serves as a key psychological resource that supports employee resilience in dynamic service environments (Spreitzer *et al.*, 2010).

Fourth, relational work refers to characteristics that promote the human need to belong and be connected to others (Ryan and Deci, 2000). It reduces isolation and loneliness and enables individuals to see how they are making a difference to others' lives. Relational work characteristics include social support from colleagues and managers, task significance, connection with beneficiaries or end-users of the work, and interdependence among workers, managers and beneficiaries. While technologies can connect geographically dispersed employees, AI's autonomous nature can also create disconnections between employees and customers, potentially decreasing relational aspects of work (Laitinen and Sahlgren, 2021). Liang *et al.* (2020) explore how relational energy and interaction cohesion between employees and customers enhance engagement in service encounters. This relational dynamic is shown to be central to effective service delivery and employee satisfaction.

Fifth, tolerable work demands refer to job demands that workers perceive they can cope with. When job demands are intolerable, workers may feel overwhelmed and stressed, leading to strain and burnout. Tolerable work demands include manageable levels of workload, emotional labor and role conflict (Parker and Knight, 2024). Though AI can potentially alleviate employees' workload by taking over drudge work and heavy lifting, it is often up to managers to design work in a way that supports employee well-being (Qiu *et al.*, 2022). Service researchers have found that when frontline service roles are designed to be tolerable and supportive of employee well-being, this leads to flourishing workplaces and sustainable service (Anderson and Ostrom, 2015). In sum, understanding the work characteristics of service work provides insights into how managers and organizations can create well-designed roles to promote healthy, thriving service work.

4. The impact of AI on FLEs' work characteristics

To date, conceptual work has been charting the potential effects of AI on service work (see Buhalis *et al.*, 2019; De Keyser *et al.*, 2019; Huang and Rust, 2021, 2018; Larivière *et al.*, 2017; Wirtz *et al.*, 2018). Those studies collectively examine the evolving role of technology

and AI in service design and delivery. They highlight how FLEs and service technologies are being augmented or replaced, redefining service encounters (Table 1).

Alongside this conceptual work, an emerging body of literature encompasses empirical studies, providing insights into FLEs' work characteristics. Importantly, we acknowledge that FLEs are not a homogeneous group, and we contend that the impact of AI on work characteristics varies across AI systems, worker types and service sectors. Therefore, we present insights from prior empirical studies in five selected service sectors: education, finance, healthcare, hospitality and retail. These five sectors form part of the Services Sectoral Classification List (World Trade Organization and World Bank Group, 2023) and were purposefully selected. These sectors have a critical economic and social impact, contributing significantly to global employment and GDP; they represent both public and private services; and they differ in terms of regulatory demands, workforce skillsets and service design and delivery, given the varying extent to which FLEs assist customers as part of the service encounter (Fan and Mattila, 2021). As such, the selected sectors provide a representative view of vital and varied service work. Within each sector, we draw on some illustrative empirical studies that shed light on the influence of AI on work characteristics.

4.1 Overview of AI applications across service sectors

AI is increasingly being integrated into service work across multiple sectors, reshaping task structures, decision-making processes and worker-customer interactions. In the education sector, AI, particularly GenAI tools like ChatGPT, is employed to support lesson planning, create teaching activities and assessments, personalize learning experiences, monitor student performance and manage routine tasks such as drafting email templates and handling tutorial registrations. In financial services, AI assists with product recommendations and automates decision-making processes, including loan approvals. In the healthcare sector, AI facilitates clinical decision-making, diagnostic support, and automation of administrative tasks across primary, secondary and tertiary care. The hospitality sector leverages AI through chatbots and service robots to assist FLEs in repetitive or information-based customer interactions. In retail, AI supports sales and telemarketing roles by automating lead generation, customer profiling and data analysis. These implementations have variable impact on FLEs' work characteristics (Table 2). The following sections examine these impacts according to each SMART category.

4.2 Stimulating work

Positive impact on stimulation was most evident in the education and hospitality sectors. In education, GenAI enabled teachers to design novel classroom materials that were more creative and engaging, such as gamified activities and content with varied difficulty levels, reducing reliance on static textbook materials (Jeon and Lee, 2023). This increased variety and personalization, afforded by GenAI's generative and versatile capabilities, made instructional roles more stimulating. However, this depended on the extent to which AI expressed autonomy in interactions with students, as there is also concern that using GenAI could limit teachers' roles to facilitating technology, rather than engaging with students (Chan and Tsi, 2024). Similarly, in hospitality, AI use – particularly through ChatGPT and service robots – facilitated proactive service behaviors and creativity, allowing workers to engage in diverse and novel service experiences (Mingotto *et al.*, 2021; Tahir *et al.*, 2025). FLEs used AI tools for augmenting innovation in customer service delivery, with some describing AI as a personalized training assistant (Limna and Kraiwanit, 2023).

In financial services, novice employees also experienced increased stimulation due to AI-supported access to complex consulting tasks previously out of reach, thereby expanding their role variety (Strich *et al.*, 2021). However, the impact on expert employees was more ambivalent due to AI systems' autonomous decision-making capabilities afforded by their ability to learn from processing vast amounts of customer data. AI systems replaced many of

Table 1. Conceptual papers on AI in service work

Authors (year)	Purpose	Core theory/ lens	Technology focus	Actor focus	Work design	Findings
Bowen (2016)	Examines FLEs' evolving roles in increasingly complex service ecosystems	Service-dominant logic	Broad coverage of AI and robotics	Employees	Partially	The paper presents four service roles, including differentiator, innovator, coordinator and enabler; the integration of AI and automation emphasizes the importance of emotional labor and service quality, encouraging a shift toward empowerment-focused roles where employees are given greater autonomy to handle complex social interactions and adapt to customer needs
Buhalis *et al.* (2019)	Reveals the transformative potential of technology to enable hyper-personalized experiences	Value co-creation; service ecosystems	AI, Internet of Things, virtual reality, augmented reality	Employees and customers	Partially	AI-driven smart environments enable employees to support hyper-personalized and sensory-rich customer experiences by providing real-time data and predictive insights, requiring employees to become more adaptive and responsive to dynamic customer needs within digitally enabled, multi-stakeholder ecosystems
De Keyser *et al.* (2019)	Classifies frontline service technology	Service pyramid framework; service-dominant logic	Broad coverage of technologies, e.g. conversational agents, extended reality, blockchain	FLEs and customers	Partially	The infusion of AI and extended reality in frontline service work leads to a blended human–machine interaction model, where employees become managers of digital interfaces and engage in tasks that require higher cognitive skills, such as interpreting customer data insights, offering nuanced responses and maintaining continuity across AI-driven service touchpoints

(*continued*)

Table 1. Continued

Authors (year)	Purpose	Core theory/ lens	Technology focus	Actor focus	Work design	Findings
Huang and Rust (2021)	Presents a strategic framework that aligns AI with service benefits	None	Mechanical, thinking and feeling AI	FLEs and customers	Partially	AI's advancement in handling routine and analytical tasks pushes frontline employees toward roles that emphasize relational engagement and emotional intelligence (e.g. empathy and problem-solving in high-touch contexts), thus requiring human workers to focus on relationship-building and tailored customer interactions as AI assumes transactional functions
Huang and Rust (2018)	Explores AI job replacement	None	Mechanical, analytical, intuitive and empathetic AI	Employees	None	A framework for AI job replacement is presented, suggesting that AI progresses through mechanical, analytical, intuitive and empathetic tasks, reshaping the nature of service work and elevating the importance of human intuition and empathy
Larivière *et al.* (2017)	Conceptualizes service encounter 2.0 and examines how technology augments or substitutes traditional roles of employees and customers	None	AI, Internet of Things, robotics, self-service technologies	FLEs and customers	Partially	AI in service encounters transforms traditional FLE roles by positioning employees as differentiators, innovators, coordinators and enablers; FLEs now support or complement automated systems rather than solely delivering services, with responsibilities expanding to supervising and enhancing customer–technology interactions and facilitating networked service experiences

(*continued*)

Table 1. Continued

Authors (year)	Purpose	Core theory/ lens	Technology focus	Actor focus	Work design	Findings
Wirtz *et al.* (2018)	Defines service robots, contrasts their capabilities with humans and explores the impact on service delivery	Role theory; job design theory; service-dominant logic	Service robots with AIs (autonomous and adaptable interfaces)	FLEs and customers	Partially	With service robots handling predictable, repetitive tasks, FLEs are freed up to focus on creative problem-solving, personalized customer interactions and emotional support, which leads to more human-centered roles that leverage uniquely human skills such as empathy, adaptability and nuanced customer understanding

Source(s): Authors' own work

the analytical and decision-making responsibilities traditionally associated with senior advisory roles, leading to a loss of task variety and decreased intellectual challenge (Perez *et al.*, 2022; Strich *et al.*, 2021). Similarly, in healthcare, AI tools enabled FLEs to solve complex problems by capturing and interpreting clinical data, diversifying their task portfolio and fostering intellectual stimulation (Bienefeld *et al.*, 2024; Mosch *et al.*, 2022). However, while AI enhanced certain problem-solving capabilities, it also risked over-streamlining roles, reducing direct engagement with hands-on tasks and narrowing task variety (Rony *et al.*, 2024; Tanaka *et al.*, 2023). Interestingly, in retail, AI's effects on workers with different skill levels were different from those observed in finance. Specifically, higher-skilled sales workers found stimulation in enhanced customer engagement as AI took over administrative tasks (Singh *et al.*, 2019), but lower-skilled workers experienced reduced stimulation and negative emotions when they lacked the capacity to adapt to AI-enhanced workflows (Jia *et al.*, 2024).

4.3 Mastery

The use of AI was found to increase mastery across education, hospitality and healthcare settings. Teachers learned to use ChatGPT effectively to produce instructional materials tailored to students' backgrounds, gaining both technological proficiency and cross-cultural insights (Chan and Tsi, 2024; Jeon and Lee, 2023). In hospitality, FLEs engaged in continuous self-directed learning with AI, leveraging real-time feedback to stay updated with industry trends and enhance their service capabilities through effective engagement with robots (Limna and Kraiwanit, 2023; Mingotto *et al.*, 2021). Similarly, healthcare workers enhanced their decision-making competence and domain-specific expertise through AI-provided feedback and diagnostic support (Chang and Hwang, 2024; Mauro *et al.*, 2024).

However, AI can also undermine the mastery of healthcare workers if overreliance erodes confidence in their own expertise, thus deskilling professionals (Tanaka *et al.*, 2023; Van Cauwenberge *et al.*, 2022). A similar trend is observed in the financial services, where it was reported that mastery was diminished when AI systems usurped tasks previously reliant on employees' expertise. AI's autonomous capabilities and data-driven learning have allowed the automation of key decision-making processes, which has resulted in FLEs' domain-specific knowledge becoming redundant or devalued, thereby undermining their perceived competence (Perez *et al.*, 2022; Strich *et al.*, 2021). However, AI's inscrutable

Table 2. Overview of insights from empirical studies

	Stimulating	Mastery	Autonomous	Relational	Tolerable
Education	+AI designs creative and engaging learning materials	+AI develops tailored learning materials	+AI provides new instructional approaches	+AI personalizes learning activities, increasing inclusivity	+AI-assisted planning and development reduces burnout
Finance	+/−AI supports access to complex tasks but takes on decision-making responsibility	−AI decision-making systems devalue FLE knowledge	+/−AI supports access to complex tasks but takes on decision-making responsibility	−AI decision-making hinders relationship development	+AI creates new demands and elevates sales targets
Healthcare	+/−AI analytical tools solve complex problems but over-streamline roles	+/−AI diagnostic support increases competence but reduces self-confidence	−AI algorithms constrain independent judgment	+AI automation enables deeper patient interactions	+/−AI automation boosts productivity but creates technical overload
Hospitality	+GenAI and service robots create novel service experiences	+AI feedback enables self-directed learning	+AI guides customers and employees to meet mutual needs and abilities	+AI and service robots facilitate co-creation	+AI removes mundane tasks and standardizes workflows
Retail	+/−AI performs administrative tasks but poses adaptation challenges	+/−AI analytics improved customer interactions but devalued personal knowledge	+/−AI increases control over the sales approach, but surveillance is restrictive	+AI automation enables deeper customer interactions	+AI removes mundane tasks and standardizes workflows

Note(s): + indicates a positive effect, − indicates a negative effect on the corresponding SMART work design category

Source(s): Authors' own work

decision-making logic allowed some experts to cope by redefining their role as interpreters of AI insights, which restored a degree of perceived competence. In retail, mastery was variably affected. On the one hand, salespeople gained feedback from behavioral analytics, improving their customer interactions (Singh *et al.*, 2019); on the other hand, when AI replaced the need for in-depth customer knowledge, some FLEs resisted knowledge sharing to preserve their value, reducing collective learning opportunities and suppressing mastery development (Monod *et al.*, 2023).

4.4 Autonomous work

AI's ability to autonomously carry out simple work increased FLEs' sense of autonomy in hospitality and retail settings where workers could offload routine tasks and redirect their efforts toward higher-value, discretionary activities. In hospitality, FLEs were able to adjust AI responses to better direct customers to areas with staffing and capabilities best suited to their needs. This gave workers more control over their tasks and allowed them to focus where they were most needed (Tahir *et al.*, 2025). FLEs high in trust in AI and proactive personality

particularly benefited through greater engagement in exploratory and innovative activities (Kong *et al.*, 2024). In retail, AI-supported salespeople reported greater autonomy in client interactions and more control over their approach to closing deals (Jia *et al.*, 2024).

Novice financial service employees also benefited, using AI to perform complex tasks independently, thereby gaining role autonomy (Strich *et al.*, 2021). However, AI significantly reduced the autonomy of expert employees by centralizing decision-making within algorithms, removing human discretion from key service tasks (Perez *et al.*, 2022; Strich *et al.*, 2021). A similar pattern was observed in healthcare, where AI-led treatment decisions and opaque algorithmic outputs constrained clinicians' independent judgment, with some professionals expressing concern about overreliance on AI and erosion of professional discretion (Mauro *et al.*, 2024; Tanaka *et al.*, 2023; Van Cauwenberge *et al.*, 2022). In retail, employee surveillance via AI tools tracking communication and performance data was perceived as restrictive and controlling, further diminishing perceived autonomy (Monod *et al.*, 2023).

4.5 Relational work

Positive relational effects were most evident in education, retail and, to some extent, healthcare. Teachers reported that AI-supported personalized learning activities improved inclusivity and created more opportunities for meaningful student engagement by enabling more tailored student-centered learning (Zhang and Zhang, 2024). These enhancements in student-centered learning were also linked to increased perceptions of task significance. In retail, automation of routine tasks enabled deeper customer interactions, enhancing emotional connectivity and personalization of service (Singh *et al.*, 2019). In healthcare, AI-improved administrative efficiency increased the amount of time available for patient communication and collegial collaboration, reinforcing relational work (Mosch *et al.*, 2022; Rony *et al.*, 2024; Shaikh *et al.*, 2023). However, studies highlighted that AI use should be discouraged for patient interactions where human empathy is irreplaceable (Bienefeld *et al.*, 2024; Tanaka *et al.*, 2023).

In financial services, relational work characteristics were sometimes undermined when managerial decisions prioritized algorithmic outputs over human judgment (i.e. AI was given more autonomy based on its ability to process and learn from data), potentially eroding the advisor–client bond (Perez *et al.*, 2022; Strich *et al.*, 2021). FLEs adapted by going beyond job expectations to cultivate customer trust and deepen relationships, thereby partially mitigating AI-induced relational disconnection.

4.6 Tolerable work

AI's autonomous and learning abilities alleviated job demands in the education, retail and healthcare sectors by reducing cognitive load and eliminating time-consuming routine tasks. Teachers reported workload reductions through AI-assisted lesson planning and assessment creation (afforded by the generativity and versatility of GenAI systems), helping to alleviate burnout (Ghamrawi *et al.*, 2024; Hashem *et al.*, 2024; Zhang and Zhang, 2024). In retail, AI was particularly found to improve the demands of sales roles, making them more tolerable, by analyzing customer data, removing mundane tasks and standardizing workflows through automation (Monod *et al.*, 2023; Singh *et al.*, 2019). Moreover, telemarketing agents redirected their energy from lead generation to client conversion, resulting in more efficient work practices (Jia *et al.*, 2024). In healthcare, task automation boosted productivity and allowed staff to focus on higher-value tasks (Mauro *et al.*, 2024; Mosch *et al.*, 2022; Shaikh *et al.*, 2023).

However, despite productivity gains, more notifications and responsibility for AI supervision introduced additional stress. Physicians expressed concerns over "alert fatigue," technical overload, and the pressure to ensure clinical safety amid rapid technological adoption (Bienefeld *et al.*, 2024; Ganapathi and Duggal, 2023; Leggett *et al.*, 2024). In financial

services, tolerability was also negatively impacted. AI introduced new demands, such as the need to interpret outputs of an inscrutably operating AI system and pressure to meet elevated sales targets based on expected efficiency gains (Perez *et al.*, 2022). FLEs also experienced role confusion and emotional strain stemming from the disruption of professional identities and continuous monitoring (Strich *et al.*, 2021).

5. Discussion and conclusions

The purpose of this paper has been to examine how AI impacts the work characteristics of FLEs. To this end, we presented a summary of empirical findings across five service sectors, using a five-pronged conceptualization of AI and the SMART Work Design Model as organizing frameworks. Our paper shows that AI's impact on work characteristics differs significantly among FLEs and across sectors, revealing specific contingencies between AI characteristics and context-dependent factors.

In education, AI, especially GenAI, lightens administrative demands, enriches teaching through diverse activities and supports mastery. This makes sense given that producing teaching and assessment materials is among the key responsibilities of educators and that GenAI excels at generating various kinds of linguistic and visual outputs with minimal human intervention. However, concerns remain about weakening teacher-student relationships, suggesting the need for caution when deciding how much autonomy such systems should assume. In financial services, AI's autonomous and learning capabilities enable it to predict customers' service needs and trustworthiness in repaying loans. In consequence, the systems are often deployed in a way that deskills FLEs' work by taking over analytical tasks, reducing employees' autonomy and raising their workloads, with benefits for novices rather than experienced professionals. In healthcare, AI supports medical professionals' decision-making, autonomy and collaboration, yet risks overreliance that may erode learning and professional judgment; human connection remains central to service quality. In hospitality, early evidence shows that AI enhances mastery and autonomy when FLEs control technologies like service robots, but fears of job loss persist due to AI's growing autonomy, and relational effects remain underexplored. In retail, AI automates routine work and frees FLEs to focus on customer relationships, but AI inscrutability restricts access to customer insights and raises concerns over surveillance, limiting FLEs' autonomy and mastery.

The sectoral differences highlight the importance of role reinvention through both top-down organizational work redesign and bottom-up individual job crafting. Where AI enables FLEs to act as innovators, coordinators or differentiators (Bowen, 2016), positive effects are more evident. Yet, most organizations have not considered redesigning service roles, which may explain the mixed and negative outcomes observed, particularly in finance. In many cases, FLEs resorted to crafting their roles through spontaneous workarounds aimed at coping with the disruption caused by AI. Following Bowen (2024), we assert that the long-term impact of AI will depend not only on the technology itself but on how FLEs react to it and whether organizations use it as a catalyst for rethinking work design.

Across sectors, an underlying theme was the focus on humanizing work in the context of digital technologies (Guest *et al.*, 2022); this was particularly strong in healthcare, hospitality and retail. These are service sectors characterized by high "touch" and emotional connectivity as part of the customer experience, meaning a strong reliance on personal interactions and human engagement (Fan and Mattila, 2021; Solnet *et al.*, 2019). Thus, a key issue here is the extent to which AI automates and augments the human service and alters FLEs' decision-making capacity and discretion. For example, while hospitality businesses that are seeking efficiencies and cost savings will likely invest in the integration of AI with standardized processes, luxury hospitality businesses, which pride themselves on unique, personalized experiences, are less likely to remove the human role (Holmqvist *et al.*, 2020; Pelet *et al.*, 2021). Empathy, as a central human characteristic, also remains a key differentiator in healthcare settings, particularly in patient-centered care focused on dignity and respect. These

examples reiterate the need for organizations to carefully rethink work design, in line with the nature of the service provided.

In the extant literature, we recognize the ambiguous treatment of AI by service work researchers, with inconsistent references to the type of AI involved. Most studies used AI as a general term, with limited definition and scope. For instance, Tahir *et al.* (2025, p. 1101) describe employee knowledge of AI as "understanding and expertise related to the field of AI, encompassing the principles, algorithms and technologies that enable machines to mimic human intelligence." In another study, AI usage was identified only through a screening question that asked whether employees used AI for their work (Liu *et al.*, 2024). Some studies offered more specificity, but overall, distinctions in AI types were vague. As a result, we could not always draw specific conclusions about the technical dimension of AI's impacts. While our conceptualization of AI through five technical characteristics helped to offset this issue by allowing some interpretive freedom, we urge future studies on AI in service work to adopt a more explicit and nuanced approach to defining AI.

5.1 Theoretical contributions

Our main theoretical contribution lies in integrating the AI, work design and service work literatures. Specifically, we show the value of SMART work design as a lens to differentiate AI impact on service work and develop a conceptual model of a socio-technical AI–work design system (Figure 1). Drawing on socio-technical systems theory (Emery and Trist, 1965), the model illustrates a dynamic co-design process, shaping the interplay of AI's characteristics (technical dimension) and FLEs' work characteristics (social dimension). By doing so, we move beyond a one-directional view of AI's impact on service work, concurring with Guest *et al.* (2022) that greater integration of both social and technical aspects is required. Our five-pronged conceptualization of AI's characteristics goes beyond previous studies by providing insightful theoretical nuance to the way in which AI's impacts can be analyzed and theorized. By showing how the five AI characteristics interact with the five work design characteristics, we help explain how and why AI's impact on FLEs' work unfolds as it does. Further, the learning nature of AI means FLEs and organizations must now adapt to the constant evolution of AI, highlighting the recursive AI–work design characteristics interaction. The static, pre-programmed rules and logic of traditional digital technologies provided predictable functionality in the work environment. However, in this new era of AI, the work design of FLEs needs to evolve and adapt to shifts in what is done by humans versus AI.

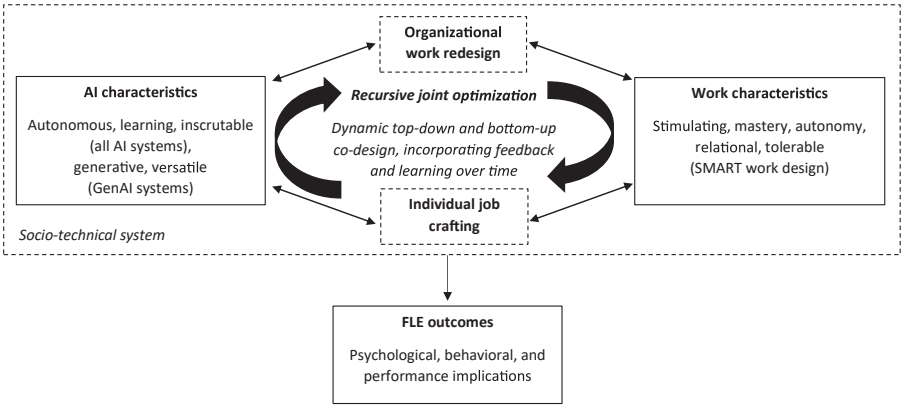

Figure 1. A socio-technical AI–work design system. Source: Authors' own work

Our model illustrates how joint optimization takes place through top-down organizational redesign and bottom-up individual crafting; the latter refers to self-initiated, proactive strategies that FLEs can take to change their jobs to better meet their needs, skills and desires (Tims *et al.*, 2013). For example, while AI may negatively impact finance work across most SMART components, we found that FLEs can cope by engaging in job crafting in various ways: investing in the unique human touch and discretion that AI cannot offer; reframing their role identity; leveraging AI's insights to gain a more holistic view to customers' needs; and gaming and manipulating the AI system. Further, our model highlights the importance of incorporating feedback and learning over time (Mele *et al.*, 2024). Ultimately, we argue that the AI–work design interaction and the joint-optimization process will shape a range of FLE outcomes, with psychological, behavioral and performance implications.

5.2 Practical implications

A better understanding of AI characteristics and their impact on evolving FLEs' roles will allow organizations to optimize service work, ideally improving both employee well-being and organizational performance. First, organizations need to go beyond surface-level assumptions about the impact of AI and conduct role-specific analysis, considering technological characteristics together with work design categories. For example, AI can relieve mundane data analysis tasks for retail employees and have a strong positive effect on FLEs, whereas this same relief poses challenges for finance employees who now face greater pressures to up-sell AI-generated leads and have more relational characteristics in their work. Being in close dialogue with service workers operating at the frontline is required to customize AI integration and to manage FLEs' emotions, addressing their fears and concerns (Solnet and Golubovskaya, 2023; Zhou *et al.*, 2024). Considering FLEs' affective, behavioral and cognitive attitudes toward AI will help organizations gain a more holistic perspective on FLEs' reactions and support new thinking on the service-profit chain (Hogreve *et al.*, 2022; Solnet *et al.*, 2018), which addresses the importance of FLE well-being – a step beyond employee satisfaction (Heskett *et al.*, 1997).

Second, for effective AI implementation, organizations should provide training to FLEs to raise awareness around the role of AI, clarify the expected AI–human interaction and outline its potential value (Jia *et al.*, 2024). For example, teachers could be encouraged and supported to experiment with AI to improve learning design and delivery, which reduces job demands for employees and increases the stimulating, mastery and autonomy work characteristics of their role. Training might be a combination of on-the-job training and simulations, or role plays, to provide guidance on how to interact with AI in various settings. Introducing AI without consulting FLEs will likely increase levels of uncertainty and result in less effective adoption (Zhou *et al.*, 2024).

Third, organizations should proactively engage in work redesign to optimize effective AI–human interactions. Such work redesign is likely to involve a mix of top-down organization-led and bottom-up individual-led approaches to be most effective (Hornung *et al.*, 2010). A top-down approach could involve senior managers proactively considering how integrating AI with organizational systems and structures impacts employees' SMART work design (Knight and Parker, 2021). A bottom-up approach could involve managers encouraging FLEs to job craft (Mirabito *et al.*, 2025), allowing them to explore new ways of shaping their service roles (Bowen, 2024). A valuable example would be healthcare managers actively seeking feedback on the relational impacts on human empathy between employees and patients. These managers could also inquire about potential information overload and employee deskilling caused by AI-enabled technologies. Job crafting may also include seeking opportunities for upskilling and reskilling in new areas of interest if AI has made certain tasks and skills redundant, such as data analysis in finance, healthcare and retail work. Managers can facilitate job crafting by giving FLEs autonomy to reshape their roles and consider alternative career paths (Bankins *et al.*, 2024a). Managers can also open doors to appropriate development opportunities to smooth the process of assimilating AI into service roles.

Fourth, to assess the impact of AI more holistically, organizations should monitor the impact on a diverse set of metrics, beyond organizational performance and customer satisfaction. These metrics could include individuals' perceptions of AI's capabilities, their SMART work characteristics and their perceptions of work meaningfulness, role identity, job satisfaction and motivation, as well as other outcomes such as improved well-being, reduced turnover and stronger performance (Subramony *et al.*, 2021). Closely monitoring these diverse metrics and sharpening the focus on employee experience (Bowen, 2024) are particularly relevant given the increased psychosocial risks at work. For example, we found hospitality managers needing to address the anxiety that came from AI-enabled tasks that had the potential for greater customer innovation but were instead overshadowed by fears of job replacement. Beyond this, AI may have broader impacts on a person's quality of life, such as experiencing physical fatigue or pain, feeling unsupported or isolated, or losing their sense of control over life. These effects can result in ill-being (McColl-Kennedy *et al.*, 2012), particularly for those in precarious work (Blustein *et al.*, 2025). This suggests that implementing AI in service-sector workplaces can introduce both physical and psychosocial risks, which need to be proactively assessed and managed to optimize the health and well-being of FLEs.

5.3 Limitations and future research

Our study has some limitations, which we view as avenues for future research. Given the recent AI integration into FLE roles, limited research exists, particularly on work design characteristics and implications for frontline service work. In the following, we present suggestions for future research at the individual and organizational levels.

First, building on our paper, future research could conduct empirical research, examining the SMART work characteristics of FLEs across different types of organizations, including both service and manufacturing sectors. Quantitative methods will be useful for measuring the SMART characteristics and analyzing a set of individual, team and organizational outcomes. Future research should unpack the proximal and distal outcomes of AI–human interactions and the changing work characteristics of evolving service work. For example, how does the implementation of AI impact FLEs' engagement, job satisfaction and turnover? Case studies that combine both quantitative and qualitative methods would be beneficial, allowing for an in-depth understanding of FLE experiences of AI–human interactions and a holistic organizational perspective on the effectiveness of AI implementation. Future studies should also provide explanatory insights regarding effects across sectors and, over time, adopt a temporal lens.

Second, future studies could utilize our conceptual model to empirically unpack the dynamic co-design process between AI and work characteristics. Longitudinal studies could explore employees' experiences over time, potentially moving from resistance to adaptation and integration. These studies could also feature various moderators, such as employee expertise, AI trust and managerial interventions, which may shape the co-design process. In addition, studies could unpack our model in the context of service interactions, service teams and the service environment, which might result in differences in resistance, adaptation and integration. For example, we might find variability across credence, experiential and transactional services offered by organizations.

Third, better understanding the job crafting behaviors of FLEs is an area of fruitful future research. We may find that "AI crafting" will lead to improved FLE engagement and performance in service work (Li *et al.*, 2024). Crafting has the potential to increase fit between the AI-human collaboration, proactively responding to these technologies, improving well-being and performance (Lazazzara *et al.*, 2020). Future research could also examine whether AI and its impact on work characteristics shape the refinement of Bowen's (2016) broader roles of service workers. Empirical research may find that FLEs take on the role of a differentiator, innovator, coordinator and enabler, in the context of AI–human collaborations. Relatedly, how such changes and the new form of collaboration influence the various role

identities of FLEs (Strich *et al.*, 2021) requires further research. The extent to which FLEs engage in job crafting will be influenced by a range of factors, such as the level of FLEs' job insecurity and tech-learning anxiety (Wu *et al.*, 2024).

Fourth, more research on top-down organizational work redesign is needed in service work. For example, future research questions might include: How can organizations best redesign roles and train FLEs to prepare them for effective human–AI collaboration in service work? How can organizations define the value-adding human aspects of FLE roles? And how can a skills-matching approach (Jooss *et al.*, 2024; Morrill *et al.*, 2026) increase agility in human–AI collaboration? Relatedly, there is a need to better understand the strategies that organizations can use to help FLEs adjust to these new realities beyond their current role (Bankins *et al.*, 2024a). For example, AI adoption may reshape roles and create new career paths, including new responsibilities and skillsets, but may also limit other traditional career paths. As such, considering career trajectories in the wider service ecosystem and the links between work design and careers is a noteworthy avenue of future research.

Our study highlights the impact of AI on work characteristics in the service sector. Utilizing the SMART Work Design Model enabled a holistic perspective on the positive and negative impacts on FLEs' work characteristics, providing insights into work design. We conclude that thoroughly understanding the evolving social and technical aspects of service work lays the cornerstone for optimizing work design and reinventing service roles for the future of work.

Data availability statement

Data availability is not applicable to this article as no new data were created or analyzed in this study.

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