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Is it Meaningful to Work with A Robot? A Quantitative Exploration Using the Job Characteristics Model among Restaurant Employees

Full research paper

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Abstract

Service robots in restaurants offer benefits; however, employee concerns about job displacement and resistance to new technology pose significant challenges. This research investigates the anticipated impact of robot integration on job characteristics in 220 restaurant employees, using the Job Characteristics Model to explore how these changes affect job meaningfulness and employee turnover intentions. By examining the influence of task significance, autonomy, and feedback on employee perceptions of meaningful work in a robotic environment, this study aims to identify key job characteristics impacting employee attitudes toward automation and contribute to supporting human workers in the era of automation.

Keywords Service robots, Job Characteristics Model, Job Meaningfulness, Turnover intention, Human- Robot Interaction

1 Introduction

In the context of restaurants designed for creating and delivering services, service robots offer many advantages (Paluch et al., 2022). Service robots are used across many domains for cost reduction, increased productivity, enhanced reliability, and scalability (Jörling et al., 2019; Wirtz & Zeithaml, 2018), as well as improved customer retention and satisfaction (Golchinfar et al., 2022; Kumar et al., 2019; Lacity & Willcocks, 2016). Additionally, service robots help address labor shortages in sectors such as construction (Morkos, 2022) and serve vital roles when limiting human contact is crucial,such as the COVID-19 pandemic (Esterwood & Robert, 2021). Consequently, there is a growing deployment of service robots in various industries, particularly within the hospitality sector, which includes restaurants (Shin & Jeong, 2020), as well as in retail (Bertacchini et al., 2017), education (Gonzalez-Aguirre et al., 2021), and healthcare (Čaić et al., 2018).

Despite their advantages, the widespread use of robots in service sectors like restaurants comes with challenges. Employees commonly harbor skepticism and anxiety regarding working alongside robots, fearing potential job displacement (Graetz and Michaels 2018; Jörling et al. 2019; Rust and Huang 2014). Consequently, this apprehension has various negative consequences, including reluctance to embrace new technologies or suboptimal utilization (Bala and Venkatesh 2016; Kaur et al. 2023). As a response, both industry experts and academics have started to address the impact of robots on the human workforce and how human employees might perceive and react to working with robot colleagues (Mott and Williams, 2022). Theoretically, scholars have highlighted the need for new theories or significant extensions to existing theories to help study emerging AI technology collaboration in the workplace (Berente et al. 2021; Burton-Jones et al. 2021). Practically, organizations need to better understand the implications of robots as potential co-workers.

To address these challenges, this study aims to explore the anticipated changes in 220 restaurants due to integrating service robots into their operations. To accomplish this, the study employs the Job Characteristics Model (JCM) as a theoretical framework to investigate employees' anticipated changes in job characteristics on work meaningfulness and its potential impact on turnover. The JCM has been chosen for its robust framework in identifying significant work dimensions impacting employee motivation and satisfaction (Oldham & Hackman, 1981; Yam et al., 2021; Willems et al., 2023), which is crucial because job meaningfulness directly affects the human experience in the workplace (Goštautaite et al., 2023). Understanding the intersection of meaningful work and robotics is essential to ensure that the integration of automation complements, rather than diminishes, the human experience (Welfare et al., 2019; Yam et al., 2023). As such, by examining job meaningfulness, we better understand how to redesign work and the technology that supports it (Welfare et al., 2019; You and Robert, 2023).

Therefore, our research addresses the following question: *What anticipated changes in job characteristics, influenced by the introduction of robots in restaurants, are expected to impact employees' perceptions of job meaningfulness and their intention to leave their jobs?*

This study provides several contributions. One, by employing the JCM framework, the research identifies key job characteristics that affect employee perceptions of meaningful work when robots are involved, contributing to both the JCM literature and a broader understanding of workplace automation. Two, the study highlights the varying relevance of job characteristics such as skill variety, task identity, task significance, and autonomy in this context, revealing that task significance is particularly crucial as employees might feel devalued when robots perform tasks. Three, the research underscores the importanceof autonomy and feedback as critical components, showing that employees value robots more when they enhance job autonomy and provide meaningful feedback. Finally, the study links job meaningfulness to turnover intentions, as employees express concerns about being replaced or competing with robotic co- workers, suggesting that work arrangements should prioritize supporting rather than replacing humans.

2 Related Work

2.1 Adoption of Robots

The literature on employee adoption of service robots highlights the benefits and challenges associated with human-robot collaboration. Organizations believe that by deploying technologies like service robots, employees can profit from enhancements in crucial parts of the business, such as communication and data analysis (Rust and Huang 2014). Robots can also enhance productivity,satisfaction, and workplace safety by helping employees complete their tasks and allowing time to focus on other salient tasks (Barrett et al. 2012; Lacity and Willcocks 2016; Noone and Coulter 2012). Employee-robot collaboration also promises higher-quality service (Wirtz and Zeithaml 2018).

However, employees' willingness to collaborate with service robots can vary significantly. Research indicates that highly advanced automation often triggers employee concerns (Jörling et al., 2019). Service robots have been associated with frustration and a perceived loss of autonomy (Barrett et al., 2012). Their deployment can engender feelings of depersonalization, surveillance, and disempowerment, challenging the established roles and positions of employees (Green et al., 2016). These concerns are frequently intertwined with the fear of job displacement among human workers. For instance, Brynjolsson and McAfee (2014) argue that rapid technological advancements can lead to job destruction rather than creation, potentially contributing to income and growth stagnation. Frey and Osborne (2017) also warn of significant labor displacement due to robot adoption, estimating that up to 47% of jobs in the US may be susceptible to automation byservice robots. Acemoglu and Restrepo (2020) studied major robot penetration and found that every robot replaces the job of six people.

Robot technologies often lack the intuitive understanding and empathetic capabilities necessary to function independently of human guidance (Hoffman et al. 2019; Huang and Rust 2018). On the other hand, humans must learn to effectively use and coordinate with such technologies (Beane 2019; Beane and Orlikowski 2015). This learning process can be challenging, perplexing, and demotivating, potentially resulting in miscommunication and mistrust (Beane 2019). The absenceof intuitive qualities in robots and the learning process demanded of employees to interact with them constitute barriers to the widespread adoption of service robots (Beane 2019; Huang and Rust 2018).

Scholars have explored the challenges for employees working alongside service robots. They've investigated stakeholders' expectations, concerns, and success criteria, noting the ability of servicerobots to create a comfortable environment (Niemelä et al., 2017) and enhance meaningful work (Bednar and Welch, 2020). In retail, store managers generally expressed satisfaction with using service robots to attract customers (Shi et al., 2016). In the health industry, end-users believe service robots can help hospital professionals reduce their workload (Mettler et al., 2017). Conversely, restaurant employees worry about service robots' capacity to remember orders and personalize services for improved customer satisfaction (Kim et al. 2021). Health workers have concerns about buildings' physical limits, usage flexibility, and the low frequency of repetitive tasks in hospitals, all potentially hindering robot efficiency (Mettler et al. 2017). Park et al., (2024) emphasize increasingpositive emotions among customers in service robot locations to promote robot use in hospitality.

In summary, researchers have also focused on enhancing design and control interfaces for service robots, including end-user programming (Vaziri et al., 2020). They have also stressed the importance of considering specific contexts to refine service robot design (Mettler et al., 2017; Songand Kim, 2022). Finally, scholars have delved into the influence of proxemics on the successful deployment of robotic workers in service settings (Bhagya et al., 2019). Yet, exploring employee adoption of service robots illuminates a complex landscape of opportunities and challenges withinhuman-robot collaboration. The journey towards seamless integration of service robots into the workforce is dynamic, where acknowledging and addressing the employees' concerns can be pivotal in realizing the full potential of this collaboration to benefit organizations, employees, and the customers they serve.

2.2 Job Characteristics Model and Employee Outcomes

JCM, as a theoretical framework, holds a prominent role in job design, redesign, and enrichment (Hackman and Oldham 1975; 1976). It posits that a combination of job characteristics collectively affects an employee's psychological state, subsequently influencing job outcomes. JCM's five job characteristics constructs are task significance–the extent to which a job has a substantial impact on the lives of other people, whether in the immediate or external environment; task identity–the extent to which a job involves completing a whole identifiable outcome; skill variety–the extent a job requires a variety of different activities that utilize the use of different skills and talents; autonomy–the extent to which a job provides substantial freedom, independence, and discretion to the employee in scheduling the work and in determining the procedures to be used in carrying it out; and feedback–the extent to which carrying out the work activities provides the employee with clear information about his or her performance (Hackman and Lawler, 1971). Generally, jobs should be high in all five characteristics for positive outcomes.

Job characteristics influence critical psychological states: experienced meaningfulness of the work, experience responsibility for outcomes, and knowledge of the actual work results (Hackman and Oldham 1975). While all three may be significantly affected by job characteristics, we focus on job meaningfulness for this paper. Meaningfulness of work explains how workers feel their work is valuable, important, and meaningful to themselves and others (Goštautaite et al., 2023; Hackmanand Oldham, 1975; Rosso et al., 2010). Robots are highlighted as a threat and an opportunity for meaningful work, with conclusions dependent upon the work context (Smids et al., 2020). Furthermore, job meaningfulness is the largest contributor to employee engagement (May et al., 2004; Rosso et al., 2010). Employees who experience

high engagement levels exert 57% more effort in their work and demonstrate 87% lower turnover intentions (Buchanan 2004; Saks 2006; Shucket al. 2011). Job meaningfulness also improves one's psychological well-being (Arnold et al., 2007) and fosters a climate of collaboration within the organization through organizational identification (Pratt et al., 2006). Job outcomes form the final part of the JCM, and one of these outcomes is turnover intention. Turnover intention is the extent to which an employee consciously seeks to leave their current employer (Hackman and Oldham 1975). Events such as radical technological changes in work design, like the introduction and implementation of robots, can impact employees' fear of displacement in a way that they feel threatened about losing their jobs to robots (Greenhalgh and Rosenblatt 1984; Roskies and Louis-Guerin , 1990). This kind of job insecurity is positively associated with job outcomes like turnover intentions (Cheng and Chan 2008; Sverke et al. 2002).High employee turnover intention undermines organizational performance (Davenport and Prusak 1998; Lee and Mowda 1987).

This study posits that the JCM can serve as a valuable framework for understanding work interactions between robots and humans. Through this lens, researchers can gain a profound understanding of the intricacies inherent in human-robot work collaboration, pinpointing the specific job characteristics that bear significance in cultivating a positive environment for co- working with robots. Despite this, little research has employed the JCM to understand anticipatedchanges from working with robots.

3 Hypothesis Development and Research Model

The JCM describes how job characteristics influence individual psychological states and how thesestates impact job outcomes (Hackman and Oldham 1975). Hypotheses in Figure 1 are derived from two overarching theoretical assertions: 1) expected positive or negative changes in job characteristics are linked to corresponding positive or negative changes in job meaningfulness, and 2) expected positive or negative changes in job meaningfulness are associated with respective expected negative or positive changes in turnover intention. A detailed explanation is presented below.

3.1 Skill Variety, Task Identity, Task Significance, and Job Meaningfulness

Skill variety, task identity, and task significance are three core dimensions in the JCM, which haveoften been hypothesized as a set rather than individually (Hackman and Oldham 1975; 1976). Skillvariety contributes to experienced meaningfulness by making the job more interesting and engaging, allowing employees to expand their skills and knowledge (Wrzesniewski and Dutton 2001). This, in turn, contributes to a sense of fulfilment and meaning in one's work. Similarly, when employees work on tasks with high task identity, they can see the tangible results of their efforts. Completing a task from start to finish provides a clear sense of accomplishment and contribution (Hackman and Oldham 1976). This clear outcome contributes to a sense of meaning in the work. Task identity can also connect individual tasks to an organization's larger purpose or goal. When employees understand how their tasks contribute to the broader objectives, they are more likely to perceive their work as meaningful (Wrzesniewski and Dutton 2001). Lastly, jobs withhigh task significance often involve tasks that directly affect other people's lives or well-being. When individuals understand that their tasks impact others, they are more likely to find their workmeaningful (Wrzesniewski and Dutton 2001).

Implementing robots could have positive and negative expected changes to these job characteristics. Humans can focus on more complex and skill-demanding activities when automation can handle more mundane tasks (Staaby et al. 2021). This can enhance skills as employees learn and develop new skills to operate, program, and maintain robots (Karwowski andSalvendy 1998). It can also enhance task identity as workers complete more holistic tasks (Karwowski and Salvendy 1998). Moreover, automation can enhance product quality and streamline existing processes for efficiency. In such a case, skill enhancement through job learning, accomplishment from task completion, and performance focusing on customer and product safetywill lead to more meaningful work. However, in some cases, introducing robots can lead to task fragmentation. When robots take over entire tasks, employees may become specialized in narrow areas or have fewer opportunities to perform various tasks (Goštautaite et al., 2023). This can reduce skill variety as well as task identity. Redundancy and monotony can reduce the sense of purpose and completeness and curtail learning, reducing job meaningfulness levels (Bessen 2018). Furthermore, automation for trivial tasks can decrease task significance for employees, removing the contribution to "good" they previously felt towards doing the task.

Therefore, we propose a direct association between skill variety/task identity/task significance and job meaningfulness in the context of working with robots, such that an increase or decrease in these job characteristics will lead to a subsequent increase or decrease in job meaningfulness.

H1) Expected increases/decreases in a) skill variety, b) task identity, and c) task significance dueto the implementation of robots will be associated with corresponding expected increases/decreases in job meaningfulness.

3.2 Job Autonomy and Job Meaningfulness

Autonomy, the degree of independence and control employees have over their work tasks and decision-making is crucial in shaping employees' perceptions of their work as meaningful. When individuals can decide how they perform their tasks, set their goals, and solve problems, they are likelier to feel that their work is (Hackman and Oldham 1976). In addition, autonomy allows employees to align their work with their values and beliefs. When individuals can make choices that reflect their values and priorities, they are more likely to find their work meaningful (Wrzesniewskiand Dutton 2001). As such, employees with autonomy can choose tasks that positively influence others or the organization, contributing to a sense of meaningful contribution (Grant 2008; Isaksen 2000).

In robot implementation, employees may sometimes be free to program, instruct, and monitor robots, allowing them to shape and control the robotic task (Welfare et al., 2019). However, at other times, employees might feel bound to specialized tasks like robot supervision, maintenance, and troubleshooting (Kaur et al., 2023). While an increase in autonomy will lead to task choice that is meaningful to self and others, a lack of the same will lead to disempowerment and task specialization, negatively impacting job meaningfulness. Hence, we propose that autonomy will be directly associated with job meaningfulness in the context of robots.

H2) Expected increases/decreases in autonomy due to the implementation of robots will be associated with corresponding expected increases/decreases in job meaningfulness.

3.3 Feedback and Job Meaningfulness

Feedback is how work activities enable employees to obtain "direct and clear" results about their effectiveness. Feedback is closely related to job meaningfulness in several ways (Johns et al. 1992). When individuals receive feedback highlighting the positive effects of their efforts, it clarifies the purpose and impact of their work, contributing to a sense of meaningfulness (Grant 2008; Hackman and Oldham 1976). In addition, constructive feedback provides employees with opportunities for continuous learning and growth (Isaksen 2000). This can lead to a sense of personal and professional development,enhancing job meaningfulness (Wrzesniewski and Dutton 2001). Furthermore, feedback helps individuals adjust their goals and approaches, ensuring that they are working toward objectives that are personally meaningful and relevant (Locke and Latham 2002). The implementation of robots can increase feedback through performance monitoring, real-time supervising, and multiple-channel information provision. Effective calibration of robots can lead to high-quality feedback, while errors andmalfunction can result in inaccurate or misleading feedback. While constructive and positive feedback will enhance job meaningfulness, error-prone feedback or no feedback will make it challenging for employees to collaborate effectively with robots. This also decreases opportunities for learning and growth and negatively impacts job meaningfulness. Thus, reinforcing JCM, we propose a direct relationship between feedback and job meaningfulness.

H3) Expected increases/decreases in feedback due to the implementation of robots will be associated with corresponding expected increases/decreases in job meaningfulness.

3.4 Job Meaningfulness and Turnover Intention

Job meaningfulness, the degree to which individuals find their work purposeful and fulfilling, should have a significant and negative relationship with turnover intention, which is the intention or inclination of employees to leave their current job or organization (Hackman and Oldham 1976).Meaningful work provides a sense of fulfilment and purpose, which can be a strong retention factor. Hence, employees are likelier to stay with an organization that offers meaningful roles (Bailey et al. 2017). Furthermore, meaningful work often aligns with an organization's values and mission. Employees who feel their work contributes to something larger than themselves and is consistent with the organization's goals are more likely to remain committed and less likely to consider leaving (Wrzesniewski et al., 1997). Finally, employees who find their work meaningful experience lower stress levels and burnout. Improved well-being is linked to reduced turnover intention, as employees are less motivated to leave a job that contributes positively to their overalllife satisfaction (Steger et al. 2012).

A shift in job roles and the acquisition of new skills with the implementation of robots may lead employees to consider their roles less important. A race to compete against the robot may lead to stress and burnout, with the constant fear of being replaced by a robot. With little sense of fulfilment, fear of displacement, and extreme competition, employees will find their work less and less meaningful to

themselves and others. They will hence be inclined to seek alternative employment. At the same time, when robot implementation leads to a more efficient and safer workplace that acknowledges the respective roles of employees and robots and gives due credit, employees are less likely to leave their jobs. Therefore, we propose that an increase (decrease) in job meaningfulness will lead to a decrease (increase) in turnover intention.

H4) Expected increases/decreases in job meaningfulness due to the implementation of robots willbe associated with corresponding expected decreases/increases in turnover intention.

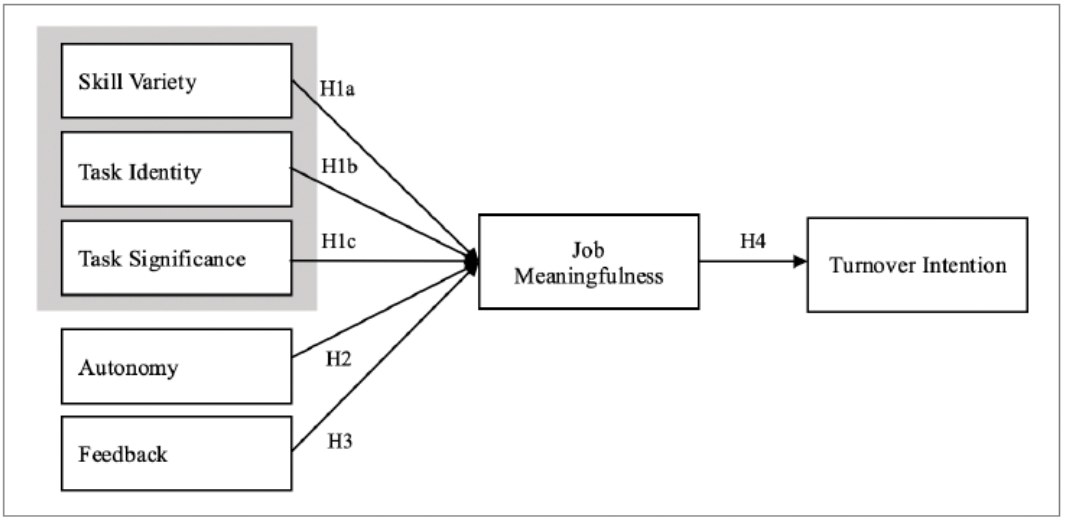


Figure 1: Research Model

4 Research Methodology

The study included 220 restaurant employees aged 18 to 67 years, with an average age of 36.8 years and a standard deviation of 12.3 years. Most participants identified as female 64.5%, followed by males 34.5%, with one transgender male 0.5% and one participant who chose not to specify their gender 0.5%. On average, restaurant employees worked 8.8 hours daily, with a standard deviation of 2.5 hours. Additionally, their average employment duration in the restaurant industry was 9.5 years. Participant roles included food server, cashier, prep and grill cook, or clean-up person, and they all had prior experience working with robots. We adopted a quantitative approach to examine each hypothesis. Data was collected using an online survey using the Qualtrics platform. Recruitment was done via a panel company. The survey depicted four picturesof robots deployed in restaurants (Appendix 1). Information about how these robots will work with restaurant employees' side by side in the next 5 years was also provided to the participants. Participants were then asked about their perceptions of expected changes about a particular JCM dimension on a 7- point scale. The scales ranged from 1 greatly decreased, 2 decreased, 3 somewhat decreased, 4 with no change, 5 somewhat increased, 6 increased, and 7 greatly increased in job characteristics, job meaningfulness, and turnover intentions due to working with robots.

5 Analysis and Results

The study consisted of items measuring skill variety, task identity, task significance, autonomy, and feedback were each adapted from Hackman and Oldham (1975). The dependent variable Job meaningfulness were also adapted from Hackman and Oldham (1975), while turnover intention items were adapted from Irving et al. (1997). Four control variables were considered: age, gender, work hours per day, and years in the profession. However, none of the control variables were significant.

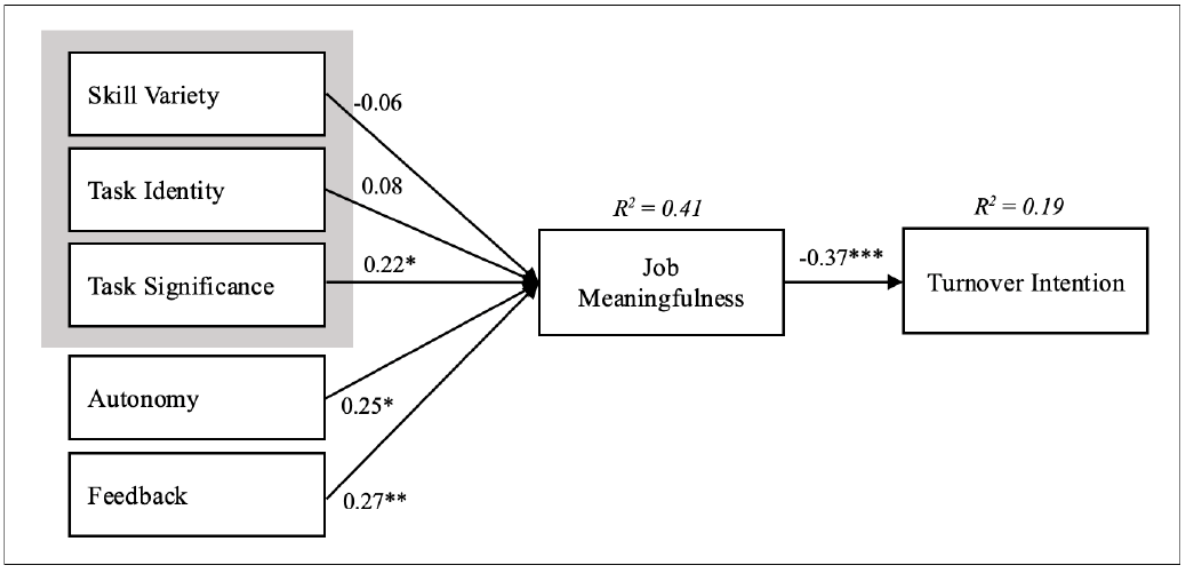
Following the Fornell-Larcker criterion (Fornell and Larcker 1981), both discriminant and convergent validity were accessed. All average variance extracted (AVE) values were over 0.5, which signifies convergent validity. To assess discriminant validity, the AVE values for each construct should be higher than any of its correlations with other constructs. The correlation matrix in Table 1 reveals that all

construct correlations remained significantly below the AVE, indicating discriminant validity. Reliability was assessed with Cronbach's alpha, with all values surpassing 0.70, affirming reliability.

	Cronbach's alpha	Mean	Std Dev	Age	Autonomy	Education	Feeback	Gender	Job Meaningfulness	Professional Years	Skill Variety	Task Identity	Task Significance	Turnover Intention	Work hours Per Day
Age	N/A	36.78	12.32	N/A											
Autonomy	0.87	3.85	1.32	0.04	**0.89**										
Education	N/A	3.41	1.31	0.05	0.01	N/A									
Feeback	0.94	3.86	1.31	0.14	0.53	0.07	**0.94**								
Gender	N/A	1.35	0.48	0.25	0.11	0.03	0.09	N/A							
Job Meaningfulness	0.95	3.55	1.44	0.06	0.54	-0.01	0.54	0.09	**0.95**						
Professional Years	N/A	9.56	8.89	0.53	-0.06	-0.01	0.05	0.19	-0.02	N/A					
Skill Variety	0.90	3.55	1.41	0.17	0.58	0.02	0.53	0.23	0.42	0.06	**0.88**				
Task Identity	0.88	3.75	1.54	0.12	0.58	0.00	0.40	0.15	0.42	-0.02	0.59	**0.89**			
Task Sigificance	0.91	3.65	1.36	0.16	0.62	0.04	0.62	0.13	0.55	0.02	0.66	0.57	**0.92**		
Turnover Intention	0.97	4.66	1.44	-0.13	-0.31	0.04	-0.21	-0.16	-0.40	-0.01	-0.30	-0.32	-0.30	**0.97**	
Work hours Per Day	N/A	8.77	2.48	-0.07	0.05	0.07	-0.02	0.05	0.10	0.07	0.03	0.07	-0.01	-0.12	N/A

Table 1. Correlations and AVE Matrix

The study evaluated the hypotheses using the partial least squares (PLS) method, utilising SmartPLS 4. Figure 3 presents detailed results for the final model, including standardized path coefficients (β) for each respective path and the variance explained ($R2$) for the variable.H1 posited that expected changes in a) skill variety, b) task identity, and c) task significance due to the implementation of robots will be associated with changes in job meaningfulness. Expected changes in skill variety (β = -0.06, p > 0.05) and task identity (β = 0.08, p > 0.05) were not related to changes in job meaningfulness. However, there was a significant positive relationship between task significance (β = 0.22, p < 0.05) and job meaningfulness, indicating that only H1c was supported. H2 and H3 posited that expected changes in autonomy and feedback due to the implementation of robots would be associated with changes in job meaningfulness. Results confirmed that both autonomy (β = 0.25, p < 0.05) and feedback (β = 0.27, p < 0.01) were related to changes in job meaningfulness. As such, both H2 and H3 were fully supported. As hypothesized in H4, expected changes in job meaningfulness due to the implementation of robots were negatively associated withchanges in turnover intention (β = -0.37, p < 0.001), which fully supports H4. The model explainedover 40 percent of the variance associated with job meaningfulness (p<.001) and 19 percent of thevariable related to turnover intention (p < .05).



**p-value < 0.05; **p-value < 0.01; ***p-value < 0.001*

Figure 2: Quantitative Results

6 Discussion

This study utilized the JCM to comprehend the expected work-related transformations stemmingfrom integrating robots into the workplace. The quantitative analysis revealed insights highlighting the importance of task significance, autonomy, and feedback to meaningful work in the context of restaurants. While most of our findings can be generalized to robot implementationin any industry, some are more relevant to the service industry. Nevertheless, our findings highlight changes in job

characteristics, psychological states, and outcomes due to robot implementation in the workplace while acknowledging that some of these constructs could be affected differently in other contexts.

First, this study demonstrates the benefits of employing the JCM to identify employee's anticipated changes due to the introduction of robots. The JCM enables IS researchers to identifyjob characteristics that can improve or detract from meaningful work with robots. This approachalso allows us to apply our findings directly to the vast body of JCM literature. This is paramount,as it allows for seamless integration with and harnessing the existing wealth of knowledge within the JCM literature (Grant 2008). Consequently, IS findings informed by the JCM have the potential to enrich the JCM literature and contribute to a more comprehensive understanding of the multifaceted implications of robots in the workplace.

Second, our study identifies which factors are likely to be most relevant to expected changes in job meaningfulness due to working with robots in restaurants. This study did not find evidence for the role of skill variety and task identity in the context of restaurant service robots. This is surprising because prior literature has shown that these are often vital to understanding the impact of automation on workers' attitudes toward their work (Morris and Venkatesh, 2010; Welfare et al., 2019). To be clear, these job characteristics may be important in other work contexts; however, our findings demonstrate that they may not be as important as the other job characteristics in this context.

Likewise, this study demonstrates the importance of task significance. This paper corroborates previous research linking a task's significance to job meaningfulness in non-robot work arrangements (Allan et al., 2018). However, our findings cover this by uncovering why this may occur in this new work environment. In particular, the comments around why task significance would impact job meaningfulness all indicate employees feeling devalued by the possibility that arobot could perform their job. These findings help to explain previous research, which showed that employees derived more meaningful work when working alongside imperfect robots that need their assistance (Goštautaite et al., 2023). Our study indicates that this may stem from employees feeling undervalued due to the presence of highly capable robots that can perform tasks independently. However, identifying task significance offers several ways to address this issue. For example, organizations can highlight that their employees' value goes beyond the type of work a robot can do.

Third, this study shows the importance of autonomy when working with robots. Employees who felt positive about working robots indicated that it allowed them more freedom to engage in more value-added activities to serve the customer better. However, the employees who felt their autonomy would decrease indicated that the robot would restrict their ability to personalize customer service. The findings support previous research highlighting the importance of robot- customized service for successful integration in the organization (Song and Kim, 2022). One way to address this issue is to design work arrangements that allow employees to determine what the robot can do when working with them. This would also further the idea that robots help to complement rather than replace employees. Nonetheless, this study further highlights the role ofautonomy in human-robot work.

This study reveals the importance of feedback as a core job characteristic that facilitates meaningful work with robots. There were comments by the employees suggesting that they believed the robot could provide meaningful feedback with the help of cutting-edge tracking systems, which would help the employees become more efficient at their work. These quantitative findings reinforce the importance of previous work on how robots can solicit and provide feedbackto human collaborators (Clair and Mataric 2015). It also motivates organizations to design novel and appropriate feedback mechanisms that promote effective employee-robot collaboration.

The study also has important practical implications. Organizations could use job characteristics like task significance, job autonomy, and feedback from the job to improve human-robot collaboration. For example, organizations could emphasize the overall good achieved by a job and the critical and complementary role of the employee in achieving it. This would promote job meaningfulness and collaboration with the robot. Organizations could also focus on determining clear task roles and division in responsibility so that employees do not feel dependent on the robot to achieve their task goals. One-way designers could facilitate this while promoting job autonomyis to design work arrangements that allow employees to determine the role of the robot and humanin a given task (Niemela et al., 2017; Kamino & Sabanovic, 2023). This would also promote a culture of synergy rather than dependency. Last, creating appropriate mechanisms to provide constructive feedback about work tasks to employees working alongside a robot could help increase the employees' feelings of responsibility toward the job and their motivation to improve.Finally, the study shows the importance of a link between job meaningfulness and turnover intention. Employees felt that introducing robots would signal them they were not wanted and would eventually be phased out. The evidence seems to support the goal of designing robots and new

work arrangements in ways that support the employees' work rather than replace theemployees' work (Park et al. 2024).

7 Limitations and Future work

Recognizing certain constraints in the present study is crucial for properly understanding the results and outlining potential avenues for future research. Even though the study tried to ensure priming, it was conducted online with employees reporting their perceptions instead of actual changes experienced while working with robots. Studying anticipated changes is thus only the first step in exploring robot implementation and work redesign. A field experiment with employees who have experience working with robots or a longitudinal study measuring actual change will support our findings.

The JCM encompasses several other constructs, including two more psychological states that impact job outcomes and job meaningfulness. Our research provides researchers with a starting point for studying JCM and its various constructs in the context of robot implementation. This is particularly relevant to IS researchers because while JCM has been successfully used to study work redesign, it does not have any technology-related constructs relevant to work redesign as a result of technology implementation. It is thus possible to explore existing constructs in the context of technology implementation and new technology-related constructs that may add to the existing model. Furthermore, extant research has also explored the mediating role of psychological states in determining the impact of job characteristics on job outcomes (Rem and Vandenberg 1995), as well as the moderating role of factors like stress (Xie and Johns 1995). Future research can explore these relationships with constructs relevant to robot implementation.

8 Conclusion

Employment arrangements that include working with robots are rising, and robots can significantly alter the nature of work, either positively or negatively. This study investigates the impact of robot implementation in a restaurant. It underscores the significant roles of task significance, autonomy, and feedback in shaping meaningful work with a robot. Our findings highlight the role of task significance, job autonomy, and feedback from the job in determining the meaningfulness of work in a human-robot collaborative task. They also underscore the importance of meaningfulness in the job, which leads to reduced turnover intention. Most importantly, the study findings emphasize the need to study human-robot interaction in the workplace and highlight the importance of job redesign in successfully implementing robots. Nonetheless, more research is needed to explore this area further.

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Appendix 1



Figure 3: Example Pictures of Robots in Restaurants

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