TECHNICAL UNIVERSITY OF CLUJ-NAPOCA

ACTA TECHNICA NAPOCENSIS

Series: Applied Mathematics, Mechanics, and Engineering
Vol. 69, Issue Special I, February, 2026

ASSESSING RETAIL EMPLOYEES' PERCEPTIONS OF DIGITALIZATION'S IMPACT ON OCCUPATIONAL HEALTH AND SAFETY

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Abstract: *Retail workplaces are undergoing rapid digitalization, with technologies such as self-checkout systems, automated inventory management, and AI-based sales analytics promising operational efficiencies. While these tools can reduce physical strain and improve transaction speed, there is growing concern that they may also introduce new cognitive demands, stressors, and ergonomic challenges, reshaping occupational health and safety risks in the sector. This study aims to explore and critically assess how retail employees perceive the impact of digitalization on their occupational health and safety. It addresses questions about perceived physical and psychosocial risks, differences across organizational contexts, and the alignment or tension between employee experiences and managerial narratives of technological progress.*
Key words: *retail, occupational health and safety, retail workforce, digitalization, technostress.*

1. INTRODUCTION

The rapid advancement of digital technologies, including automation, self-checkout, and AI management tools, has transformed retail operations and employee roles, raising important occupational health and safety (OHS) concerns [1]. Despite significant investment, the effects on retail workers' health and safety remain underexplored [2]. While companies highlight operational benefits, less attention is given to challenges such as increased cognitive demands, role ambiguity, and psychosocial stressors affecting employee well-being [3].

This study explores retail employees' perceptions of digitalization's impact on OHS, examining physical and psychosocial risks, differences across retail environments, and how employee experiences compare to managerial narratives. Understanding these perspectives is vital for developing balanced strategies that support both efficiency and worker health [4].

The paper includes a literature review, methodology, findings, and discussion, providing comparative analysis and statistical insights into employee perceptions [5]. Prior research shows both benefits, like efficiency and reduced physical strain [6], and risks such as increased monitoring, reduced autonomy, and stress from tech-driven workflows [7]. However, most studies focus on large retailers in wealthy countries, limiting relevance for smaller businesses and diverse cultural contexts. Important gaps remain regarding employees' subjective experiences, and how training, management support, and organizational culture influence digitalization's health and safety outcomes. Addressing these gaps is crucial for creating fair, effective OHS strategies amid retail's technological evolution.

2. DIGITALIZATION IN RETAIL

Digitalization in retail, through automation, self-checkout, and AI-driven tools, has reshaped

operations and employee roles, increasing efficiency and reducing manual tasks [8]. However, new demands arise, such as handling technical failures and assisting customers, which elevate cognitive load and stress. AI applications like demand forecasting streamline supply chains but pressure workers for rapid decision-making, blurring front-line and managerial roles [9]. While automation may reduce physical strain and ergonomic risks [10], embedded AI surveillance can increase stress and reduce autonomy, highlighting a trade-off between physical and psychosocial risks.

Impact varies by context: large retailers in wealthy countries tend to integrate technology with training and ergonomic support effectively [11], whereas smaller or developing market retailers often face heightened risks due to limited resources. Overall, retail digitalization's effects on health and safety are complex and context-dependent, influencing workload, stress, and role clarity [12]. A notable research gap exists regarding employees' subjective experiences across diverse settings, underscoring the need for comparative studies to guide balanced policy and management responses.

3. OCCUPATIONAL HEALTH AND SAFETY (OHS) IN RETAIL

Occupational health and safety (OHS) in retail is increasingly complex, involving physical, ergonomic, and psychosocial risks. Traditional hazards include repetitive lifting, prolonged standing, and poorly adapted workstations causing musculoskeletal issues [13]. Psychosocial risks stem from high job demands and low control, leading to stress and burnout, especially during peak periods [14]. Larger multinational retailers typically implement formal OHS policies, while smaller stores often lack structured safety programs, increasing vulnerability [15].

Digital technologies introduce new challenges by reducing some physical strain but increasing cognitive demands and stress from monitoring and troubleshooting [16]. AI surveillance may undermine autonomy and trust, expanding OHS concerns to include mental health risks. Existing research focuses mainly on large retailers in developed countries, with limited attention to employee experiences and smaller or emerging market contexts. Addressing these gaps is essential for developing inclusive, context-sensitive OHS strategies in retail.

4. METHODOLOGY

This study uses a quantitative survey with Likert-scale and open-ended questions to assess retail employees' perceptions of digitalization's impact on workload, stress, ergonomics, and safety. The survey was distributed online and on paper to ensure broad participation.

A purposive, stratified sampling method was used to include diverse roles such as cashiers, sales associates, stockroom workers, and supervisors, totaling 325 respondents. Demographic data—age, gender, experience, role, and education—were collected to analyze differences in perceptions across subgroups. The sample was balanced in gender and age, with most participants aged 25–44 and varied experience levels, from newcomers to veterans. Educational backgrounds ranged from secondary to higher education, which may influence adaptation to digital tools. This comprehensive demographic information supports a nuanced understanding of occupational health and safety perceptions in the context of retail digitalization (Table 1).

Table 1

Demographic profile of survey respondents.

Demographic variable	Category	n	%
Gender	Male	152	46.8%
	Female	170	52.3%
	Other / Prefer not to say	3	0.9%
Age group	Under 25	75	23.1%
	25–34	110	33.8%
	35–44	85	26.2%
	45–54	40	12.3%
	55+	15	4.6%
Role in organization	Cashier	120	36.9%
	Sales Associate	95	29.2%
	Stockroom Worker	65	20.0%
	Supervisor / Manager	45	13.8%
	0–5 years	145	44.6%

Demographic variable	Category	n	%
Years of experience	6–10 years	85	26.2%
	11–15 years	60	18.5%
	Over 15 years	35	10.8%
Educational background	Secondary Education	140	43.1%
	Vocational/Technical Training	110	33.8%
	Higher Education	75	23.1%

The case study focused on a large national retail chain with multiple urban and semi-urban branches, enabling comparison of employee experiences within a consistent organizational context. The company has implemented digitalization initiatives, including self-checkout, automated inventory, and AI-driven sales analytics—over the past three years. Examining various branches allowed assessment of differences in implementation quality, management support, and customer demographics influencing occupational health and safety perceptions.

Data analysis employed descriptive statistics to summarize response patterns and inferential tests (t-tests, ANOVA) to evaluate demographic and branch-level differences. Correlation analyses examined relationships between workload, stress, and safety concerns. This quantitative approach, conducted using IBM SPSS Statistics version 26, provided robust insights to guide management and policy on OHS in digitally evolving retail settings.

5. RESULTS

The survey reveals mixed perceptions of digitalization's impact on occupational health and safety among retail employees. While 62% acknowledged efficiency gains from technologies like self-checkout and AI analytics, 54% reported increased workload due to multitasking demands such as system monitoring and troubleshooting.

These results suggest that digitalization reduces physical strain but introduces new cognitive pressures that elevate employee stress (Figure 1).

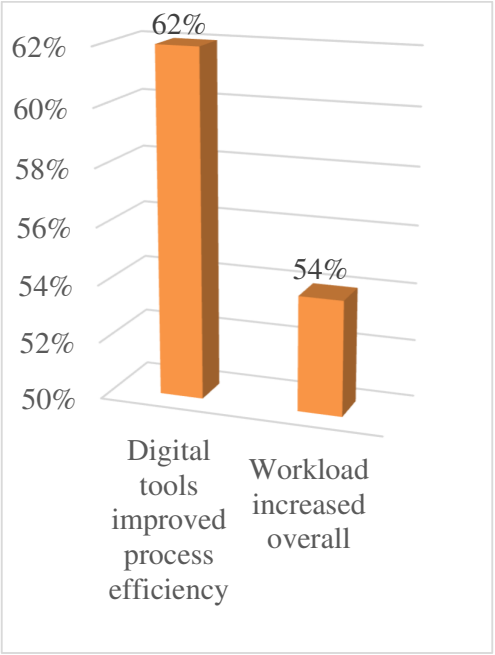

Fig. 1. Perceptions of digital tools: efficiency gains versus increased workload

Analysis of perceived stress levels revealed notable variation across roles. Cashiers and front-line sales associates were significantly more likely to report increased stress and time pressure compared to stockroom workers and supervisors. ANOVA tests confirmed statistically significant differences between these groups ($p < 0.01$), indicating that the impact of digitalization on stress is not uniform across the retail workforce (Table 2).

Table 2

ANOVA role-based differences in perceived stress levels.

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	F	p-value
Regression (Between Groups)	5.734	1	5.734	18.025	<0.001
Residual (Within Groups)	22.266	70	0.318		
Total	28.000	71			

The ANOVA test indicates statistically significant differences in perceived stress levels across employee roles ($F = 18.025$, $p < 0.001$), suggesting that front-line workers experience notably higher stress than other groups.

Correlation analysis also identified a moderate positive relationship (r = 0.42) between reported workload increases and self-reported stress levels, suggesting that rising task complexity and responsibility may be key drivers of employee strain.

Regression analysis indicates a moderate positive and statistically significant relationship between workload increase and stress levels (Beta = 0.42, $p < 0.001$), suggesting that higher task complexity is linked to greater employee strain (Table 3).

Table 3

Impact of workload increase on stress levels

	Unstandardised Coefficient	Standard Error	Standardised Coefficient (Beta)	t	p-value
(Constant)	1.200	0.300		4.0	<0.001
Work-load Increase	0.450	0.120	0.420	3.75	<0.001

Regarding ergonomic concerns, 47% of respondents reported that digital tools had either no impact or a slightly negative effect on their physical comfort at work. While 53% of respondents noted reduced lifting and carrying, others described increased static postures when monitoring screens or attending to self-checkout stations for extended periods. This pattern points to the need for a more nuanced ergonomic evaluation that considers not only traditional manual handling risks but also new postural and attentional demands (Figure 2).

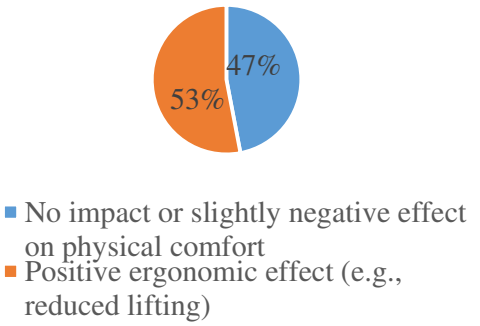

Fig. 2. Reported ergonomic effects of digital tools on physical comfort

Comparative analysis across branches revealed significant variation in employee perceptions related to implementation quality and management support. Urban branch employees reported notably higher positive experiences (72%) compared to those in semi-urban branches (33%), underscoring the critical role of training and managerial backing in successful digitalization initiatives (Figure 3).

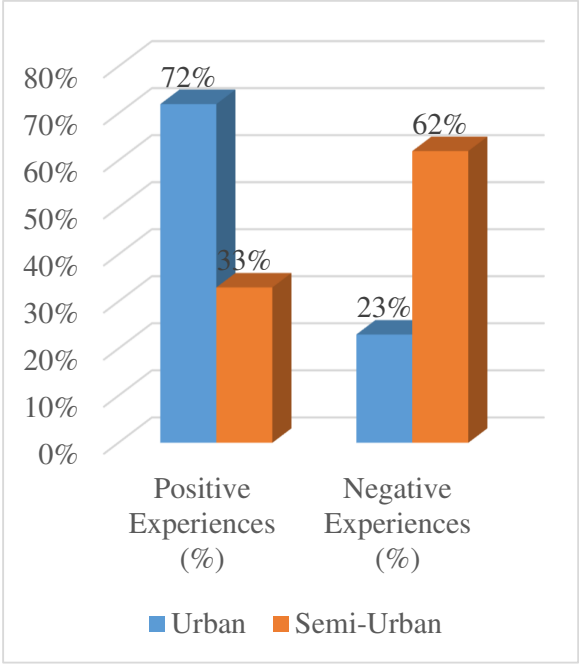

Fig. 3. Branch-level variation in employee experiences with digitalization

Employees in urban branches with better training and technical support reported significantly more positive experiences, including reduced stress and fewer safety concerns. In the other hand, staff in semi-urban locations described feeling underprepared for the technological transition and more frequently reported technical issues that disrupted workflows and heightened frustration. These differences underscore the importance of local context in shaping the success of digitalization initiatives and their impact on health and safety.

Further analysis examined whether perceptions of digitalization's impact varied by demographic factors such as age and years of experience. Younger employees (<30) reported more positive perceptions of digitalization (70%), while more experienced staff (>15 years)

indicated higher stress levels and concerns about role ambiguity (60%) (Figure 4).

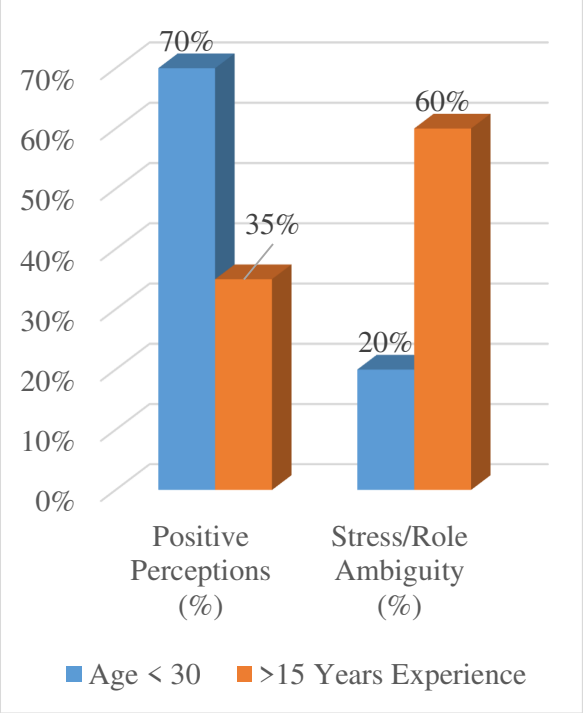

Fig. 4. Perceived impact of digitalization by age and experience

Younger employees, especially those under 30, reported greater ease in adapting to new technologies and more positive perceptions of efficiency gains. In contrast, employees with over 15 years of experience more frequently reported stress related to learning new systems and expressed concerns about role ambiguity. The t-test analysis indicated a significant difference in perceived stress between age groups ($t = 2.42$, $p = 0.018$), highlighting the need for targeted training programs to address generational disparities in technology adoption (Table 4).

Table 4

Independent samples t-test: perceived stress by age group

Group	Mean Stress Score	Standard Deviation
Age < 30	2.8	0.65
>15 Years Experience	3.7	0.70

A cross-tabulation of responses by years of experience and reported workload changes is presented in Table 4. The data suggest that while less experienced workers often see digital tools as helpful, experienced staff perceive them as adding layers of responsibility without corresponding support. This finding aligns with the broader literature on technology-related role expansion in retail workforces.

The results indicate that branches with structured training and support reported an average stress score of 2.5 and 78% of employees felt confident using digital systems. In the other hand, branches with limited support had a higher average stress score of 3.8, with only 45% of employees reporting confidence in using the technology.

These disparities indicate that the success of digitalization in promoting health and safety is contingent on consistent organizational investment in employee readiness and support infrastructure (Table 5).

Table 5

Branch-level comparison of training/support, stress, and confidence in digital system use

Branch type	Average stress score (1-5)	% Confident in using digital systems
Structured Training and Support	2.5	78%
Limited Support	3.8	45%

The results show that 54% of respondents felt they maintained or improved their safety vigilance when using new digital systems, while 39% reported reduced attention to traditional safety procedures. An additional 7% were unsure or did not respond. This highlights a potential trade-off where technological task focus may undermine awareness of critical safety practices such as monitoring shoplifting risks or maintaining clear pathways. This potential trade-off between technological task focus and situational awareness raises important considerations for designing workflows that balance automation with safety-critical vigilance (Figure 5).

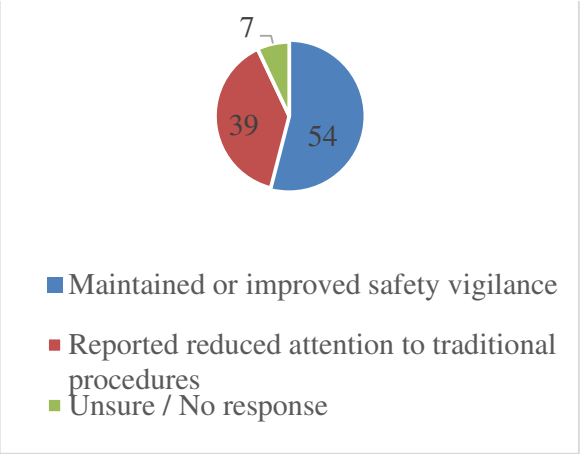

Fig. 5. Reported impacts of digitalization on safety awareness

Benefits such as reduced physical strain and increased transaction speed coexist with new sources of cognitive load, stress, and ergonomic challenges. Variation across demographic groups and branch contexts further highlights the need for customized implementation strategies that account for differences in experience, training needs, and local operational realities.

6. DISCUSSION

The survey confirms complex effects of digitalization in retail: 62% of employees reported efficiency gains, while 54% experienced increased workload due to cognitive demands such as system monitoring and error resolution ($r = 0.42$; Beta = 0.42, $p < 0.001$) [17]. Frontline workers showed significantly higher stress (ANOVA $F = 18.025$, $p < 0.001$). Ergonomic effects were mixed, with nearly half reporting discomfort from static postures. Organizational support reduced stress and improved confidence [18]. Younger employees adapted more easily, whereas those with over 15 years' experience faced greater stress and role ambiguity ($t = 2.42$, $p = 0.018$). Additionally, 39% noted decreased attention to traditional safety tasks [19].

7. CONCLUSION

The digital transformation of the retail sector constitutes a multidimensional shift that extends beyond technological innovation, encompassing significant changes in occupational structures and customer engagement. While digitalization has demonstrably improved operational efficiency and reduced physical strain for retail employees, it has concurrently introduced a range of psychosocial and ergonomic risks. These include increased cognitive load, elevated stress levels, and discomfort associated with prolonged static postures. Furthermore, the divergence between managerial narratives and employees' subjective experiences reveals persistent role ambiguity and a lack of adequate institutional support.

Crucially, these developments also bear implications for customers. The proliferation of self-service technologies and the redefinition of the cashier role as "customer advisor" are frequently presented by retailers as markers of progress.

However, many consumers perceive these changes as a transfer of labour responsibilities, often expressing dissatisfaction with the diminished human interaction and the expectation to perform tasks traditionally managed by staff. This tension underscores the need for a more inclusive and empathetic approach to digitalization—one that accounts for both employee well-being and customer experience.

To ensure the sustainability and social acceptability of digital transformation in retail, organisations must revise occupational health and safety (OHS) policies to reflect the realities of digital work environments. This includes updating ergonomic assessments, implementing targeted training programmes, and re-evaluating service models to preserve meaningful interpersonal engagement.

Future research should adopt longitudinal and mixed-method designs to capture the evolving nature of these transformations.

Expanding the analytical scope to include customer perspectives and cross-sector comparisons will be essential for developing comprehensive strategies that balance technological advancement with human-centred values such as accessibility, empathy, and social responsibility.

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Evaluarea percepțiilor angajaților din comerțul cu amănuntul privind impactul digitalizării asupra sănătății și securității în muncă

Locurile de muncă din comerțul cu amănuntul trec printr-o digitalizare rapidă, tehnologii precum sistemele de autoservire, gestionarea automată a stocurilor și analiza vânzărilor bazată pe inteligență artificială promițând eficiență operațională. Deși aceste instrumente pot reduce efortul fizic și pot îmbunătăți viteza tranzacțiilor, există o îngrijorare tot mai mare că acestea pot introduce și noi cerințe cognitive, factori de stres și provocări ergonomice, remodelând riscurile pentru sănătatea și securitatea ocupațională în acest sector. Acest studiu își propune să exploreze și să evalueze critic modul în care angajații din comerțul cu amănuntul percep impactul digitalizării asupra sănătății și securității lor ocupaționale. Acesta abordează întrebări despre riscurile fizice și psihosociale percepute, diferențele între contextele organizaționale și alinierea sau tensiunea dintre experiențele angajaților și narațiunile manageriale despre progresul tehnologic.

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