



EVALUATING THE EFFECTIVENESS OF CROWD MANAGEMENT STRATEGIES IN SUPERMARKETS IN JEDDAH, SAUDI ARABIA

Ali Adam Mahamatⁱ

Master in Business Administration,
University of the Cordilleras,
Baguio City, Philippines

Abstract:

This study assessed the effectiveness of crowd management strategies (CMS) in supermarkets in Jeddah, Saudi Arabia, focusing on customer experiences and staff-related challenges. A descriptive cross-sectional design was employed, involving 384 customer respondents and 72 employees from four purposively selected supermarkets. Data were collected using validated structured questionnaires and analyzed using weighted mean and thematic analysis. Findings revealed that CMS were generally perceived as not very effective, with low ratings across service efficiency (2.49), customer perceived value (2.49), and shopping convenience (2.47), resulting in an overall mean of 2.48. Key influencing factors, including perceived ease of navigation (2.50) and system reliability (2.49), were found to have minimal impact on customer perceptions, indicating poor integration and inconsistent implementation of crowd management tools. Customers reported persistent challenges such as long waiting times, overcrowding, limited cashier availability, and difficulty navigating store layouts. From the staff perspective, major challenges included insufficient staffing, high workload, inadequate training, and low customer compliance with crowd control measures. These findings highlight that CMS effectiveness depends not only on technological tools but also on operational coordination and human resource capacity. The study recommends an integrated approach combining system reliability, staff support, and improved customer guidance to enhance overall supermarket performance.

JEL: L81, M11, M31

Keywords: crowd management strategies, supermarkets, customer experience, Saudi Arabia

1. Introduction

Saudi Arabia's retail sector contributes approximately 23% to GDP and has expanded significantly under Vision 2030, fostering competition and attracting foreign investment

ⁱ Correspondence email: ali.mahamat.ihg@gmail.com

(Saudi Ministry of Municipal and Rural Affairs & Housing, 2024). Supermarkets play a central role in this growth, with major chains such as Panda, Carrefour, and Lulu Hypermarket increasing their presence across urban centers. However, this expansion has intensified crowd management challenges, particularly during peak periods such as weekends, Ramadan, and major religious events. Overcrowding often results in congested aisles, long checkout queues, and reduced service efficiency, negatively affecting customer satisfaction and operational performance (Mwinuka, 2023). These issues are especially pronounced in Jeddah, a key commercial hub and gateway for pilgrims traveling to Makkah and Madinah. High and seasonal foot traffic places substantial pressure on supermarket operations, particularly during religious seasons and public holidays (Jarrar, 2026; Alyamani, 2025). This study focuses on four large supermarkets in Jeddah, selected for their strategic locations and high customer volumes. These stores employ a mix of traditional and technology-supported systems, including multiple checkout counters, limited self-checkout kiosks, electronic queue displays, and structured store layouts (Alawadh, 2024).

Despite these measures, persistent challenges remain, including uneven customer distribution, long waiting times, and congestion in high-demand areas. Cultural shopping patterns, particularly family-based shopping, further increase in-store density and complicate crowd control (Sagar, 2024; Purcărea *et al.*, 2022). These dynamics suggest that existing systems may not fully align with local behavioral patterns, highlighting the need for empirical evaluation of crowd management effectiveness within the Saudi retail context.

1.1 Review of Literatures

Research indicates that effective crowd management in retail requires an integration of technology, store design, and human intervention. Digital queue systems and self-service technologies improve organization and reduce customer frustration but are insufficient without adequate staffing and real-time coordination (Hammadi, 2025; Nouzri & Ejjami, 2024). Studies also show that trained personnel and responsive service significantly enhance customer flow and service efficiency (Rantala, 2024; Islami *et al.*, 2024; Awais, 2023).

Customer perceived value is closely linked to smooth movement and minimal congestion. Poor crowd flow reduces satisfaction, trust, and repeat patronage (Schappo, 2022; Okoye & Nwokike, 2024). Cultural and demographic differences also shape responses to crowd management strategies, with younger customers favoring digital tools and older shoppers preferring human interaction (Sagar, 2024; Lee & Hammant, 2024). Similarly, shopping convenience and ease of navigation depend on effective integration of layout design, signage, and staff support, particularly in high-density environments (Wolniak *et al.*, 2024; Jithu, 2024). System reliability is critical, as inconsistent or malfunctioning technologies undermine customer confidence (Nguyen *et al.*, 2022; Gurley, 2021). Both customers and staff face adaptation challenges, including long queues, unclear systems, and insufficient training (Aithal & Saldanha, 2025; Cai *et al.*, 2024).

Despite these valuable contributions, several gaps remain in the literature. First, while extensive research has been conducted in developed countries, studies on the effectiveness of crowd management strategies in Saudi Arabian supermarkets are limited. This lack of localized research leaves uncertainty regarding the applicability of global best practices to the Saudi retail context. Second, existing studies reveal the role of digital solutions in crowd management, but there is insufficient research on how Saudi customers perceive and adapt to these technologies. Given the cultural and technological differences, further investigation is needed to understand customer acceptance and potential resistance to digital queue systems and self-checkout kiosks. Third, while most research focuses on customer perspectives, minimal attention has been given to the challenges faced by supermarket staff in implementing crowd management strategies. Staff members play a critical role in enforcing queue systems, assisting customers, and mitigating congestion, yet their experiences and difficulties remain largely undocumented. This study addressed these gaps by conducting a comprehensive evaluation of crowd management effectiveness in Jeddah supermarkets, considering both customer perceptions and staff challenges.

1.2 Theoretical Framework

This study is supported by two key theories: the Technology Acceptance Model (TAM) and the Theory of Planned Behavior (TPB), both of which provide a strong theoretical foundation for evaluating the effectiveness of crowd management strategies in supermarkets. These theories help explain how customers perceive and adapt to crowd management measures and how service quality influences their overall shopping experience.

1.2.1 Technology Acceptance Model

The Technology Acceptance Model (TAM) introduced by Davis (1989) provides a framework for understanding how individuals adopt and utilize new technologies based on their perceived usefulness and perceived ease of use. In the context of supermarket crowd management, these two factors play a crucial role in determining customer acceptance of digital solutions designed to streamline shopping experiences. Perceived usefulness refers to the extent to which customers believe that a particular technology will enhance their shopping experience, such as reducing checkout time or minimizing congestion. Perceived ease of use, on the other hand, reflects how effortless customers find the adoption of such technologies, with a more user-friendly system increasing the likelihood of acceptance (Isiaku & Adalier, 2024). In supermarket settings, digital queue systems, self-checkout kiosks, and mobile payment solutions are commonly introduced to enhance crowd management. According to Park and Zhang (2022), if customers recognize that these technologies improve efficiency and convenience, they are more likely to embrace them.

However, acceptance is not universal, as individual factors such as age, digital literacy, and cultural attitudes toward technology can significantly influence adoption rates (Martín-García *et al.*, 2022). For example, younger and tech-savvy customers may

find self-checkout systems intuitive and time-saving, whereas older consumers or those unfamiliar with digital interfaces may perceive them as complex and frustrating. Additionally, cultural perspectives on human interaction in retail settings may also affect attitudes; in some societies, face-to-face service is preferred, making customers reluctant to switch to automated solutions (Pantano *et al.*, 2022). The justification for using TAM in this study lies in its ability to explain customer adaptability to technological solutions in crowd management. Given the increasing reliance on digital tools in modern retail spaces, TAM provides a useful framework for understanding how system reliability and ease of navigation (two research variables) influence customer perceptions. By applying TAM, this study can offer insights into how well customers in Jeddah supermarkets embrace technology-driven crowd management strategies.

1.2.2 Theory of Planned Behavior

The Theory of Planned Behavior (TPB) developed by Ajzen (1991) provides a framework for understanding how individuals make decisions based on three key psychological determinants: attitude toward the behavior, subjective norms, and perceived behavioral control. In the context of supermarket crowd management, TPB helps explain how customers perceive and respond to different crowd control strategies, such as well-marked aisles, digital queue systems, and designated shopping times. According to TPB, if customers believe that these strategies enhance their shopping experience, making navigation easier and reducing waiting times, they will be more likely to comply with them (Bhati *et al.*, 2022). On the other hand, if they perceive crowd management strategies as restrictive, inconvenient, or ineffective, their willingness to follow them may decrease. Attitude toward the behavior refers to whether a customer has a favorable or unfavorable evaluation of a supermarket's crowd control measures. If customers see digital queue management, self-checkout counters, or store layout improvements as beneficial, they will be more likely to accept and support these changes. Subjective norms involve the influence of social expectations on customer behavior. In supermarkets, customers might adopt crowd management strategies based on peer influence, cultural norms, or recommendations from family and friends (Charinsarn *et al.*, 2023). For instance, in Saudi Arabia, where social interactions and traditional service models remain integral to shopping culture, customers may be more inclined to follow crowd control measures if they see others complying. Perceived behavioral control refers to an individual's confidence in their ability to engage in a behavior. In this case, customers who feel comfortable navigating a supermarket with clear signage, organized checkout systems, and efficient crowd control measures will likely exhibit higher compliance and satisfaction. However, challenges such as complex store layouts, confusing self-service technologies, or overcrowded spaces may reduce perceived control, leading to frustration and reluctance to engage with crowd management strategies (Mehta & Shah, 2023).

The Theory of Planned Behavior (TPB) supports service efficiency, customer perceived value, and shopping convenience by explaining how customer attitudes, social influences, and perceived control shape their acceptance of supermarket crowd management strategies. Service efficiency improves when customers have a positive

attitude toward digital queue systems and structured layouts, while subjective norms influence their willingness to adopt these measures (König, 2025). Customer perceived value is enhanced when shoppers believe that crowd control strategies save time and improve service quality, with perceived behavioral control playing a key role in how easily they navigate the supermarket (Marikyan *et al.*, 2023). Similarly, shopping convenience increases when customers find supermarket layouts easy to navigate and checkout processes seamless, but declines if they encounter long waits or confusing systems (Köklü, 2022). TPB justifies its use in this study by explaining why customers comply with or resist crowd management strategies, offering information that can help supermarkets optimize operations to improve efficiency, value perception, and convenience.

1.3 Research Questions

This study aims to evaluate the effectiveness of crowd management strategies in supermarkets in Jeddah, Saudi Arabia. Specifically, it provided answer to the following research questions:

1. What is the perceived effectiveness of crowd management strategies in supermarkets in enhancing customer experience during peak shopping hours, in terms of:
 - a. service efficiency;
 - b. customer perceived value; and
 - c. shopping convenience?
2. What are the key factors influencing customer perceptions of crowd management strategies in supermarkets in terms of:
 - a. Perceived ease of navigation; and
 - b. System reliability?
3. What challenges do customers face in adapting to crowd management strategies in supermarkets?
4. What challenges do supermarket staff encounter in implementing crowd management strategies?

2. Methodology

This study employed a descriptive cross-sectional design, which involves collecting data at a single point in time to describe perceptions and relationships among variables (Hajra *et al.*, 2025). This approach was appropriate as the study aimed to evaluate the perceived effectiveness of supermarket crowd management strategies without manipulating variables. The study was conducted among customers and employees of four anonymized supermarkets (A-D) in Jeddah, Saudi Arabia. Jeddah was selected due to its high retail activity, large population, and role as a commercial and religious gateway, resulting in significant customer traffic. The supermarkets were chosen based on high footfall and diverse clientele. Using Cochran's (1977) formula for an unknown population, a sample of 384 customers was determined and evenly distributed (96 per

supermarket). For employees, a population of 88 yielded a sample of 72 respondents using Raosoft (2004), proportionally allocated through stratified sampling. Convenience sampling was applied to customers due to unpredictable retail traffic, while inclusion criteria ensured respondents had relevant peak-hour experience (Vyt *et al.*, 2022). Data were collected using structured questionnaires for customers and employees. Customer instruments measured service efficiency, perceived value, shopping convenience, ease of navigation, and system reliability using Likert scales, alongside open-ended questions. Employee data focused on operational challenges. Instruments underwent expert validation, achieving strong content validity (Aiken's $V \geq 0.75$) and high reliability (Cronbach's $\alpha = 0.913$). Data collection was conducted via Google Forms over 21 days with strict ethical protocols, including informed consent, anonymity, and secure data handling. Quantitative data were analyzed using weighted mean, while qualitative responses were examined through thematic analysis (Braun & Clarke, 2006) to identify recurring challenges.

3. Results and Discussion

Table 1: Key Dimensions of Perceived Effectiveness
of Crowd Management Strategies in Supermarkets

No.	Dimensions	Weighted Mean	Interpretation
1	Service efficiency	2.49	CMS strategies are not very effective
2	Customer perceived value	2.49	CMS strategies are not very effective
3	Shopping convenience	2.47	CMS strategies are not very effective
Overall Weighted Mean		2.48	CMS strategies are not very effective

*CMS – Crowd management strategies

Presented in Table 1 are the findings of the perceived effectiveness of crowd management strategies (CMS) in supermarkets, summarized across three key dimensions: service efficiency, customer perceived value, and shopping convenience. Each dimension yielded a weighted mean below 2.51, specifically, service efficiency and customer perceived value both scored 2.49, while shopping convenience rated slightly lower at 2.47. These results culminated in an overall weighted mean of 2.48, indicating that, generally, customers perceive crowd management strategies in supermarkets as not very effective. This suggests a consistent sentiment across various aspects of the shopping experience that the current CMS implementations are falling short of expectations. The implications of these findings hold important consequences for stakeholders. For supermarket management and staff, the data points to systemic inefficiencies in handling customer flow and maintaining order during peak periods. These shortcomings may lead to operational disorganization, increased workload for staff, and elevated stress levels, particularly when service disruptions become frequent. For customers, the perceived ineffectiveness across all dimensions reflects a suboptimal shopping experience, marked by longer queues, difficulty navigating aisles, and a general lack of comfort and satisfaction. This dissatisfaction may erode brand trust and reduce customer loyalty over time. For retail business owners, the findings signal potential business risks, customers

who consistently face inconvenient or inefficient shopping conditions are more likely to shift to competitors or online platforms that offer better service coordination and in-store experience.

The results of the study align closely with the findings of Mehta and Shah (2023), who reported that customers consistently rated crowd management aspects, including service flow, queue handling, and store navigation, as unsatisfactory in high-traffic retail settings. This pattern was evident across the four supermarkets examined in Jeddah, Saudi Arabia. In Supermarket A, although an electronic queue ticketing system was installed to organize checkout order, peak-hour congestion persisted because staff occasionally bypassed the machine, manually calling customers and creating confusion. Supermarket B relied on a combination of self-checkout kiosks and traditional counters, yet insufficient kiosk availability and limited staff assistance led to longer waiting times, particularly for customers unfamiliar with the technology. In Supermarket C, narrow aisle intersections and promotional displays caused frequent bottlenecks during weekends, despite the presence of floor markings and directional signage. Supermarket D employed digital counter displays to indicate available checkout points, but counters were not consistently opened even when lines grew, resulting in uneven distribution of customers and prolonged waiting periods. These examples demonstrate that ineffective crowd management is not isolated to a single store but is a common challenge in high-traffic supermarkets (Mehta & Shah, 2023). This observation also complements Yellanki's (2023) argument that the mere presence of crowd management tools is insufficient; their effectiveness depends on integration with thoughtful store design and real-time staff coordination. For instance, in Supermarket A and D, digital tools were only partially effective because employees did not actively monitor customer flow or adjust counter availability during peak periods. Similarly, in Supermarket B, staff were often stretched between assisting self-checkout kiosks and supervising traditional lanes, which hindered smooth customer movement despite the technological support. The findings suggest that customer satisfaction improves when store layout, technology, and employee actions are aligned to manage congestion effectively, echoing the idea that tools must be operationally supported to achieve meaningful results (Yellanki, 2023).

However, the study's findings contradict those of Jalandoni (2023), who reported that simple crowd control tools such as floor signage, queue lines, and digital check-in systems could significantly enhance customer satisfaction. In the four supermarkets studied, these strategies alone received low ratings from respondents. For example, in Supermarket C, although floor markings and barriers were clearly visible, congestion still occurred near high-demand product areas, reducing shopping convenience. In Supermarket A, promotional setups temporarily blocked main aisles, undermining the intended flow despite the presence of physical queuing systems. These observations indicate that the mere installation of crowd management tools does not guarantee improved customer satisfaction unless they are actively maintained, monitored, and supported by staff and operational processes, highlighting the importance of an integrated approach to managing high-volume retail environments (Jalandoni, 2023). Supporting these findings are comments from respondents in the open-ended

questionnaire. One respondent shared, “I shop here every weekend, but nothing really changes, it’s still hard to move around or check out fast” (Respondent “H”). Another remarked, “It doesn’t matter what time I come; it’s always crowded, and I don’t see anyone helping manage the flow” (Respondent “I”). These sentiments are consistent with the demographic data, which revealed that most customers visit supermarkets weekly and have no specific shopping time preference, highlighting the persistence of crowd-related issues across different shopping periods and reinforcing the need for more effective crowd management systems.

Table 2: Key Factors Influencing Customer Perceptions
of Crowd Management Strategies in Supermarkets

	Indicators	Weighted Mean	Interpretation
1	Perceived ease of navigation	2.50	Factors have minimal influence on CMS
2	System reliability	2.49	Factors have minimal influence on CMS
Overall Weighted Mean		2.50	Factors have minimal influence on CMS

*CMS - Crowd management strategies

Presented in Table 2 are findings of the key factors influencing customer perceptions of crowd management strategies in supermarkets, focusing on perceived ease of navigation and system reliability. Both dimensions yielded low weighted means, 2.50 for ease of navigation and 2.49 for system reliability, leading to an overall weighted mean of 2.50. This indicates that these factors are perceived to have minimal influence on the overall effectiveness of crowd management strategies. It also suggests that customers do not feel significantly aided by current navigational supports or system functionality, which could point to either underperformance or insufficient integration of these Crowd management strategies in their shopping experiences. The implications of these findings carry clear consequences for various stakeholders. For supermarket management and staff, the results reflect a lack of impactful infrastructure or personnel support that can effectively direct crowd flow or respond promptly to system failures. This can lead to inefficient store operations, disorganized customer movement, and increased pressure on employees during high-traffic periods. For customers, the perceived lack of effective navigation and system reliability may create frustration, confusion, and an overall sense of disorganization during shopping. This can reduce the likelihood of return visits and erode customer loyalty. For retail business owners, the minimal influence of these factors suggests a gap between customer expectations and actual service delivery, which may result in reduced competitiveness and lost revenue if not addressed.

The results of the study are consistent with the observation of Hammerschick (2022), who found that weak signage and poorly maintained crowd systems contribute to negative perceptions of store orderliness. In the context of the four supermarkets in Jeddah, this was apparent in Supermarket C, where floor markings intended to guide customers through aisles were worn out and partially obscured by promotional displays, causing congestion near high-demand sections such as frozen foods and dairy. In Supermarket A, the electronic queue ticketing system occasionally malfunctioned during peak hours, leading to confusion about checkout order and frustration among shoppers.

Similarly, Supermarket B's self-checkout kiosks, while present, were insufficient in number and sometimes inoperative, resulting in long queues and customer dissatisfaction despite clear signage directing shoppers to these stations. Supermarket D employed digital displays to indicate open counters, but inconsistent updates and slow staff response meant that customers often queued at closed or inactive registers, undermining perceptions of efficiency and orderliness. This finding aligns with Völkl (2024), who concluded that the mere presence of technology is insufficient to satisfy customers when such systems are not actively managed or consistently functional. In Supermarket B, for example, self-checkout kiosks required staff assistance to resolve technical issues, yet staff were often spread thin between supervising traditional checkout lanes and assisting multiple customers simultaneously. In Supermarket D, digital counter boards signaled open registers, but delays in opening additional lanes during high-traffic periods led to bottlenecks. These examples indicate that operational oversight and timely intervention are essential for crowd management technologies to effectively improve customer experience.

However, the findings of this study contrast with those of Mantratzis *et al.* (2023), who reported that clearly marked layouts and reliable queue systems alone were sufficient to enhance customer perception of the in-store experience. In the present study, even supermarkets with organized floor layouts, visible signage, and implemented queue systems, such as Supermarket A and C, still experienced customer dissatisfaction due to insufficient staffing, poor monitoring, and occasional system malfunctions. For instance, despite clear directional signs in Supermarket C, shoppers struggled to navigate congested aisles during weekends, and in Supermarket A, malfunctioning queue machines contributed to customer frustration. These examples underscore that in large, high-traffic urban supermarkets, structural and technological measures must be complemented by active staff coordination and real-time operational management to achieve positive customer perceptions. These revelations are supported by personal feedback from respondents in the open-ended section of the questionnaire. One shopper noted, *"I visit every week, but I still end up wandering around because the signs don't really help"* (Respondent "B"). Another shared, *"regardless of the time I come, the system either breaks down or no staff is around to assist"* (Respondent "H"). These views are consistent with the demographic data, which revealed that most customers visit supermarkets weekly and had no specific preference for shopping time. This suggests that challenges with navigation and system reliability are consistently experienced, reinforcing the perception that these factors have only minimal influence on the perceived effectiveness of crowd management strategies.

**Table 3: Challenges Customers Face in Adapting
to Crowd Management Strategies in Supermarkets**

	Indicators	Frequency	Percentages (%)
1	Long waiting times at checkout	189*	13.45
2	Limited number of checkout cashiers	177*	12.60
3	Difficulty navigating crowded aisles	172*	12.24
4	Feeling rushed by other shoppers	169*	12.03
5	Difficulty finding specific items in a rearranged layout	168*	11.96
6	Customers not following guidelines	164*	11.67
7	Overcrowding during peak hours	140*	9.96
8	Feeling unsafe due to close proximity to others	119*	8.47
9	Limited availability of staff for assistance	107*	7.62

*Multiple responses.

Presented in Table 3 are the findings of the challenges customers face in adapting to crowd management strategies in supermarkets. The data reflect multiple responses, with the most frequently reported challenge being long waiting times at checkout (13.45%), followed by a limited number of checkout cashiers (12.60%) and difficulty navigating crowded aisles (12.24%). Other notable issues include feeling rushed by other shoppers (12.03%), difficulty locating items due to rearranged layouts (11.96%), and customers not following guidelines (11.67%). Lower, yet still significant concerns were overcrowding during peak hours (9.96%), feeling unsafe due to close proximity (8.47%), and limited availability of staff for assistance (7.62%). Collectively, these findings revealed a range of behavioral, structural, and systemic issues that prevent customers' ability to adapt effectively to crowd management strategies. The implications of these findings are far-reaching. For supermarket management and staff, persistent complaints about long queues, limited staff support, and navigation challenges suggest inefficiencies in service delivery and organizational flow. These operational gaps can lead to increased stress among employees, reduced productivity, and rising customer dissatisfaction. For customers, the consequences are more personal; many experience frustration, confusion, and discomfort, particularly during crowded hours or when systems and layouts are changed without adequate support. This may lead to a reluctance to revisit certain supermarkets, especially if customers feel unsafe or unwelcome. For retail business owners, the accumulation of such negative experiences threatens customer loyalty and retention, potentially causing a gradual decline in foot traffic and revenue, particularly when consumers turn to more convenient or better-managed alternatives.

The findings further support Davis' (1989) Technology Acceptance Model (TAM), which suggests that customers' reluctance to adopt technological systems stems from their perception that such systems are neither useful nor easy to use. In the context of the four supermarkets studied in Jeddah, this was evident in repeated complaints about long checkout lines and difficulties navigating store aisles despite the presence of crowd management tools. For example, in Supermarket A, the electronic queue ticketing system was intended to streamline service, yet customers reported that staff occasionally ignored the system, leading to confusion and extended wait times. Similarly, in Supermarket B, self-checkout kiosks were underutilized because many shoppers, particularly older

adults, found them difficult to operate without assistance, resulting in increased reliance on traditional checkout counters and subsequent congestion. The findings also align with Ajzen's (1991) Theory of Planned Behavior (TPB), which posits that behavior is influenced by perceived control and social norms. Many respondents reported feeling rushed or pressured by other shoppers during peak hours, especially in Supermarket C, where narrow aisle intersections and crowded promotional sections amplified social stress and reduced individual control over movement. In Supermarket D, even with digital signage indicating open counters, customers noted that failure to follow queue numbers or lack of staff intervention created frustration, demonstrating that negative social pressure and limited perceived control discourage adherence to crowd management measures.

These observations also reflect Aithal and Saldanha's (2025) findings, which highlighted long waiting times and limited staff presence as key barriers to customer adaptation in high-traffic supermarkets. For instance, in Supermarket B, although self-checkout kiosks were installed, insufficient staff support during busy evenings meant customers often abandoned their queues or required manual assistance, undermining system effectiveness. Similarly, Douglas *et al.* (2025) noted that crowded aisles and unclear signage disrupt shopping flow and create anxiety. In the current study, Supermarket C's aisles near high-demand product areas were frequently congested despite visible floor markings, while promotional displays partially blocked pathways, illustrating the disruptive impact of poor layout management during peak hours. Findings correspond with Schakel (2023), who reported that customer discomfort increases when layout changes are made without adequate communication or support. In Supermarket A, temporary relocation of popular products during promotional events caused bottlenecks and confusion, as customers were not informed of the changes. Conversely, the findings are inconsistent with Degeling *et al.* (2024), who suggested that customers quickly adapt to crowd control systems if minimal instructions or signage are provided. In the present study, adaptation issues were widespread across all four supermarkets, highlighting that signage, queue machines, or self-checkout technology alone were insufficient to facilitate smooth customer flow without active staff support, consistent monitoring, and proper communication.

These views are further validated by personal comments from respondents in the open-ended questionnaire. One customer stated, *"I shop here every week, but it's always the same, too many people and not enough cashiers, so I end up wasting time"* (Respondent "C"). Another said, *"I don't come at a particular time, but no matter when I do, I get stressed because people don't follow the crowd rules and it gets chaotic"* (Respondent "A"). A third respondent noted, *"It's hard to find things now that the store layout changed; I just wander around until I give up"* (Respondent "I"). These views align with the demographic data, which showed that most customers visit supermarkets weekly and do not have a specific shopping time preference. This suggests that the challenges are experienced consistently across different timeframes, reinforcing the notion that many customers struggle to adapt to current crowd management strategies implemented in the surveyed supermarkets.

Table 4: Challenges Supermarket Staff Face in Adapting
to Crowd Management Strategies in Supermarkets

No.	Indicators	Frequency	Percentages (%)
1	Insufficient staffing during peak shopping hours.	29	23.97
2	Difficulty handling uncooperative or resistant customers.	18	14.88
3	Low customer compliance with crowd control measures.	18	14.88
4	Stress from multitasking between customer service and crowd control.	17*	14.05
5	High pressure during peak hours affecting staff performance.	14*	11.57
6	Inconsistent training due to rotating shifts.	14*	11.57
7	Repetitive need to enforce floor markings and movement restrictions.	11*	9.09

*Multiple responses

Presented in Table 4 are the findings of the challenges supermarket staff face in adapting to crowd management strategies in supermarkets. The most frequently reported issue was insufficient staffing during peak shopping hours (23.97%), followed by difficulty handling uncooperative or resistant customers (14.88%) and low customer compliance with crowd control measures (14.88%). Other significant concerns included stress from multitasking between customer service and crowd control (14.05%), high pressure during peak hours affecting staff performance (11.57%), inconsistent training due to rotating shifts (11.57%), and the repetitive need to enforce floor markings and movement restrictions (9.09%). These results point to a mix of operational, psychological, and interpersonal stressors that prevent staff adaptation to crowd management protocols. The implications of these findings reveal critical consequences for various stakeholders. For supermarket management and staff, the challenges signal the urgent burden placed on employees, especially during peak hours where staff shortages and multitasking demands result in stress, reduced performance, and burnout. The need to repeatedly address customer resistance and enforce crowd rules without adequate support or training further contributes to workplace fatigue. For customers, these staff-related struggles often manifest in slower service, inconsistent enforcement of safety measures, and a less organized shopping experience, which may lead to dissatisfaction. For retail business owners, unresolved staff challenges can directly affect operational efficiency, staff morale, and customer retention, ultimately risking brand reputation and profitability.

This revelation appears to complement Cai *et al.*'s (2024) argument that the success of crowd management strategies depends not only on technological systems and tools but also on the human capacity and preparedness of frontline employees. In the four supermarkets studied in Jeddah, this was particularly evident. For example, in Supermarket A, although an electronic queue ticketing system was in place, staff were often unable to manage peak-hour surges effectively because they lacked sufficient training in monitoring the system and assisting customers who skipped their numbers. Similarly, in Supermarket B, employees supervising self-checkout kiosks faced difficulties guiding customers unfamiliar with the technology while also managing

traditional checkout lanes, demonstrating that staff preparedness is critical to system effectiveness. In Supermarket C, floor markings and physical queue barriers were available, yet staff were frequently overextended during weekend rush hours, leaving aisles crowded and customers frustrated. Supermarket D's digital counter displays were only partially effective because employees did not consistently open additional registers in response to long queues, highlighting the importance of active staff intervention alongside technology. These findings also align with Bloodsworth-Lugo and Lugo-Lugo (2022), who established that staff burnout and insufficient training significantly undermine the effectiveness of customer-facing crowd control efforts. Employees in Supermarket B and C reported experiencing high stress during peak hours due to continuous customer inquiries, malfunctioning kiosks, and overcrowded aisles, which negatively affected their ability to enforce crowd management measures consistently. In Supermarket A, staff indicated fatigue from manually reconciling electronic queue tickets with actual customer flow, leading to longer wait times and dissatisfaction among shoppers.

Related findings were reported by Vignoli *et al.* (2021), who noted that poor customer compliance and high emotional labor contribute to staff stress and decreased service quality. In the present study, customer non-adherence to queue numbers in Supermarket D and failure to follow floor markings in Supermarket C created additional pressure on employees, reducing the overall efficiency of the crowd management system. Conversely, the findings contrast with Sholanke *et al.* (2025), who suggested that staff quickly adapt to crowd management protocols and that customer resistance diminishes over time. In this study, even with clearly implemented protocols across the four supermarkets, employees continued to face recurring challenges in managing congestion, guiding customers, and monitoring digital tools, indicating that protocol introduction alone is insufficient without adequate training, supervision, and reinforcement. These perspectives are further substantiated by the qualitative responses provided by staff through the open-ended section of the questionnaire, which offer deeper insight into their lived experiences. One respondent shared, *"I get overwhelmed during busy times because I have to do too many things at once"* (Respondent "M"), highlighting the issue of task overload, particularly during peak hours. This suggests that employees are often required to multitask beyond manageable limits, which can compromise both efficiency and the consistent implementation of crowd management protocols.

Similarly, another respondent remarked, *"some customers just ignore the signs and crowd around, and we're the ones who get blamed"* (Respondent "B"). This statement underscores the difficulty staff face in enforcing guidelines when customer compliance is low. It also reflects a sense of frustration and perceived unfairness, as employees are held accountable for situations that are partly beyond their control. Such experiences may contribute to decreased morale and increased workplace stress. In addition, a third respondent noted, *"we don't always get proper training, especially when shifts change a lot, it makes it harder to stay consistent"* (Respondent "D"). This points to gaps in training and communication, particularly in dynamic work environments where shift rotations are frequent. Inconsistent training can lead to variations in how crowd management

strategies are applied, thereby reducing their overall effectiveness and creating confusion among both staff and customers.

4. Conclusions

This section presents the key conclusions drawn from the findings of the study on the effectiveness of crowd management strategies in supermarkets in Jeddah.

- 1) Crowd management strategies in the selected supermarkets are generally ineffective, indicating that customers consistently perceive service efficiency, perceived value, and shopping convenience as inadequate.
- 2) Key influencing factors such as perceived ease of navigation and system reliability have minimal impact on customer experience. This suggests that existing crowd management tools are either poorly integrated, inconsistently applied, or insufficiently supported by operational processes.
- 3) Customers face persistent difficulties in adapting to supermarket crowd management systems. Common challenges include long waiting times, overcrowding, limited cashier availability, and difficulty navigating store layouts, indicating a mismatch between CMS design and actual shopping conditions.
- 4) Staff-related constraints significantly hinder the effectiveness of crowd management strategies. Issues such as insufficient staffing, high workload, inadequate training, and low customer compliance contribute to operational inefficiencies and reduced service quality.

5. Recommendations

This section provides practical recommendations based on the findings of the study to improve the effectiveness of crowd management strategies in supermarkets.

- 1) It is recommended that supermarket management adopt an integrated crowd management approach that combines technology with active human coordination. This includes improving real-time monitoring of customer flow and ensuring better synchronization between staff actions and digital systems.
- 2) Supermarkets should strengthen operational infrastructure by improving system reliability and navigational support. This includes increasing the availability of functional self-checkout systems, ensuring consistent operation of queue systems, and maintaining clear and updated signage to guide customer movement.
- 3) It is recommended that supermarket management enhance staffing policies and training programs. This involves increasing staff allocation during peak hours, improving shift planning, and providing continuous training on crowd control techniques, customer handling, and technology usage.
- 4) Supermarkets should improve customer communication and compliance strategies to enhance crowd management effectiveness. This includes clearer instructions on queue systems, better enforcement of movement guidelines, and

increased staff presence to guide customers and reduce congestion-related confusion.

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Conflict of Interest Declaration

The author declares that there are no conflicts of interest related to this study. No financial or personal relationships influenced the conduct or outcomes of the research.

About the Author

Ali Adam Mahamat is an aspiring industrial engineer currently pursuing a Master in Business Administration at the University of the Cordilleras, Philippines. He holds a Bachelor of Science in Industrial Engineering from the University of Perpetual Help System DALTA. His professional experience spans roles in process engineering and hospitality, including serving as a Specialist in Reservation Sales at Intercontinental Hotels Group (2019-2023) and as a Senior Process Engineer in manufacturing firms. He has expertise in lean manufacturing, Six Sigma, quality control, and process improvement. Ali is skilled in analytical thinking, problem-solving, and communication, and is committed to continuous learning and contributing to innovative, efficiency-driven solutions in dynamic organizational environments.

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