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A Study on Factors Affecting Intention of Ai Enabled Self Checkout Retail Customer

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ABSTRACT
Artificial intelligence (AI) enabled checkout technology is a new innovation in the rapidly changing retail sector. Using a sample of customers of retail sector in Delhi NCR this study examined the effects of technology quality of AI, personalisation quality, level of AI's intelligence on consumers' intention towards the AI enabled self-checkout. Multiple regression was used to analyse the data. By explaining shoppers' attitudes towards AI-enabled checkouts, this study indicates that the perceived convenience of such checkouts can reduce anxiety in acceptance of this innovative technology. This study adds up to the consumer behaviour literature and the developing framework of marketing literature and offers to marketers and retail owners a better understanding of the influence of AI-enabled technology on consumers' attitude.

Keywords: AI, self-checkouts systems (SCS), intention , technology, behaviour, consumer behaviour, attitude, adoption

INTRODUCTION
In today's digitally-driven retail landscape, the integration of cutting-edge technologies has revolutionized traditional shopping experiences. One such innovation gaining prominence is AI-enabled self-checkout systems, which offer consumers a convenient and efficient alternative to traditional cashier-assisted transactions. As retailers seek to enhance operational efficiency and meet evolving consumer demands, understanding the factors influencing consumers' intention to use AI-enabled self-checkout systems becomes imperative.

AI-enabled checkout revolutionizes the retail experience by allowing pre-registered shoppers to seamlessly navigate stores, select desired items, and exit without the need for cashier interaction. This innovative technology streamlines the entire shopping process, including payment, through online platforms. In stark contrast, traditional checkouts entail customers physically paying cashiers during in-store transactions. The growing adoption of AI in retail is evidenced by its substantial market value, which surged from USD 4.8 billion in 2021 to a projected USD 31 billion by 2028, according to Statista. This surge underscores an increasing technological awareness driving transformative shifts in retail operations and consumer experiences. Various studies have been conducted to examine the consumer's willingness to use AI enabled services. For instance, (Dogan Gursoy, 2019) studied using a research model which was grounded in the artificially intelligent device use acceptance (AIDUA) framework to study the hedonic motivation on use of AI on Mobile phones and its effect on Gen Z members. However, the study was only based on hospitality sector. Furthermore, it has been observed though a study of use of self-checkout centres in retail industry is done in the retail grocery sector of Hyderabad region (Mukherjee et al., 2018) but very limited study is done on the AI enabled self-checkouts in the Delhi-NCR region. The factors like perceived ease of usefulness and perceived ease of use are studied to analyse the acceptance of technology but other factors like personalisation of

services, the quality of technology and the intelligence of AI technology are studies in relation to the adoption of AI enabled self-checkouts systems in retail industry in Delhi NCR region.

Therefore, this research work aims to study the influence of technology quality, personalization quality, AI intelligence level on consumers' intention to utilize AI-enabled self-checkout systems in retail environments. By examining these factors comprehensively, this study seeks to provide insights that can inform retailers, policymakers, and industry stakeholders in optimizing the design and implementation of AI-driven retail technologies.

The remainder of this paper is organized as follows: Section 2 provides a comprehensive review of relevant literature, elucidating existing theories and empirical findings related to technology adoption, personalization, and AI in retail settings. Section 3 outlines the theoretical framework guiding this study and formulates research hypotheses based on the identified relationships. Section 4 outlines the approach used for data collection and analysis, detailing the research design, selection of the sample, and the tools used for measurement. Section 5 presents the findings from the empirical analysis and explores their significance for both theory and practical application. Lastly, Section 6 provides a summary of conclusions, discusses the study's limitations, and suggests potential directions for future research.
In conclusion, this study aims to provide insights into the various factors influencing consumers' willingness to use AI-driven self-checkout systems, offering valuable contributions to both academic knowledge and industry practices.

REVIEW OF LITERATURE

AI-powered automated retail stores represent a transformative shift in the physical retail sector. Consumers are now encountering fully automated systems within these stores (Pillai et al. 2020) In retail, artificial intelligence holds the potential to predict customer preferences, automate operations, improve customer interactions, personalize shopping experiences, and optimize pricing strategies. The integration of AI has led to notable improvements, such as a 50% boost in assortment efficiency, a 20% reduction in stock levels, and a 30% increase in online sales for retailers utilizing AI technologies (wankhade et al, 2018). Moreover, AI-enabled checkout systems have been shown to significantly enhance the likelihood of consumer return visits. The impact of these technologies is also influenced by sensory stimuli from in-store communications—such as product assortment, advertisements, and technological features. A crucial factor in these effects is the extent to which consumers perceive AI technology as threatening, which can act as a boundary condition influencing these outcomes (Hsieh, 2011)
Oosthuizen et al. (2020) studied to find that Al technologies can be used across various retail value chain activities. Also identified the four key roles for Al solutions in the retail value chain: knowledge and insight man- agreement, inventory management, operations optimization, and customer engagement. A study was made by collecting the responses with the help of questionnaire using snowball sampling and it was found that this approach is customer-centric not process-driven and, therefore. better suited to the complex nature of business amidst new technologies.
Moore et al. (2022) in his study aimed to study to understanding the social significance of AI in retail on customer experience (CX) and the managerial implications of consumers interactions with AI digital humans. Discovery-oriented research goals were used in selecting the multi-phase ethnographic approach to explore the consumer interaction with AI enabled services that interfere as a part of in store experiences. This study only focuses on the in-store experience of the customers and did not take into account the online consumers which are increasing at an increasing rate recently.
Uresh et al. (2020) focused on customer centric search with respect to chatbot system, visual search, production recommendation & categorization are playing predominant role in the online shopping

with regard to artificial intelligence in online shopping. The concluding observations are that there is no relationship between usage and recompenses factors while there is significant relationship between the techniques factors.

Bulmer et al. (2018) observed the understanding of how self-service checkouts influence shopping practices and consumers' experiences of the in-store environment. Findings illustrate that unwilling customers feel a sense of social obligation to use self-service checkouts at times in order to help others. This study provides a broader appreciation of how consumers engage with self-service checkout processes, and extends understanding of how consumers manage the paradoxes that surround the introduction of in-store technologies by retailers.

(Rigner, 2019) in his Masters thesis studied the accuracy of automated self-checkouts detection of products was evaluated. A data set consisting of 10 different retail products have been gathered and annotated. The results from this work are promising, but there are still a lot of things to be done and to optimize before a commercialization of the prototype is possible.

(jain et al., 2021) in his study introduced a novel variable to consumer literature, callousness, a subconstruct of psychopathy and features the unexplored tripartite "AI–physical–human" ecosystem, which adds a significant layer to the incipient AI literature and serves as a theoretical framework for continued inquiries. In a retail setting, he conducted two field studies and one controlled online experiment show that compared to self-service checkouts, artificial intelligence (AI)-enabled checkouts temporarily activate perceived shopping convenience. It was observed that the research was Limited for consumers who have higher levels of self-efficacy.(moore et al., 2018) in his Findings illustrated that unwilling customers feel a sense of social obligation to use self-service checkouts at times in order to help others. to conduct the study Semi-structured face to face interviews were used to capture consumers' discursive accounts of their shopping practices, and to examine their interactions with self-service checkouts. Further studies can be done to this as It was only limited to the unwilling customers and did not study the outcomes of customers who were willing to use the AI enabled self-checkouts.(Dongmin et al., 2021) proposed a fully automated payment system with AI vision technology and showed system feasibility by the performance test. The system realizes contactless service for self-checkout in the restaurant business area and improves the cost-saving in managing human resources. To test the proposed system feasibility, we established an AI vision system using a commercial camera and conducted an image recognition test by training object detection AI models using donut images. The proposed system has a self-learning system with mismatched information in operation. The study Focuses on payments only while ignoring factors like product recognition and ease of use.

(park et al., 2022) showed that moral intention (intention to report an error) is less likely to emerge for AI checkout and self-checkout machines compared with human checkout. In addition, moral intention decreases as people consider the machine less humanlike. The hypotheses are tested in three experimental studies to be reported. 128 adults recruited from Amazon Mechanical Turk (MTurk) for a nominal payment. Participants were exposed to one of two checkout agent types (human vs. AI) conditions of a between-subjects design. this study was administered through online panels providing experimental scenarios portraying potential situations. Future research should also examine contextual factors that could influence our results.

(van Esch et al., 2020) attempted to investigate the "just-walk-out" retail technology in cohort with in-store communication. AI-enabled checkouts lead to significantly higher consumers' patronage likelihood. Furthermore, sensory stimulation stemming from in-store communication (environmental cues including assortment, advertising, and technology) underlies this impact. Importantly, the extent to which consumers perceive AI technology to be threatening is revealed as a boundary condition to these effects. Three studies, conducted online and in the field, the authors demonstrate that, compared to self-service checkout.

(Adapa et al., 2020) showed that perceived complexity, perceived advantage, perceived novelty and perceived risk of using smart retail technologies determine consumers' perceived shopping value, which, in turn, influences their store loyalty and intentions to adopt smart retail technology. To test the conceptual model, measurement of constructs via a self-completion, online survey administered to a panel of respondents ($n = 338$) sourced from Amazon Mechanical Turk.

(mercadeo et al., 2021) studied the path to quantitative approaches for such comparison, as it aims to provide a performance analysis through queueing theory. The article compared two queueing systems; a traditional retail store vs. the Amazon Go Store. Both systems were analysed as queueing stochastic networks. First, the traditional retail store was modelled as a two-stage (shopping and payment) network. The implemented methodology allowed obtaining, for both compared systems, the key performance indicators (KPIs) such as the cycle time (CT), work in process (WIP), and the throughput (TP), revealing that the Amazon Go Store model exhibits better performance regarding the WIP and CT. the lack of comparative analysis between this model and traditional retail models using queueing theory was observed.

(Prasad et al., 2019) revealed that respondents' technology readiness was moderate with respect to mobile based SCS. Significant positive correlations were found between: technology readiness and perceived ease of use, perceived ease of use and perceived usefulness, perceived ease of use and likelihood to use, perceived usefulness and likelihood to use. Total of 152 responses were received via questionnaires. the researchers used the TRI 2.0 along with Kaiser–Meyer–Olkin Measure of Sampling Adequacy. This study is limited only to find out the respondents' TR about mobile-based SCS in retail stores in India. The future researchers may also investigate why TR does not appear to help predict the likelihood of using self-checkout technologies within a retail setting. Future study may be conducted to find out post-adoption behaviour of Indian customers particularly with respect to usage, usage pattern, satisfaction. (Gursoy et al. 2019) proposed the AIDUA model which incorporates three acceptance generation stages (primary appraisal, secondary appraisal, and outcome stage) along with six antecedents (social influence, hedonic motivation, anthropomorphism, performance expectancy, effort expectancy, and emotion) which effects the acceptance of artificial intelligence enabled devices by the consumers based on the cognitive appraisal and cognitive dissonance theory of consumer behaviour. Findings indicate that social influence and hedonic motivation are positively related to performance expectancy while anthropomorphism is positively related to effort expectancy. Both performance and effort expectancy are significant antecedents of customer emotions, which determines customers' acceptance of AI device use in service encounters. (Yang et.al., 2022) proposed a theoretical model for the use of task-oriented AI devices by the tourism industry. The data was collected in the form of questionnaires and 419 responses were received with an effective response rate of 95%. It is an extension of AIDUA model and explain the following findings: (1) utilitarian motivation (2) perceived competence and flow of experience (3) utilitarian motivation (4) perceived competence which flows positively with the flow of experience. further (Pillai et.al., 2020) studied how Artificial Intelligence (AI) is transforming the way retail stores operate. AI-Powered Automated Retail Stores are the next revolution in physical retail. Consumers are facing fully automated technology in these retail stores. The outcome of the study reveals that Innovativeness and Optimism of consumers affect the perceived ease and perceived usefulness.

CONCEPTUAL MODEL

Research done on self-checkout Services is new and its adoption in the exploratory stage. Studies using technology for self-checkouts are limited and so pressing need arises to investigate it. Therefore, we propose to test the adoption of AI enabled self-checkouts in the Indian context and

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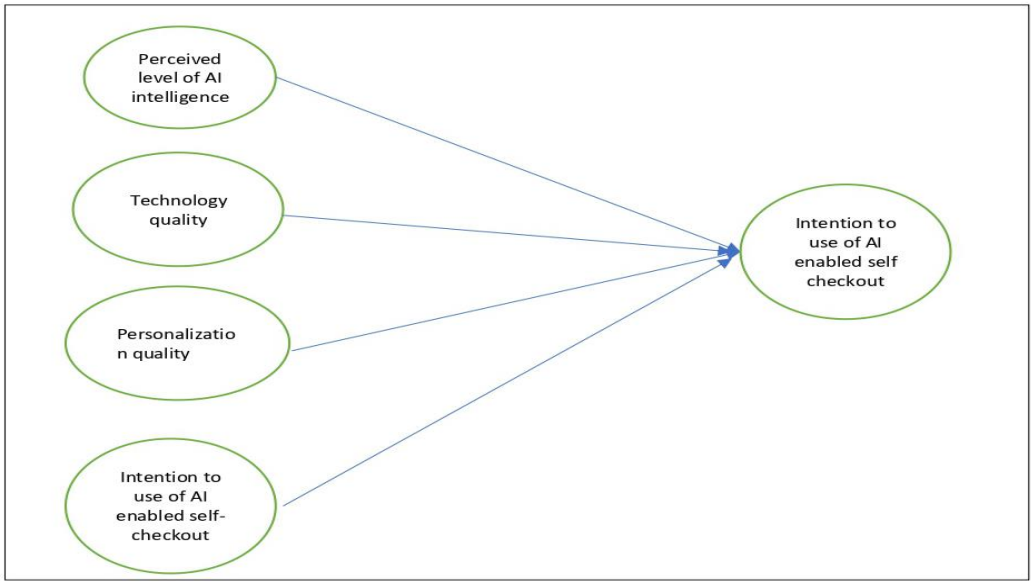
replicate the TAM & TRAM model along with AIPRS (Rajashirri Pillai, 2020). Accordingly, we utilize the following conceptual model for this study.

The conceptual model given below depicts 4 independent variables namely Perceive ease of use, Perceived level of AI's intelligence, Technology quality, Personalisation quality and one dependent variable which is "users' intention to use AI enabled self checkout services".

Perceived level of AI's intelligence: Perceived intelligence mainly concentrates on competence, knowledge delivery, sensibility , intelligence and responsible reaction of a robot or a Ai enabled machine. (Rajashirri Pillai, 2020). (Dogan Gursoy, 2019) (Rajashirri Pillai, 2020) (Dogan Gursoy, 2019)
Technology quality: An AI system embodied by a high level of technology may be perceived as a more accurate decision. The decision of using the AI enabled services is depended upon the quality of the AI or the ML embodied in it. (Edward et., 2023)

Personalisation quality : Personalization refers to the ability to provide services or content based on individual's, preferences and consumption patterns. It saves customers considerable research time and makes it easier for companies to attract their interest. (G Haas, 2023).

Perceive ease of use:
Perceived ease of use (Davis, 1989) explains how a customer would be able to use a system or technology without any difficulties or efforts.



RESEARCH METHODOLOGY

The study is conducted in Delhi-NCR based on the primary data which collected in the form of questionnaires filled by the customers of the major retail outlets like ZARA, MC Donald's. KFC, Decathlon, shopper's stop and Marks & Spencer's that offer the facility of Intelligent Self- checkouts where the interaction with the human employees is not required.
To collect the sample judgemental sampling technique was used. To test the proposed relationships multiple regression was employed using SPSS.

The measurement items for **Perceived Usefulness**(PU) were adopted from (Venkatesh et al., 2003) also, (Weijters et al., 2007) where scale has reported the reliability of 0.91which to exceed minimal value (AI enabled SCSs improves my shopping performance; I find AI enabled SCSs useful in purchasing products at grocery stores).
Perceived Ease of Use (PEOU) is measured in this study by 6 items as adopted from (Dabholkar & Bagozzi, 2002) with Cronbach alpha 0.90, which exceed minimal value 0.70 (I believe that AI enabled SCSs will be complicated, Using AI enabled SCSs will be confusing).
Personalisation quality (PQ) is measured with three itemstaken from Lin and Hsieh (2011). The scale have cronbach alpha as .70. (The exact figures were not provided in the article. (The firm's AI enabled SCSs understands my specific needs, The firm's AI enabled SCSs has my best interests at heart).

Technology Quality (TQ) is also taken from Lin and Hsieh (2011). The Cronbach's alpha for the scale is .72. (The operation of the firm's AI enabled SCSs is interesting, I feel good being able to use the AI enabled SCSs).

The scale for **Perceived level of AI's intelligence** is taken from Huang & Rust (2018). The scale includes 7 items including- I think that AI enabled SCSs device works like a machine, I can communicate well with AI enabled SCSs device).

All the items are measured on a five point linkert scale ranging from strongly disagree to strongly agree.

ANALYSIS

It has been observed from the pie-chart that 41.4 per cent of the respondents have done schooling, 9.6 percent have completed their post-graduation, 42.7 percent have done graduation, 6.3 per cent have completed their doctorate degree.
It has been viewed from the analysis that 23.9 per cent of the respondents have been using self-check out services over one year, while 54.2 per cent have been using it over less than a year, whereas 12 per cent of them have been using it over a period of two years and 9.9 per cent have been using over more than three years.
It has been observed from the analysis that 51.5 per cent of the respondents have been using AI enabled self check outs at quick stores like MC Donalds, KFC's etc where as 15.6 per cent of them have been using at retail stores such as life styles, Decathlon, while 13.3 per cent of them have been using at luxry retail outlets such as Zara, Marks and Spenser and 18.6 per cent of them are using it petrol pumps while only one per cent using snap chat.

$$Y\ (Perception) = 0.822788 + 0.183302\ X_1\ (PU) + 0.239738\ X_3\ (TQ) + 0.297132\ X_4\ (PLAI)$$

ANOVA table

Source	DF	Sum of Square	Mean Square	F Statistic	P-Value	P-value
Regression (between $\hat{y}_i$ and $\bar{y}$)	3	79.652144	26.550715	45.673909	0	0
Residual (between y_i and $\hat{y}_i$)	296	172.067856	0.58131			
Total (between y_i and $\bar{y}$)	299	251.72	0.841873			

The results of multiple linear regression model indicated that there was a moderate collective significant effect between the X1 (PU), X2 (PQ), X3 (TQ), X4 (PLAI) and Perception. ($F(3, 296) = 45.67$, $p < .001$, $R^2 = 0.32$, $R^2_{adj} = 0.31$).

Y and X relationship and Test of Goodness of Fit

R square (R^2) equals **0.316432.** It means that the predictors (X_i) explain 31.6% of the variance of Y. Adjusted R square equals **0.309503.**

The coefficient of multiple correlation (R) equals **0.562522**. It means that there is a moderate correlation between the predicted data ($\hat{y}$) and the observed data (y).

Overall regression: right-tailed, $F_{(3,296)}$ = **45.673909**, p-value = **0**. Since p-value < α (0.05), we reject the H_0.

CONCLUSION

Hence it can be concluded that the aim is to study the shopper's attitude towards the AI enabled self-checkouts and the extent to which they are willing to adopt the same. The overall purpose is to shed light on the factors that contribute towards building a certain attitude of the customers of the retail sector in Delhi NCR. The effect of independent factors like the advancement of the technology used in building the AI enabled checkouts, amount of personalization provided by the system, how quick is the response of the AI based checkouts and what is the usefulness of the same as perceived by the customers is studied to evaluate the attitude being built for the same in the retail organizations like MC Donald's, Decathlon etc. in Delhi-NCR.The future researchers may also investigate why TR does not appear to help predict the likelihood of using self-checkout technologies within a retail setting. Future study may be conducted to find out post-adoption behaviour of Indian customers particularly with respect to usage, usage pattern, satisfaction

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