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The Effect of Digital Transformation on Customer Satisfaction in the Retail Sector of Dubai

International Business,
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Master's thesis

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Abstract

The retail industry digital transformation has transformed consumer experience by using technologies like the digital payment systems, personalization technologies based on AI, and the omnichannel retailing. Although the literature indicates that these technologies have the potential to increase customer satisfaction, little research has explored such correlation in the specific retail context of Dubai, where luxury and mass retail coexist, consumers are multicultural, there is a high level of digital infrastructure, and stringent data privacy laws are in place. Through this study, the researcher examines how digital transformation affects customer satisfaction in Dubai through four aspects: digital payments, AI-based personalization, omnichannel retailing, and data privacy and security. The data were collected using a positivist approach based on Expectancy-Disconfirmation Theory through the administration of structured questionnaires to retail customers and analyzed through reliability analysis, descriptive statistics, correlation, and regression analysis.

Findings revealed that all the four digital transformation factors have a positive correlation with customer satisfaction, with omnichannel retailing being the most significant predictor ($\beta = .373$), followed by digital payment systems ($\beta = .261$), data privacy and security ($\beta = .192$), and AI-driven personalisation ($\beta = .107$). Such results indicate the significance of integrated shopping experiences in pushing satisfaction in the technologically advanced and diversified retail market in Dubai. The research adds to the theory by applying Expectancy-Disconfirmation Theory to a digitally transformed, culturally diverse retail setting and offers practical advice to retailers regarding what technology investments to focus on first in order to achieve the greatest customer satisfaction without causing privacy and cultural insensitivity.

Keywords: Digital transformation, Customer satisfaction, Omnichannel retailing, AI personalization, Digital payments, Data privacy

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1 Introduction

1.1 Research Background and Context

In the retail industry, customer satisfaction has emerged as a key success factor, especially in a digitised world (Nandasena and Wickramasinghe, 2024, 208). Previously, the quality of products, store atmosphere, and one-on-one service experiences were the main determinants of customer satisfaction in retail (Venkateswaran and Sundram, 2021, 146). Nevertheless, the quick adoption of digital technologies in the retail business has changed the customer-retailer interaction significantly and the satisfaction formation and assessment (Phuong et al., 2024, 1844).

Digital transformation in retail is the process of introducing digital technologies into business operations to optimize their operation and provide better customer experiences through various touchpoints (Kraus et al., 2022, 2; Luo, 2024, 325). This change has brought new dimensions that affect customer satisfaction which is not limited to factors of traditional service quality.

The implementation of digital payment technologies, such as mobile wallets and contactless payment systems, is one of the dimensions that provide greater speed, convenience, and the perception of security (Rachapudi, 2022, 228). The more the transactions are streamlined, the higher the expectations of the customers are regarding efficiency and trust in the payment processes. Omnichannel retailing is another important dimension and entails the combination of online and mobile, as well as physical stores channels in order to create a unified and convenient shopping experience (Verhoef et al., 2015, 176). Retailers are now being expected to provide equal quality service and accessibility in all channels by their customers.

Moreover, the increased utilization of customer-related information to create customized experiences has also transformed the retail experiences. Systems based on artificial intelligence allow personalised recommendations and personalised interactions, and these can increase the perceived value and decrease the effort of decision-making. Meanwhile, the large pool of collected and used personal data has raised the risk of data privacy and security concerns, and the transparency of data practices is a significant factor to determine the level of customer trust and satisfaction (Bhuiyan, 2024, 164; Hee et al., 2021, 696–707).

Digital transformation has turned out to be a strategic priority in retail worldwide. The growth of e-commerce and the growing use of digital technologies has prompted retailers to invest in sophisticated systems, including artificial intelligence, data analytics, and integrated supply chain. Large global retailers have used digital innovations to streamline processes and improve customer interaction, and

new retailing forms in some parts of the world, including Asia, show how increasingly important digitally augmented customer experiences become (Bhuiyan, 2024, 164; Peng et al., 2024, 158). The trend observed worldwide shows that digital transformation is no longer a choice but a necessity in ensuring competitiveness in customer satisfaction.

In this international setting, Dubai is a unique retailing setting. Dubai being an international retail centre, a combination of state-of-the-art digital infrastructure and a very diverse consumer base comprising of local residents, expatriates, and international tourists is a mix that can be utilized. Retail business is divided into the luxury and mass-market segments, which means that retailers must cater to both the need to provide high expectations of personalised service and the need to provide efficient digital experiences at the same time. Moreover, regulatory requirements like the United Arab Emirates Personal Data Protection Law demand stringent standards in data processing, which influence the retailers to weigh personalization versus the privacy issue. These attributes make Dubai a special place in terms of testing the effect of digital transformation on customer satisfaction within a dynamic and intricate retailer.

1.2 Problem Identification

Available literature has significant evidence that digital transformation has the potential of improving customer satisfaction in a retail setting. According to previous research, digital technologies enhance the accessibility to the product and services, allow achieving a higher degree of customization, and increase the efficiency of the transaction, all of which have a positive impact on customer satisfaction (Lemon & Verhoef, 2016, 76–78; Phuong et al., 2024, 1848). Further studies indicate that smooth customer experiences with many touchpoints, reliable and effective online payment, and open data policies further enhance customer perceptions and satisfaction results (Hee et al., 2021, 696–707; Naidu et al., 2024, 99).

Digital transformation and customer satisfaction are correlated and backed by standard theoretical frameworks. The Expectancy-Disconfirmation Theory describes how satisfaction is constituted by the perceived performance compared to or surpassing customer expectations, which are also augmented by the digital and physical store experiences (Schiebler et al., 2025, 124). On the same note, the SERVQUAL model establishes dimensions like reliability, responsiveness, assurance and

empathy as essential determinants of perceived service quality, which are applicable in digitally enabled retail settings. These theories give a basis of the impact of digital transformation on satisfaction in relation to better service delivery and customer experience.

In spite of these contributions, there are still significant gaps in the knowledge of how digital transformation influences customer satisfaction in the complex and context-specific retail setting. A

large portion of the literature is focused on Western markets or the overall mass-market retail context, and little is devoted to the situations that incorporate the features of luxury retailing, multicultural consumers, and goods regulation (Oman & Begum, 2025, i355). Consequently, it is not clear whether the current models can be applied to such situations.

The former gap is associated with the position of omnichannel retailing in various retail forms. Although it is generally believed that the integration of the omnichannel can enhance the efficiency and convenience, the current study has been conducted on the mass-market retail settings. Empirical studies of the role of omnichannel strategies in customer satisfaction in the context of luxury-oriented environments, where experiential service and personalised interactions are the focal points of the customer experience, are scanty (Lisnawati et al., 2021, 1735–1736; Wolf & Steul-Fischer, 2023, 1610). This leaves doubt about whether the same satisfaction levels are generated by models of efficiency driven omnichannel models in an environment that values experiential value highly.

The second gap is related to the relationship between personalization and privacy. Even though the previous literature acknowledges that clients appreciate customized experiences and at the same time raises concerns about information security, this connection has been mainly investigated in less regulated and culturally homogeneous situations (Cloarec, 2020, 11). Little has been done in the field of customer evaluation of personalization and privacy in the context of a world where strict data protection laws and varying cultural demands prevail. Current findings indicate that such consumers can exhibit the presence of strong privacy attitudes in addition to high levels of acceptance of their personalization but the overall impact of these two dimensions on customer satisfaction is not well comprehended (Jawabri et al., 2025, 60).

The third gap is associated with the drivers of digital transformation. A large portion of the literature is devoted to digital transformation as a reaction to the competition or external shocks like the COVID-19 pandemic (Redda, 2024, 385-387). Nevertheless, the effects of policy-led initiatives on digital transformation on customer satisfaction are not well understood. Under the conditions when governments are actively encouraging the adoption of digital technologies, i.e., by implementing

digital payment schemes and regulatory frameworks, the mechanisms by which digital transformation influences customer satisfaction may not be the same as those that occur in market-driven contexts.

These missing links point to a more general gap in the literature, which is the fact that there is no empirical data on the joint impact of various dimensions of digital transformation on customer satisfaction in complex retail contexts. Although each of the factors, including the payment system, personalization, integration of the omnichannel, and data privacy, have been analyzed individually, the interaction among these factors and their contribution to the overall satisfaction has not been understood well when they are considered together.

To fill such gaps, it is essential to consider the individual and joint impact of the critical dimensions of digital transformation on customer satisfaction in an environment that captivates the complexity of the retail reality. The Dubai retail industry offers an ideal environment, with a mix of luxury and mass-market retail, an extremely multicultural consumer population, developed digital infrastructure, and a robust regulatory framework. This background allows considering the impact of digital transformation on customer satisfaction in greater depth than what are already existing models.

1.3 Research Questions

This research examines the impact of digital transformation on customer satisfaction in the Dubai's retail industry. The study is informed by the fact that although digital transformation has positively contributed to customer satisfaction across the world, the unique retail background of Dubai necessitates a specific examination to ascertain how the digital transformation constituents affect customer satisfaction in the context of the unique setting of the country.

Primary Research Question

What is the effect of digital transformation on customer satisfaction in the retail sector of Dubai, UAE?

Sub-Research Questions

What is the effect of digital payment systems on customer satisfaction in Dubai's retail sector?

How does AI-driven personalization affect customer satisfaction in Dubai's retail sector?

What is the impact of omnichannel retailing on customer satisfaction in Dubai's retail sector?

How do data privacy and security concerns affect customer satisfaction in Dubai's retail sector?

The data analysis method is simple and multiple regression. Each of the sub-questions is answered using simple regression analysis, which evaluates the direct impact of one of the dimensions of digital transformation on customer satisfaction. Conversely, multiple regression analysis is used to answer the primary research question because it looks at the relationship of all four dimensions at the same time. The given approach will define not only whether the digital transformation in general influences customer satisfaction, but also which particular factors are the most influential when other dimensions are considered.

The sub-questions concentrate on the digital transformation in the following aspects:

The digital payment systems enhance the convenience of transactions, their security, and their adoption, which is especially relevant to the multicultural and internationally connected retail environment of Dubai (Naidu et al., 2024, 99; Gupta and Arora, 2019, 88 - 114). Trust in security and privacy systems has an impact on adoption (Gupta and Hakhu, 2021, 150-165).

Personalization based on AI allows providing timely, relevant, and personalized customer experiences via recommendation systems, predictive analytics, and chatbots (Bhuiyan, 2024, 164; Karami et al., 2024, 1035–1084). Personalization is less harmful than decision fatigue but can result in algorithmic fatigue when used excessively. Its effect on satisfaction may be moderated by cultural expectations and privacy issues in such a diverse environment as Dubai (Akour et al., 2022, 1 – 18; Misra et al., 2024, 1).

Omnichannel retailing is a system that incorporates both online and offline services to offer a seamless flow of service, including a single price, stock awareness, and the capability to buy in various ways (Lemon & Verhoef, 2016, 76; Guo et al., 2023, 23-52). Omnichannel approaches are also needed in Dubai to reconcile the high-touch luxury service with the digital convenience (Faccia et al., 2023, 1 - 29).

Customer trust in digital retail setting is anchored on data privacy and security. The confidence of the consumers is affected by the transparent adherence to the UAE Personal Data Protection Law and safe transactions, which in turn can moderate the impact of other aspects of the digital transformation on the satisfaction (Bleier et al., 2020, 46; Alzaabi, 2023, 88; Cloarec, 2020,11).

The sub-questions, when combined, give a systematic scheme of the research question to be answered, as they identify both the simultaneous and independent impacts of the dimensions of digital transformation on customer satisfaction in the complex retail sector in Dubai.

1.4 The Strategic Contextualization of Research

1.4.1 Retail environment features of Dubai

The retail sector in Dubai is unique in aspects that make it not comparable to the normal retail research scenarios. Dubai economically is an international shopping center which welcomes millions of foreign shoppers every year in addition to catering to the local residents and expatriates. The retail market includes both luxury retail, which involves the sale of high-end retail to the high-net-worth market, and mass-market retail, which involves the sale of retail to the mass market. This two-tiered type of structure obliges retailers to serve two customer categories with conflicting service demands simultaneously (Faccia et al. 2023, 1 - 29; Ifekanandu et al., 2023, 1936).

Dubai, in terms of demographics, is very multicultural with the expats forming 88 percent population. This diversity of culture forms different types of retail demand with the differences in culture shopping habits, communication and expectations of services. Diverse nationalities have different shopping habits, and consumers shopping impulse also brings their shopping practices with them. Also, Dubai receives large transitional populations such as season workers and international travelers and introduces constantly changing customer demographics.

Dubai has made a significant investment, in terms of technology, with a high rate of broad band penetration, smart phone adoption and e-commerce adoption. The digital literacy level of the Dubai population is quite high, which allows digital retail to be adopted quite fast. The government of Dubai has been a strong advocate of digital change with programs such as Smart Dubai and Dubai Cashless Initiative 2022 driving the move towards a digital payment system (Alzaabi, 2023, 88; Faccia et al. 2023, 1-29).

1.4.2 Dubai Digital Transformation Initiatives

The process of digital transformation in Dubai is implemented both in government-required policies and within the retail industry. Digital Economy Strategy offers the United Arab Emirates a framework for digital transformation of the economic sectors. The Dubai Cashless Initiative 2022 is a policy-based digital payment promotion, which is unlike crisis-based transformation in pandemic literature (Kraus et al. 2022, 2).

The Personal Data Protection Law (PDPL) of United Arab Emirates, passed in 2021, comes out with some of the highest data protection standards that surpass most of the global markets. The compliance of personal data protection law takes the form of a competitive imperative and customer expectation.

Distributors who have good data protection will be able to differentiate based on privacy assurance. Alzaabi (2023, 88) determined that the stringency of the personal data protection law has provided an avenue that helps retailers establish customer trust in their form of compliance communication.

Large retail companies working in Dubai have put substantial amounts of data into digital transformation and advanced omnichannel strategy, AI-based personalization, and combined digital payment. Such corporate investments generate competition pressure on other retailers to modernize online capabilities (Faccia et al. 2023, 1 - 29).

1.4.3 Dubai Consumer Behavior and Demographics

The consumer population of Dubai has unique features. The consumer base is comparatively young and more digitally literate than the rest of the world. The level of education is very high, which goes along with the digital literacy and advanced knowledge concerning the problem of privacy. The shopping behavior demonstrates the interests in multicultural specifics and global exposure. The shopping habits of the residents of different nationalities are influenced by their native countries. The global retailers introduce shopping anticipations by international tourists.

Dubai boasts of high digital rates, with e-commerce penetration being way above the global rates. The adoption rate of digital payments increased after the government's efforts. There is a growing level of expectations for omnichannel shopping. Nevertheless, the level of adoption is different among the segments, with younger, educated, and internationally-exposed customers being more engaged, and traditional customers having strong cash preferences (Celestin & Sujatha, 2024, 66–73).

The level of privacy in Dubai is higher than in other parts of the world, probably due to reports of privacy violations in the media and the privacy protection focus set by the governments. At the same time, customers are very receptive to personalization if they are promised that their privacy is not violated. Such a peculiar mixture of concerns of high privacy and high acceptance of personalization is typical of the Dubai context (Cloarec, 2020, 11). Such characteristics of culture as focus on relationship-based interaction and customized service is still appreciated. The digital transformation should be able to strike the right balance between these cultural preferences and efficiency expectations.

2 Literature Review

2.1 Customer Satisfaction

2.1.1 Conceptualizing Customer Satisfaction

Customer satisfaction is one of the most widely investigated constructs in the marketing literature but still, it is an ambiguous phenomenon because of its multidimensional nature. In general, customer satisfaction can be defined as the fulfilment reaction of a consumer that is caused by comparing the predicted performance of a product or service with its perceived performance (Schiebler et al., 2025, 124). Satisfaction happens when the perceived performance is equal to or better than previous expectations and dissatisfaction is realized when performance is below the expectations.

Gradually this definition has changed to include cognitive and affective aspects. Cognitively, satisfaction is an evaluative decision on whether a product or service has been able to work as per expectation. Affectively, it shows feelings of either pleasure, disappointment or frustration on the consumption experience. This two-sided outlook brings to the fore the fact that customer satisfaction is not merely a rational evaluation but an emotional response that is determined by experience.

The American Customer Satisfaction Index (ACSI) also conceptualizes the concept of satisfaction as a process of perceived quality, perceived value, and customer expectations (Morgeson et al., 2023, 2). This method stresses the point that satisfaction is a multidimensional variable that is determined by a number of antecedents and not just one. It also enables one to have more detailed insights into the role of various factors in the overall customer ratings.

The other relevant difference in the literature is that of transaction-specific satisfaction and cumulative satisfaction. Transaction-specific satisfaction is the measure of a one-off interaction or purchase experience whereas cumulative satisfaction is the measure of a general assessment based on several interactions in the long run (Keiningham et al., 2014, 310). This difference is especially pertinent to the sphere of retail when a customer deals with a brand repeatedly in various channels.

The level of customer satisfaction in the retail environment means that it is more than the evaluation of the products that the customers are buying. These are terms like the level of service, the store atmosphere, the effectiveness of the transactions, and the value perception (Abdella & Indradewa, 2024, 371-372). The SERVQUAL model has formulated five dimensions of service quality such as tangibles, reliability, responsiveness, assurance and empathy, which play significant roles in

determining the levels of satisfaction (Berry et al., 1985, 48). These dimensions are still used in both the real world and online retail setting, but they are manifested differently in each setting.

Within the framework of this research, customer satisfaction refers to the general assessment of a consumer of their online retail experience, which is developed as a result of the comparison of their perceived performance and previous expectations on the main service and technological aspects. This definition is both evaluative in terms of cognition, and responsive in terms of affect, and is not circular in its reasoning, and is consistent with the existing theoretical viewpoints of satisfaction formation.

2.1.2 Theoretical Foundation of Customer Satisfaction

One of the most acceptable models of customer satisfaction is the Expectancy-Disconfirmation Theory (EDT). This theory states that the definition of satisfaction depends on the comparison between expectations of a customer before consumption and perceived performance following the experience (Schiebler et al., 2025, 124). Customers develop anticipations founded on previous experiences, the marketing communication and external sources of information like reviews and recommendations.

After the consumption experience, customers compare the actual performance with their expectations. The disconfirmation as the result of this comparison can be of three forms. Positive disconfirmation happens when the performance is greater than expected that results in satisfaction and in most cases delight. Negative disconfirmation is observed when the performance is lower than anticipated leading to dissatisfaction. Zero disconfirmation is when performance is equal to the expectations, which results in a neutral level of satisfaction.

The extent of disconfirmation is an important aspect that determines the response of the customer. The bigger the positive differences, the higher the satisfaction and loyalty, whereas the bigger the negative differences, the higher the dissatisfaction, complaints, and negative word-of-mouth (Nilsson et al., 2001, 16). Consequently, in their quest to gain competitive advantage, organizations not only need to match but preferably go beyond customer expectations.

The SERVQUAL model offers an alternative approach to EDT by putting emphasis on the disparity between the anticipated and actual quality of the service in numerous dimensions (Parasuraman et al., 1988, 26; Berry et al., 1985, 48). Whereas EDT describes the general process of satisfaction formation, SERVQUAL provides a deeper insight into particular service attributes that are involved in satisfaction.

These frameworks combine in pointing out the fact that both comparisons of expectations with performances and perceived quality of services contribute to customer satisfaction and are therefore relevant more than ever when it comes to the analysis of customer satisfaction in complex settings like retail.

2.1.3 Retail Customer Satisfaction Determinants

There is a set of interrelated factors determining customer satisfaction in retail settings, and they could be classified into product-related, service-related, environmental, and experiential determinants (Jaafri & Mansor, 2024, 144–153).

Factors related to the products are quality of product, variety and affordability of the product. The quality of products, which is the degree to which a product meets or surpasses the expectations of the customers, is a major source of satisfaction (Ebrahim et al., 2024, 17). The customer choice is improved through product variety and the chances of finding the appropriate options are also high, the perceived value is a measure of price and quality balance (Fornell et al., 1996, 13). These considerations apply to product presentation in digital retailing, such as the quality of the images, description, and customer reviews, which allow the customer to make informed choices.

The dimensions of SERVQUAL are closely associated with service-related factors. Reliability is the consistency and the correct delivery of services whereas responsiveness is the willingness and capability of serving customers on time. Assurance is associated with the competency and credibility of the service providers and empathy is the personalized consideration of customer needs. These dimensions are manifested in the digital environment in terms of system reliability, responsiveness of digital interfaces, security guarantees, and individualized recommendations.

The environmental factors are also important in determining customer satisfaction. The shopping experience in the traditional retail environment is affected by store layout, cleanliness, lighting, and crowding (Moukrim et al., 2024, 34). These factors in the digital retail context are converted into the design of the websites, ease of navigation, and overall usability, which influence the interaction of customers with online shops (Guo et al., 2023, 23 - 52).

Experience is concerned with emotional and hedonic dimensions of shopping. The customers are also demanding more interactive and entertaining experiences as opposed to strictly functional deals. Affective brand attitudes and the enjoyment of the shopping experience play a major role in determining levels of satisfaction (Ifekanandu et al. 2023, 1936; Kraus et al., 2022, 2). This shows the need to incorporate functional and experiential components in retail strategies.

2.1.4 Measuring Customer Satisfaction

The customer satisfaction measurement will involve the adoption of relevant measures that capture the cognitive and affective aspects. The American Customer Satisfaction Index (ACSI) is one of the most developed models that combines the customer expectations, perceived quality, and perceived value into one framework (Fornell et al., 1996, 13). The model can be used to make comparisons across time and industries, which offers a uniform method of measuring satisfaction.

The other popular model is the SERVQUAL measurement model, which is used to measure the differences between the anticipated and perceived service quality on various dimensions. Both the expectations and perceptions are assessed by the customers and the difference between the scores determines the degree of satisfaction (Berry et al., 1985, 48). Such a strategy is specifically effective when it comes to defining certain aspects of service improvement.

Single-item measures on the other hand evaluate overall satisfaction with one question, usually rated on a Likert scale. Single-item measures, even though not as elaborate as multi-item scales, are effective and save time on fatigue of respondents, particularly in the large-scale survey (Drolet & Morrison, 2001, 196). The available literature indicates that single-item scales are highly associated with multi-item scales, thus it is an effective technique of measuring overall satisfaction (Bergkvist & Rossiter, 2007, 183).

2.1.5 Digital Retail Environment and Customer Satisfaction

Customer satisfaction has been brought to new levels with the introduction of digital retail. Digital environments do not involve physical interaction, and unlike traditional retail, human service elements will have to be replicated or substituted by technological systems. Consequently, the usability, trust, and security become crucial determinants of satisfaction (Choi et al., 2018, 46).

E-S-QUAL model is a modification of previous service quality frameworks applied to online settings, which concentrates on web design, quality of information, responsiveness, and security of transactions (Ighomereho et al., 2022, 2). These aspects determine how the customers view the quality of digital services and their satisfaction.

The aspect of convenience and efficiency is paramount especially in digital retail. Easy checkout procedures and quick check out time are very important in improving satisfaction, and complicated or time-consuming processes may be cause of dissatisfaction (Gupta and Arora, 2019, 88 - 114). They should also have secure payment systems because issues related to fraud and data breach may have a negative effect on trust and satisfaction (Gupta and Hakhu, 2021, 157).

Another major contributor to satisfaction online is personalization. Customer behavior can be analyzed to recommend tailored suggestions with reduced effort to make a decision and higher perceived value

(Bhuiyan, 2024, 164; Karami et al., 2024, 1035–1084). But over personalization can lead to privacy concerns so there is a trade-off between the benefits of personalization and data protection.

Omnichannel integration also increases satisfaction as it allows the customer to cross online and offline channels without any hassle. Customers demand platform consistency, such as the same price, same inventory, and same quality of service (Lemon & Verhoef, 2016, 81).

Lastly, privacy and security of data is an important factor in influencing customer satisfaction. Open data habits and effective security systems foster trust whereas data breaches may substantially decrease client confidence (Bleier et al., 2020, 473). A personalization-privacy paradox, also known as the balance between personalization and privacy, is another major challenge in digital retail.

2.2 Digital Retail Transformation

2.2.1 Defining Digital Transformation

Digital transformation is the incorporation of digital technologies into the organizational processes in a manner that fundamentally changes the way businesses are conducted and provide value to the customers (Kumar, 2023, 1). It is not restricted to the use of new technologies but a total change of business models, organization structures, and strategies.

According to Vial (2019, 118–144), digital transformation is a process where organizations use digital technologies to enhance performance and generate new types of value (118). Likewise, Kraus et al. (2022) underline that digital transformation goes beyond the aspect of technological implementation to cover cultural transformation, data-centered decision-making, and a high emphasis on customer-centered approaches (2). This difference shows that digital transformation is an overall organizational change and not a technological upgrade.

Digital transformation should be distinguished with such related notions as digitization and digitalization. Digitization means the opportunity to change analog information into the digital one and digitalization means to use the digital technologies to enhance the existing processes. Digital transformation on the other hand is a deeper shift that transforms the way organizations define and provide value.

Digital transformation in the retail industry includes the use of technology in the supply chain management, customer relationship management, payment systems, inventory control, and customer service. This change redefines customer interaction and competition of retailers in an increasingly digital world.

2.2.2 Retail Digital Transformation Structures

A number of frameworks are created to describe the organization and execution of digital transformation in retail. Among the most notable ones is the Omnichannel Integration Framework, which prioritizes the development of smooth customer experiences through the use of several channels and the physical stores, online platforms, and mobile applications (Lemon & Verhoef, 2016, 81).

The framework emphasizes the need to have touchpoints with customers that will provide uniformity in service delivery, pricing, and product availability. Instead of having channels functioning separately, the retailers are supposed to offer a unified experience, which will enable customers to easily travel across channels.

The Customer Experience Framework is another significant viewpoint that states that the digital change must be used to improve customer experience in all interaction points instead of concentrating on the efficiency of operations (Faccia et al., 2023, 1-29). This kind of approach puts the customer in the forefront of transformation efforts so that any investments in technology is translated into a better satisfaction and engagement.

With these frameworks as a starting point, digital transformation in retail may be viewed as comprising of four main components that are a common theme in the literature:

- Digital payment systems
- Personalization by artificial intelligence (AI).
- Omnichannel retail integration
- Information protection and control.

These elements do not work independently but interrelate to create a holistic digital ecosystem, which influences customer experiences and organizational performance (Luo, 2024, 329).

2.2.3 Results of the Digital Transformation

The effects of the digital transformation occur at various levels which include operational, customer-related, and financial levels. On the operational level, it increases efficiency by automating it, optimizing the coordination of supply chains, and allowing it to be more effective in predicting demand (Kraus et al., 2022, 2). Such enhancements save money and enhance organizational responsiveness.

Regarding customers, the digital transformation increases the convenience, personalization, and the speed of service. Customers enjoy quicker transactions, more targeted product suggestions and enhanced flexibility in their interactions with retailers. These are some of the improvements that make the customer experiences and satisfaction better.

Digitally, transformation may result in increased sales volumes, customer retention and customer lifetime value. Companies that effectively apply the digital transformation strategies can be more inclined to compete in the dynamic markets and attain sustainable growth (Nilsson et al., 2001, 16).

In spite of these advantages, the effect of digital transformation is not universal in all organizations and customer segments. It relies on the quality of introducing digital technologies and the perception of customers regarding the value of those technologies. The systems may be poorly designed or the strategies may be misaligned hence resulting in dissatisfaction instead of improvement.

Thus, although digital transformation can contribute to customer satisfaction in a very significant way, it will be up to the functioning of certain digital elements and their correspondence with the expectations of the customers. It shows the need to analyze separate aspects of digital transformation instead of considering it as a single and homogenous entity.

2.3 Expectancy-Disconfirmation Theory and Conceptual Model

2.3.1 Expectancy-Disconfirmation Theory

Expanding the issue of customer satisfaction and digital transformation, the section incorporates the constructs using a theoretical framework. As the main theoretical framework, the Expectancy-Disconfirmation Theory (EDT) is chosen to explain the process of the formation of customer satisfaction in reaction to the online retail experiences.

Expectancy-Disconfirmation Theory describes satisfaction as a variable that depends on the gap between the expectations prior to consumption and perceived performance (Schiebler et al., 2025, 124). The customers develop expectations through past experiences, marketing communications, and external sources of information including reviews and recommendations. After consumption they measure the real performance of the product or service and compare it with the expectation before the consumption.

The outcome of this comparison is disconfirmation which can be either positive, negative or neutral. Positive disconfirmation is observed when there is a higher performance relative to the expectations and the results are satisfaction and positive behavioral results. Negative disconfirmation occurs when performance becomes lower than expectations leading to dissatisfaction. Zero disconfirmation and neutral level of satisfaction are experienced when performance is as expected.

The power of EDT is in the fact that it is able to identify both the cognitive evaluation and emotional response. The consumers do not just evaluate the fulfillment of the expectations, but they also have emotional responses depending on the result of the comparison. These responses affect the future behavior like repurchase intention, loyalty, and word-of-mouth (Nilsson et al., 2001, 16).

The applicability of EDT in different contexts, including digital retail environment, is largely proven through the use of empirical studies. As an example, Choi et al. (2018, 46) establish that perceived quality of the website affects the satisfaction via expectation-performance comparisons, and Bleier et al. (2020, 473) prove that data privacy practices surpassing the expectations have a positive influence on the customer satisfaction. The results also support the applicability of EDT in the explanation of satisfaction within technologically based settings.

Nevertheless, one must admit that there is a methodological weakness of the EDT implementation in this study. Although this theory focuses on the comparison of expectations against the perceived performance, the empirical measure that is applied in this study captures the perceived performance of the customers and their overall satisfaction without directly comparing the pre-consumption expectations and the disconfirmation process. Consequently, satisfaction is deduced on the basis of perceived performance, as opposed to the direct quantification of expectation-performance differences. This is one of the limitations that should be factored in the interpretation of the findings.

2.3.2 Expectancy-Disconfirmation Theory Systematization into Digital Transformation

The Expectancy-Disconfirmation Theory implementation to digital retailing settings must take into account the shaping of the expectations and performance within the technology-mediated setting. In contrast to the conventional retail, online retail is not as interactive and the experiences of customers are mostly dictated by technology.

The expectations of customers in the digital sphere are predetermined by previous online experiences, exposure to sophisticated online platforms, and the information presented in the online reviews and social networks (Bleier et al., 2020, 473; Choi et al., 2018, 46). This tends to create an expectation that is influenced by the industry leaders and the best-in-class digital experiences and not by individual retailers.

Perceived performance in digital retail is measured by such aspects like system usability, efficiency in transactions, accuracy of personalization, channel integration, and safety of data. All these factors influence the perception of quality of digital services by customers and whether they are satisfied with it or not.

The confirmation or disconfirmation process works in the digital environment just like in the traditional environment. Positive disconfirmation happens when the digital systems work in ways that were better than anticipated, such as speedy and secure payment options, precise customized suggestions, or flawless channel integration, which increase satisfaction. On the other hand, negative disconfirmation and dissatisfaction may result as a result of system failure, delayed services, or security issues.

Notably, digital retail also adds more complexity to the disconfirmation process through such factors as technological uncertainty, perceived risk, and privacy concerns. Customers can also consider not only functional performance but also the reliability and openness of digital systems. This is where one should take into account several aspects of performance to apply EDT in the digital environment.

2.3.3 Conceptual Model and Theoretical Justification

The research conceptualizes customer satisfaction as the results of the evaluation of the essential digital retail elements by the customers as per the theoretical background presented by Expectancy-Disconfirmation Theory. Precisely, four aspects of digital transformation are considered to be critical determinants of perceived performance:

- Digital payment systems
- Artificial intelligence-driven personalization
- Omnichannel retail integration
- Privacy and security of data

These elements are the fundamental aspects of digital retail experiences and are always featured in the literature as the core drivers of customer satisfaction. In the context of EDT, the elements serve as sources of satisfaction because they impact on the performance of the customers in terms of their evaluation in relation to their expectations.

Customer satisfaction is thus assumed as dependent variable and the four components of digital transformation are assumed to be independent variables. Perceived performance is cumulative, influencing the overall level of satisfaction.

This theoretical framework aligns with EDT, because it is concerned with the association between perceived performance and satisfaction consequences. Even though the research does not directly estimate the expectations or disconfirmation, the research presumes that perceived performance reflects the product of the implicit expectation-performance comparison made by customers.

Moreover, this framework recognizes that the extent of influence of various components on satisfaction can be different. Certain factors, including payment efficiency and data security, might lead to a more immediate effect, whereas others, including personalization and omnichannel integration, may create a more lasting effect and loyalty.

Combining the elements of digital transformation into the Expectancy-Disconfirmation framework, this paper offers a systematic way of comprehending the impact of technological developments on customer satisfaction in the context of a retail store.

2.4 Customer Satisfaction and Components of Digital Transformation

According to the theoretical framework, this study establishes the relationships between four items of the components of digital transformation (IVs) and customer satisfaction (DV) in Dubai's retail industry. The framework is developed based on Oliver's (1997, 218) expectancy disconfirmation theory as a basis to explain how each technological element influences satisfaction via different mechanisms.

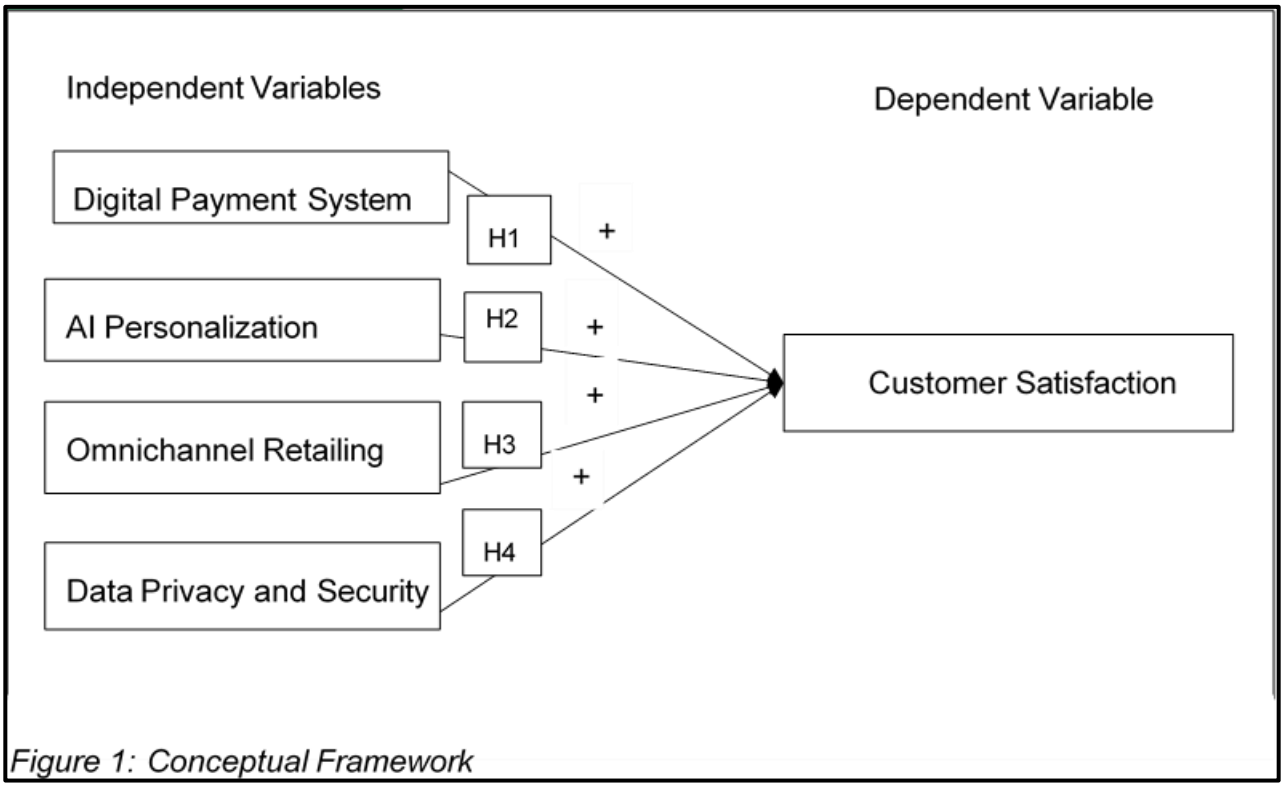

Figure 1: Conceptual Framework

2.4.1 Digital Payment systems and Customer satisfaction

Retail transactions have been changed by the digital payment systems because they are faster, convenient and efficient. Digital payments that are conducted using credit cards, mobile wallets, and contactless payments, unlike the old system of cash-based transactions, minimize the time spent on the transaction and make the purchasing process easier (Kumar and Pardeep, 2024, 2869).

Empirical research has shown that effective payment systems are very effective in customer satisfaction. Quicker checkout will decrease transactional friction, enhance the perceived value, and the payment options will enhance flexibility and convenience (Gupta and Arora, 2019, 88). Customers are more likely to relate smooth payment experiences with better service quality and greater value of their time. Security and trust are essential variables affecting satisfaction of digital payment systems. The issues of fraud, data breaches, and unauthorized access may adversely affect customer confidence and satisfaction

(Gupta and Hakhu, 2021, 157). On the other hand, systems that utilize encryption, authentication features, and regulatory compliance ensure security in payment systems and add value to customer ratings.

Regardless of these benefits, there is a risk that a client will find digital payment systems to be complicated or unsafe, especially when they are not used to digital technologies. In these instances, perceived performance can be lower than expectation and this can cause dissatisfaction. This emphasizes the fact that user-friendly and secure payment systems have to be designed.

According to the Expectancy-Disconfirmation model, in cases where the digital payment systems are efficient, secure and convenient compared to customer expectations, then positive disconfirmation is experienced, leading to increased satisfaction. Accordingly:

H1: Digital payment systems positively impact the customer satisfaction.

2.4.2 AI-Driven Personalization and Customer Satisfaction

Personalization has become highly important in the retailing industry, where artificial intelligence (AI) has been instrumental in helping retailers to customize products to the preferences of each customer. The AI systems are able to provide individualized recommendations, and enhance the suitability of marketing communications by studying customer data which may include purchase history and browsing behavior (Bhuiyan, 2024, 164).

Studies show that personalization enhances customer satisfaction through lessening information overload and easing decision-making. Relevant recommendations and AI-powered chatbots also contribute to perceived value and engagement, respectively, and responsiveness through immediate assistance (Karami et al., 2024, 1035–1084). This is because these factors help in achieving more efficient and satisfying customer experiences.

Nevertheless, personalization brings privacy and perceived intrusion issues. Too much or poorly done personalization can result in discomfort, commonly known as algorithmic fatigue when customers become overwhelmed or feel limited by an automated recommendation (Misra et al., 2024, 1). Also, the issues of collecting and using personal data may adversely affect satisfaction.

The success of AI-driven personalization is thus determined by the possibility to strike a balance between relevance and privacy. Clear data operations and the ability of users to control personalization options may increase trust and high satisfaction rates.

In an Expectancy-Disconfirmation view, positive disconfirmation arises when the personalization systems give relevant, accurate and helpful recommendations that not only do not fall short of expectation, but also surpass it. Accordingly:

H2: AI-driven personalization positively impacts on the customer satisfaction.

2.4.3 Omnichannel Retailing and Customer Satisfaction

Omnichannel retailing can be defined as a combination of various channels of shopping into one seamless and cohesive customer experience. In contrast to multichannel strategies, which use channels independently of each other, omnichannel retailing provides uniformity and integration between physical outlets, websites, and mobile applications (Lemon & Verhoef, 2016, 81).

Research indicates that the integration of omnichannel makes customers more satisfied due to the increased convenience and flexibility. Customers will be able to move through channels, get the same information, and decide on their favourite shopping behaviors without inconvenience (Hee et al., 2021, 696–707). Online ordering with in-store pickup is also convenient and efficient (Guo et al., 2023, 23 - 52).

Unity in channels is a major factor that determines satisfaction. The customers demand the same price, good visibility of inventory and quality services irrespective of the channel employed. Inability to ensure such consistency may result in bad experiences and dissatisfactions.

Nevertheless, there are operational issues such as the necessity of coordinated inventory systems and service delivery when implementing omnichannel systems. In case such systems do not work properly, they can lead to inconsistencies in services and decreased satisfaction.

In the Expectancy-Disconfirmation model, smooth and consistent omnichannel experiences beyond the expectations of customers result in positive disconfirmation and increased satisfaction. Accordingly:

H3: Omnichannel retailing positively impacts on customer satisfaction.

2.4.4 Data Privacy and Security and Customer Satisfaction

The privacy and security of data have emerged as important factors of customer satisfaction in online stores. Customers have to provide their personal and financial data online, so they have to trust the data handling practices (Bleier et al., 2020, 473; Choi et al., 2018, 46).

Studies have revealed that effective data security and open privacy policies contribute greatly to customer satisfaction. By effectively communicating its data collection, storage, and usage, customers will be more inclined to trust and interact with retailers (As & Martinez, 2023, 6). On the other hand, information breaches and misuse may have the most devastating effect on the trust of customers and dissatisfaction (Mishra, 2024, 5).

The personalization-privacy paradox is one of the main issues in the sphere as customers want to receive personalized services but are also worried about the privacy of their data (Cloarec, 2020, 11). This contradiction demands the retailers to strike a balance between the gains of personalization and strong privacy.

Best practices in data privacy are transparency, compliance with regulations, secure data management system, and customer control over their data. These practices when they match or even surpass the customer expectations add to satisfaction.

Through Expectancy-Disconfirmation Theory, customers need to feel that their data is being managed in a secure and responsible manner, and in this case, positive disconfirmation will happen and result in the increased satisfaction. Accordingly:

H4: Data privacy and security positively impact on customer satisfaction.

2.4.5 Summary of Hypotheses

According to the literature and theoretical background, the research hypothesizes the following:

- H1: Digital payment systems positively impact the customer satisfaction.
- H2: AI-driven personalization positively impacts on the customer satisfaction.
- H3: Omnichannel retailing positively impacts on customer satisfaction.
- H4: Data privacy and security positively impact on customer satisfaction.

All these hypotheses make up the foundation of investigating the effects of digital transformation elements on customer satisfaction.

3 METHODOLOGY

3.1 Research Philosophy and Approach

This research took the positivist research philosophy, which states that there is an objective reality that is not dependent on the beliefs of researchers and that scientific knowledge can be identified by means of empirical observation and measurement. Positivism focuses on quantifiable data, statistical analysis and objective analysis of phenomena. In this philosophy, the researcher is not affiliated with the research subjects and this means that data collection will be done without subjectivity (Ali, 2024, 188).

This study is especially appropriate when it comes to the positivist approach since the researcher examines the correlations between factors of digital transformation and customer satisfaction. The aspects of digital transformation, including the trustworthiness of online payment systems, the topicality of personalization, the efficiency of omnichannel services, and the safety of information are measurable with the help of survey tools. Customer satisfaction is also a measurable construct and interrelationships between variables can be statistically analyzed. To demonstrate the impact of these elements on satisfaction, it is possible to collection of standardized measurements of several respondents and provide an objective assessment.

The research design used was deductive, which began with the general Expectancy-Disconfirmation Theory and constructed hypotheses to be tested empirically. Having this theory, four hypotheses were developed in order to investigate the interactions between components of digital transformation and customer satisfaction. These hypotheses were tested using empirical data obtained through retail customers in Dubai. Deductive reasoning is the movement through theory to observation unlike inductive approaches, which start with observation to form theory. The study is a deductive study since it commences with a theory and formulates hypotheses, which are then evaluated using the gathered data.

The research objectives are consistent with the positivist philosophy and deductive approach. The research was designed to quantify relationships between specified variables, with the effect of digital transformation elements on customer satisfaction in the spotlight. These four hypotheses are directional relationships, which can be tested using quantitative analysis.

The positivist approach enabled the research to consider the Dubai retail market as an objective reality that has quantifiable features. The implementation of standardized ratings of satisfaction allowed analysing respondents in comparison and statistically identifying whether the elements of digital transformation have a significant impact on satisfaction. Although an interpretivist method might have yielded the desired information of the subjective perceptions of the customers by conducting interviews, it would not have allowed testing the hypotheses in this research statistically.

3.2 Research Strategy

The research strategy that was used in this study was a survey to gather quantitative data regarding customer perceptions towards the factors of digital transformation and their satisfaction with digital retail services. Surveys can be identified as a powerful tool of collecting standardized data about large groups of people, which can be statistically analyzed to reveal the relationships among the variables (Saunders et al., 2019, 11). The survey method was suitable in the current study since it made it possible to measure subjective constructs, including the convenience of digital payment systems, the relevance of AI-enhanced personalization, and seamlessness of omnichannel services and confidence in data privacy, using structured and quantifiable responses.

A cross-sectional design was implemented where data was gathered at one point in time as opposed to gathering data across more than one period. This design helped to collect the data efficiently given the limited resources of the study and to evaluate the level of current customer satisfaction of Dubai retail customers on digital retail service. This is especially well applied in the cross-sectional approach which is used to examine the relationship among the variables in a given market situation at a point in time.

The individual retail customer was the unit of analysis in this study. Every survey respondent was a unit of analysis, and he or she gave an insight into his or her perception of the elements of digital transformation and their general satisfaction. The sample size was sufficient and the minimum sample size required by utilizing power analysis to accomplish multiple regression with four independent variables was 384 valid responses.

The survey tool was administered in a dual channel method, which involved both the online and face-to-face data collection methods. Online distribution was done through social media platforms and web-based survey tools to target digitally engaged consumers and field-based distribution was done by approaching customers at high-traffic retail outlets in Dubai. This mix was followed to make sure that the different demographic and behavioural profiles such as age, nationality, education, and shopping habits were represented.

A pilot test was done before full deployment involving 30 participants to test the understanding and clarity of the questionnaire. The pilot identified some slight ambiguities in wording, which were eliminated so that all the items were clearly understood by the respondents. The questionnaire was expected to take about 8-10 minutes to complete, which was very low burden to the subjects.

The questionnaire tool had five sections, including demographic data, digital payment options, AI-driven personalization, omnichannel retailing, and data privacy and security, and the answers were provided on a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). This design allowed measurement of each construct with reliability and also allowed quantitative comparison of respondents.

There were ethical considerations that were made during data collection. The informed consent of the participants was obtained before they filled out the survey, they were assured of anonymity, and advised on the voluntary nature of the participation. No personal identifiers were collected and data were safely kept in encrypted files that would only be accessed by the research team. The Personal Data Protection Law of the United Arab Emirates was followed in all the procedures and guaranteed confidentiality and proper processing of the information of the participants.

3.3 Data Collection

The target population was retail customers in Dubai, the United Arab Emirates aged 18 years and above that had attempted retail shopping (online or in-store) within six months before the study. This population definition comprised of the local Arab population, expatriates, and international tourists that make frequent purchases in the retail industry in Dubai. The target population was chosen due to the fact that these customers have first-hand experience with the retail landscape, as well as the digitalization programs in Dubai.

The sampling frame consisted of retail clients in Dubai, whose distribution was done through online and in-store channels. Online sampling used online shopping platforms and social media, where customers of Dubai use social media frequently. In-store sampling reached the customers in shopping centers and retail establishments in Dubai who represent different retail segments, such as luxury retailers and mass-market retailers.

The method used in this study was convenience sampling, where the retail customers were recruited based on the available tools such as online and position in the shopping centers. The reason is that convenience sampling was chosen due to the ease of data by collecting the respondents that were easily available and responsive to the inclusion criteria. Although convenience sampling also has drawbacks such as lack of representativeness, the sampling method was feasible to this exploratory research which focused on the relationship between variables in a given market scenario.

The information used to calculate the size was based on the needs of the multiple regression analysis. On the basis of power analysis and medium effect size, the power analysis required a minimum of 384 respondents to test 4 independent variables that predicted customer satisfaction (assuming the appropriate power). In this study, 384 survey responses were obtained with completion.

The questionnaire had five major sections as detailed in Appendix 1 Survey Questionnaire. Section 1 contained demographic data such as age, gender, education level, occupation and frequency of shopping. Section 2 evaluated the perceptions of the digital payment system based on the 5-point Likert scale. The perceptions of AI-driven personalization were measured similarly in Section 3. Section 4 evaluated joint experiences of omnichannel retailing. Section 5 captured the perceptions of data privacy and security. Another section was the general satisfaction of the customer with digital retail services.

The questions in the questionnaire were on 5-point scales using a Likert-scale system in which the respondents were asked to give their level of agreement with the statements provided (1 = Strongly Disagree to 5 = Strongly Agree). This scaled out the system, which helped in quantitative analysis and comparison between respondents. Each construct (digital payment systems, AI personalization, omnichannel retailing, data privacy) was measured by a variety of items in order to measure several variables reliably.

Before full distribution of the surveys to the retail customers, a pilot test was done with 30 customers. A pilot test was done to test the clarity of the questionnaire; ambiguous items were found, and the time to take the questionnaire was estimated (around 8-10 minutes). Three wording changes were done based on pilot feedback prior to complete data collection. First, the AI personalization item that was originally phrased as 'Personal sales improve my shopping experience' was unclear and was changed to 'Personalized product recommendations improve my shopping experience. ' Second, the omnichannel item 'online platforms and physical stores can easily replace other to me' was reformulated as 'I can seamlessly switch between online and physical stores during my shopping journey' to better represent channel integration behavior. Third, the data privacy statement, 'my belief in online resources is influenced by privacy issues' was changed to 'Privacy concerns affect my trust in online retailers' to minimize ambiguity in the construct direction. These modifications enhanced the clarity of items without any change in the constructs under measurement.

The survey used a dual-channel distribution approach to make sure the sample representation was diverse. Online distribution made use of social media platforms and web-based survey tools with participants recruited through retail-oriented digital communities. Field-based distribution complemented this approach by in-person recruitment in high traffic shopping areas in the retail districts throughout Dubai. Survey administrators approached voluntary participants in publicly accessible shopping locations, inviting individuals who had been involved in retail shopping recently to complete the brief survey. This integrated approach included both digitally-engaged consumers as well as traditional in-store shoppers and took into account both demographic and behavioural diversity reflective of Dubai’s retail customer base.

Before every respondent completed the survey, he or she read an informed consent statement which described the purpose of the research, how the data would be used, and how their confidentiality would be protected, as well as the voluntary nature of participation. Consent was clearly captured in that the respondents affirmed consent before taking the survey. Ethical compliance and response comprehension were achieved through the process of consent.

The data were collected in the course of six weeks in November and December 2025, which allowed addressing 384 surveys. The period was sufficient to attain the target sample size in the online and in-store mediums. It received about 520 customers who were contacted in the channels of distribution. Out of these 384 responses were received, which is a 74 percent response rate. The non-completions were because the customers chose not to participate or answer all items in the survey.

Although more information could have been obtained through in-depth interviews or a focus group, a structured questionnaire was preferred because it enables the collection of a large sample of responses from the participants, allowing statistical hypothesis tests to be performed.

3.4 Operationalization

The concept of customer satisfaction was operationalized as the general assessment of customer satisfaction with digital retail services in Dubai. This measure was determined using 5 items that tested overall satisfaction with digital retail services, ease of use of digital platforms, speed of transactions, quality of customer support, and likelihood of recommending the platform. The respondents showed the same views in the terminals of 5-point Likert scales. A mean score of the five items was formed to give a total satisfaction.

Table 1: Summary table of operationalization

Variable	Indicator	Scale	Source
Customer Satisfaction	I am satisfied with the overall digital retail experience	5-point Likert scale	Fornell et al. (1996, 7)
	The online retail platforms I use are user-friendly	5-point Likert scale	Oliver (1987, 218)
	Online transactions are fast enough to meet my expectations	5-point Likert scale	Reichheld and Sasser (1990, 105)
	Online retailers have effective customer support	5-point Likert scale	Anderson et al. (1997, 129)
	I would recommend my favourite online shopping site	5-point Likert scale	Verhoef et al. (2009, 31)
Digital Payment Systems	Digital payment methods are convenient for online shopping	5-point Likert scale	Chawla and Joshi (2019, 1590)
	I believe in digital payment systems that offer safe transactions	5-point Likert scale	Rachapudi (2022, 228)
	Money transfer is fast and efficient	5-point Likert scale	Kumar and Pardeep (2024, 2869)
	I appreciate the variety of digital payment methods available	5-point Likert scale	Csiszarik-Kocsir and Lentner (2023, 266)
	I trust the accuracy of online payment systems	5-point Likert scale	Rachapudi (2022, 228)
AI-driven Personalisation	Personalised recommendations improve my shopping experience	5-point Likert scale	Bhuiyan (2024, 162)
	My expectations are satisfied with AI-powered customer service	5-point Likert scale	Bhuiyan (2024, 164)
	I believe in AI-powered suggestions in e-commerce	5-point Likert scale	Bhuiyan (2024, 164)

	Forecasting analytics come in handy in decision making	5-point Likert scale	Ajiga et al. (2024, 307)
	I prefer to have control over personalisation features	5-point Likert scale	Smith et al. (2011, 989)
Omnichannel Retailing	I can seamlessly switch between online and physical stores	5-point Likert scale	Hee et al. (2021, 696)
	I receive consistent service quality across channels	5-point Likert scale	Hee et al. (2021, 696)
	Inventory availability is transparent at online platforms	5-point Likert scale	Pantano and Viassone (2015, 106)
	My orders are completed efficiently using combination of channels	5-point Likert scale	Pantano and Viassone (2015, 106)
	Omnichannel makes my shopping experience more convenient	5-point Likert scale	Grewal et al. (2020, 96)
Data Privacy and Security	I understand how online retailers use my personal data	5-point Likert scale	Bleier et al. (2020, 466)
	I am confident my data is securely protected	5-point Likert scale	Choi et al. (2018, 42)
	I trust online retailers to protect my privacy	5-point Likert scale	Bleier et al. (2020, 473)
	I am willing to share personal data for personalised recommendations	5-point Likert scale	Bleier et al. (2020, 473)
	Online retailers maintain good balance between security and usability	5-point Likert scale	Acquisti et al. (2015, 509)

The scale of digital payment systems was measured using 5 questions that will cover perceived convenience, security, ease of use, speed, and dependability of digital payment alternatives. Products measured their attitudes towards the quality of the payment systems.

AI-Driven Personalization was scored using 5 items that measure the perceived relevance of individual recommendations, accuracy of the algorithm, trust in the data use, and satisfaction with the personalized experiences. Items that are captured impart on the perception as well as privacy confidence.

In the case of omnichannel Retailing, 5 items that were evaluated by the perceived seamlessness of the channel integration, service consistency across the channels, inventory visibility, convenience of the omnichannel choices, and the quality of the overall integration.

Data Privacy and Security was Measured using 5 items that refer to confidence in data protection, privacy policy transparency, regulation adherence, payment information security, and general data mishandling reliability.

The measurement of all variables was done on a 5-point Likert scale on the basis of a consistent anchoring (1 = Strongly Disagree, 5 = Strongly Agree). There were many items in each variable, which guaranteed a good measurement of each construct as detailed in Appendix 2 Operationalization Table.

3.5 Data Analysis Methods

Data Screening and Cleaning was done for missing responses, duplicate responses, and out-of-range values. The cases having over 10 percent missing data were eliminated. The number of duplicates of the responses was found to be zero. All the rest of the data were verified to be within reasonable limits (1-5 Likert data values).

Descriptive statistics were done on all of the variables, and they included means, standard deviation, and frequency distribution. Such statistics defined the sample and tested distributions of variables, followed by hypothesis testing. Demographic statistics defined the age, nationality, and education of the respondents, and their frequency of shop visits.

In the reliability analysis, the coefficient of Cronbach was determined to assess the scales composed of multiple items, which measured the independent and dependent variables. The level of internal consistency of all the scales was adequate (0.80), meaning that items in each of the scales were measuring the intended construct with high consistency.

Validity Assessment Scientific data on construct validity were measured by checking item-total correlation and exploratory factor analysis to establish whether items were loading correctly on their intended constructs. Anything that proved to correlate well with the corresponding scale totals, and the factor analysis proved that it was expected to look this way.

The hypothesis test was performed by employing a two-stage regression method. In the first stage, simple linear regression was employed to evaluate the independent effect of each of the digital transformation variables on customer satisfaction, while in the second stage, multiple regression was employed to evaluate the combined explanatory power of the four variables taken together. This two-stage method facilitates the comparison of the combined explanatory power of the individual independent variables with the combined explanatory power of the entire conceptual model.

3.5.1 Hypothesis Testing

In correlation analysis, Pearson correlation coefficients were estimated by looking at the associations between all the variables. Correlations were used to ascertain how much the components of digital transformation were related to customer satisfaction, as well as the relationship among components. Multiple linear regression analysis was done to test four hypotheses at the same time. The four digital transformation components were regressed on customer satisfaction, and standardized beta coefficients were produced, which showed the effect of each of the components on customer satisfaction when the other components were held unchanged.

The most important assumptions were verified before the regression analysis. Multicollinearity was assessed using Variance Inflation Factors (VIF). All four predictors returned VIF values between 2.63 and 4.01, well below the widely accepted threshold of 5.0 that indicates problematic multicollinearity (Hair et al., 2019, 46 - 72), confirming that multicollinearity was not a significant concern for the regression analyses. The full collinearity statistics are presented in Appendix 3. Normality of the residual was incorporated with the help of Shapiro-Wilk tests.

IBM SPSS statistics version 27 was used to analyze all the data. SPSS was used to screen, examine the data in descriptive statistics, reliability analysis, correlation analysis and multiple regression analysis.

3.6 Reliability, Validity and Methodological Considerations

3.6.1 Reliability of Measures

The research instruments were assessed to test the reliability of the instruments used to measure the constructs in the research study to determine whether the measurements were consistent among respondents. Cronbach alpha was used to measure internal consistency with a scale of above 0.70 being acceptable (Nunnally & Bernstein, 1994, 12–56). All constructs, including digital payment systems, AI-based personalization, omnichannel retailing, data privacy and security, and customer satisfaction, were assessed using five items on a 5-point Likert scale. The application of more than one item in a construct was useful in capturing the underlying variables in a comprehensive manner and minimizing random measurement error.

The questionnaire was tested on 30 retail customers prior to full distribution in order to measure its clarity and understandability. The pilot results also proved that the questionnaire took 8-10 minutes to complete, and it was not exhausting, which proves the reliability of the data collection processes. Three specific wording changes were also done enhance clarity of the item and to create a similar understanding of the item among all respondents, as detailed in section 3.3.

3.6.2 Validity of Measures

The validity was determined to ensure that the instruments were able to measure the constructs of interest. There was a guarantee of content validity as questionnaire items were based on existing literature (Oliver, 1987, 218; Reichheld and Sasser, 1990, 105; Fornell et al., 1996, 18), whereas construct validity could be maintained through the assessment of the operationalization of all variables in line with the past studies. Convergent validity was also tested in line with the fact that all items in a construct had to correlate positively, and discriminant validity was done by establishing that the correlation between constructs are lower than the correlations within constructs.

Moreover, the online and in-store survey distribution enhanced representativeness and minimized possible bias caused by the use of one type of data collection. Additional ways such as ethical practices, such as informed consent and voluntary participation, also enhanced validity of responses because the respondents were aware of the purpose of the study and data confidentiality provisions.

3.6.3 Threats to Validity and Methodological Limitations

There were a number of methodological limitations that were taken into account in this study. To begin with, convenience sampling can restrict the potential extrapolation of the results to the general population of retail consumers in Dubai. Despite the fact that the dual-channel strategy increased the sample diversity, it is possible that the sample also overrepresents digitally engaged consumers. Second, the cross-sectional design limits causal inference; the associations found between the aspects of digital transformation and customer satisfaction are descriptions of relationships and not causal links.

The other possible limitation is self-reported survey responses that might suffer social desirability bias or subjective perception of the respondents at the time of completion. This weakness was however alleviated by ensuring anonymity of the respondents and giving clear guidelines to help them give honest and unrestricted answers.

Another limitation is associated with demographic data collected. Although this research highlights the diversity of the consumer population in Dubai in terms of its multicultural character as a critical contextual variable, the information on nationality was not incorporated into the survey tool. Consequently, the insights provided into the role of cultural diversity on satisfaction outcomes,

especially the relatively less powerful impact of AI-based personalization, cannot be supported by the sample data and can be seen as the possible hypotheses to be tested in the future, but not as the empirically-based conclusions. The next round of research must include nationality as a demographic variable in order to conduct a rigorous cross-cultural comparison among the consumer population in the city of Dubai.

Irrespective of these limitations, the study had a well-designed study, pilot testing and operationalized constructs to ensure that the data gathered was reliable and valid. Combined discussion of reliability, validity, and methodological issues enhances the trustworthiness of the study to measure the impacts of the elements of digital transformation on customer satisfaction.

3.7 Ethical Considerations

The study facilitated the best ethical principles, such as respect for persons, beneficence, and justice. The respect toward a person was shown in the form of informed consent and voluntary interactions. Beneficence was also upheld by ensuring that no harm was done to the participants and minimization of burden by ensuring that the survey took a reasonable time to be completed. It was conducted without discrimination and treated the participants equally so that justice was served.

Each participant was informed of a statement of informed consent before taking part in the survey. The consent statement had detailed the purpose of the research, data collection process, use of data, protection of confidentiality, and the voluntary nature of the process. Participants clearly stated their consent prior to accessing a survey.

An anonymous survey was used to ensure the anonymity of the respondents. Not a single piece of personal information was received. Questionnaires were provided with identification numbers, with the help of which the data might be tracked without the identification of the respondents. All the data were stored in password-protected files that were available to the research team only.

The data of surveys were put in encrypted files in safe servers. No personal response information was provided to a third party. Data was stored at the end of one year after the research was conducted and safely destroyed. The analysis of the data was based on aggregate outcomes and not on the individual responses because of respondent privacy.

This study adhered to the personal data protection law of United Arab Emirates, which demanded the use of an express consent to collect and process data, open explanation of data usage, and secure storage of data. The process of administering the questionnaires met the PDPL conditions of informed consent and minimization of data (gathering information that was relevant to the research).

4 DATA ANALYSIS AND DISCUSSION

This chapter presents the data analysis and interpretation of the information gathered in this study. The main aim of the chapter is to analyse how the elements of digital transformation affect customer satisfaction within the retailing sector of Dubai. The data applied into the analysis were gathered using a structured questionnaire that was administered to retail customers in Dubai and a total of 384 valid responses were obtained. This sample size confirmed through power analysis as sufficient for multiple regression with four independent variables. The Statistical Package of Social Sciences (SPSS) version 27 was used to analyse the collected data so that their statistical analysis could be accurate and reliable. Prior to analysis, all Likert scale items were recoded to the standard direction (1 = Strongly Disagree, 5 = Strongly Agree) and computed the composite mean scores for each construct using items confirmed through item-total correlation analysis.

This chapter involved the use of a number of statistical methods to examine the data collected. To determine the internal consistency of measurement scales in the questionnaire, reliability analysis was carried out first. Calculation of the Alpha Coefficients of Cronbach was done to establish the reliability of the items used to measure each of the constructs supported by the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity to confirm construct suitability for analysis. Second, demographics analysis has been undertaken to illustrate the nature of the respondents such as age, gender, education level, occupation as well as frequency of online shopping. Third, the key characteristics of the variables in the study were summarized with the help of descriptive statistics complemented by normality testing using the Kolmogorov-Smirnov and Shapiro-Wilk tests for all five composite variables.

In addition, Pearson correlation was done to test the relationship between the independent variables and customer satisfaction. Lastly, a two-stage regression analysis was used to test the hypotheses of the proposed research. Simple linear regression was first applied to evaluate the independent effect of each digital transformation variables on customer satisfaction, followed by multiple regression to assess their combined predictive power simultaneously. This defined how much the digital payment systems, AI-driven personalization, omnichannel retailing, and data privacy and security impact the customer satisfaction in the retail sector of Dubai. Such statistical tests are empirical in answering these research questions as well as testing hypotheses formulated in the previous chapters.

In general, this chapter is a systematic statistical analysis of the data that became the basis of further discussion and conclusions in the next chapter.

4.1 Reliability Analysis

This study applied reliability analysis as the method of measuring the internal consistency of the measurement scales in the given study. Internal consistency is a measure of the similarity of the results of several items that measure the same construct. In this study, the Alpha coefficient of Cronbach has been taken as the main measure of reliability since it is a common principle of measurement in the social science research community.

Cronbach's Alpha of 0.70 and above is usually acceptable, with values above 0.80 indicating good reliability and values above 0.90 reflecting excellent internal consistency (Nunnally & Bernstein, 1994, 265). The constructs that have been analyzed in the study are customer satisfaction, digital payment systems, AI-based personalization, omnichannel retailing and data privacy and security. Each construct was measured using five items on a five-point Likert scale with 1 (strongly disagree) to 5 (strongly agree). Items were selected based on item-total correlation analysis to ensure that each item contributed to its construct meaningfully.

Prior to reliability testing, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity were conducted to confirm the suitability of the data for construct analysis. The overall KMO value was .952, classified as marvellous (Kaiser, 1974 ,35), and Bartlett's test was statistically significant ($\chi^2 = 8501.175$, df = 300, $p < .001$), confirming that the correlation matrix was suitable for further analysis. At the construct level, KMO values ranged from .825 to .895, all within the meritorious range, as presented in Table 2.

Table 2: KMO and Bartlett's Test of Sphericity — Per Construct

Construct	**KMO**	**Bartlett's Sig.**	**Interpretation**
Customer Satisfaction	.825	< .001	Meritorious
Digital Payments Systems	.867	< .001	Meritorious
AI-driven Personalisation	.841	< .001	Meritorious
Omnichannel Retailing	.895	< .001	Meritorious
Data Privacy & Security	.874	< .001	Meritorious
All Constructs (Overall)	**.952**	**< .001**	**Marvelous**

Note: KMO ≥ .80 Meritorious; ≥ .90 Marvelous (Kaiser,1974,35)

All KMO values exceed the minimum acceptable threshold of .60, confirming that the sample is adequate and the data are suitable for factor and reliability analysis.

The outcomes of the reliability test show that all constructs had Cronbach's Alpha value that exceeds the required minimum of 0.70 indicating satisfactory internal consistency. The specific Cronbach's alpha values for all five constructs are presented in Table 3.

Table 3: Reliability Statistics – Cronbach's Alpha by Construct

Construct	**No. of Items**	**Cronbach's α**	**Interpretation**
Customer Satisfaction	5	.895	Good
Digital Payments Systems	5	.919	Excellent
AI-driven Personalisation	5	.884	Good
Omnichannel Retailing	5	.924	Excellent
Data Privacy & Security	5	.891	Good
All Constructs Combined	**25**	**.966**	**Excellent**

Note: α ≥ .70 acceptable; ≥ .80 good; ≥ .90 excellent (Nunnally & Bernstein, 1994, 265)

The specific Cronbach's alpha values were: Customer Satisfaction (α = .895), Digital Payment Systems (α =.919), AI-driven Personalisation (α = .884), Omnichannel Retailing (α = .924), and Data Privacy and Security (α = .891). All values indicate good internal consistency. Digital Payment Systems and Omnichannel Retailing achieved excellent reliability (α > .90), while the remaining three constructs demonstrated good reliability (α > .88). The overall alpha across all 25 items was .966, confirming the coherence of the full measurement instrument. This shows that the measures used to measure the individual variables are reliable and consistent in measuring the intended constructs.

The results of the reliability analysis verify that the data measurement instrument applied in this research is reliable and ready to carry out data analysis. This data set is appropriate to carry out further data analysis techniques such as descriptive analysis, correlation analysis, and regression analysis.

4.2 Demographic Analysis

The demographic analysis was aimed at describing the features of the respondents who took part in this study. Knowledge of the demographic profile of respondents is significant in that it establishes the background features of the sample, as well as gives an appreciation of the population that the study will represent. The demographic variables used in this study were age, gender, educational level, and occupation as well as the frequency of online shopping. Frequency tables and bar charts were used to present the demographic findings. This research involved 384 valid responses.

4.2.1 Age Distribution

The age distribution of the respondents indicated that most of the participants were categorized under the young, and middle-aged categories. The highest percentage of respondents are in the 25-34 age bracket as they constituted 32.6% (n=125) of the total sample. This was then supported with the respondents who were 35-44 years old and they were 30.7 % (n = 118). In combination, the two age groups constituted over half of the total sample, which meant that the study was primarily representative of the views of economically active people who are extremely active in digital technologies and online shopping platforms.

The respondents in the 18-24 age segment made 17.7% (n = 68). This demographic is usually the group of young digital natives highly knowledgeable of modern technologies and digital services. In the meantime, 16.4% (n = 63) of the respondents occupied the age brackets 45-54, and the 55 years and above (n = 10) occupied only 2.6%.

The age distribution is illustrated in Figure 2 and the corresponding frequency distribution is presented in Table 4.

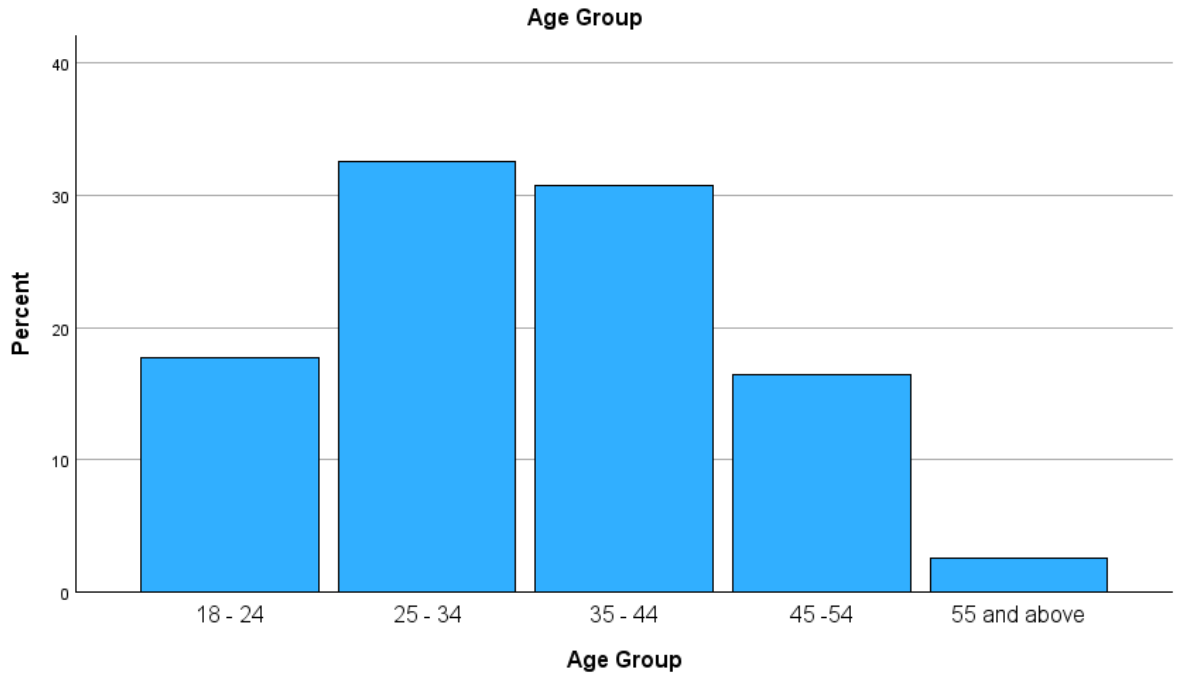

Figure 2: Age Distribution

Table 4: Age Distribution

Age Group

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18 - 24	68	17.7	17.7	17.7
	25 - 34	125	32.6	32.6	50.3
	35 - 44	118	30.7	30.7	81.0
	45 -54	63	16.4	16.4	97.4
	55 and above	10	2.6	2.6	100.0
	Total	384	100.0	100.0	

On the whole, the age structure indicated that the sample consisted of younger and middle-aged generations more inclined to use online retail services, including online shopping services, mobile payment solutions, and customized online services.

4.2.2 Gender Distribution

The distribution of the gender of the respondents showed that the female respondents were the majority of the sample. There were 384 respondents out of which 58.3% (n = 224) were female and

41.7% (n = 160) were male. This finding suggested that the female customers were more engaged in the survey participation.

The fact that more female respondents were represented may also indicate the great presence of women in shopping activities online and offline. The gender distribution is presented in Table 5.

Table 5: Gender Distribution

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	224	58.3	58.3	58.3
	Male	160	41.7	41.7	100.0
	Total	384	100.0	100.0	

Their increased representation in the sample offers useful data on the issue of customer satisfaction in the retail Sphere.

4.2.3 Education Level

The level of education of the respondents showed that the highest proportion of the respondents had a moderate to high education level. The greatest proportion of respondents held Diploma qualification and comprised 46.9% (n = 180) of the sample. It was then followed by the respondents who had a Bachelor's degree at 34.4% (n = 132).

Also, 14.1 percent (n= 54) of the respondents had high school education and 4.7 percent (n=18) held a Master's degree. The relatively high percentage of people who held diploma and bachelor qualifications suggested that the majority of the participants were educated customers who were likely to be conversant with the digital technologies and online stores.

The education level distribution is illustrated in Figure 3 and the corresponding frequencies are presented in Table 6.

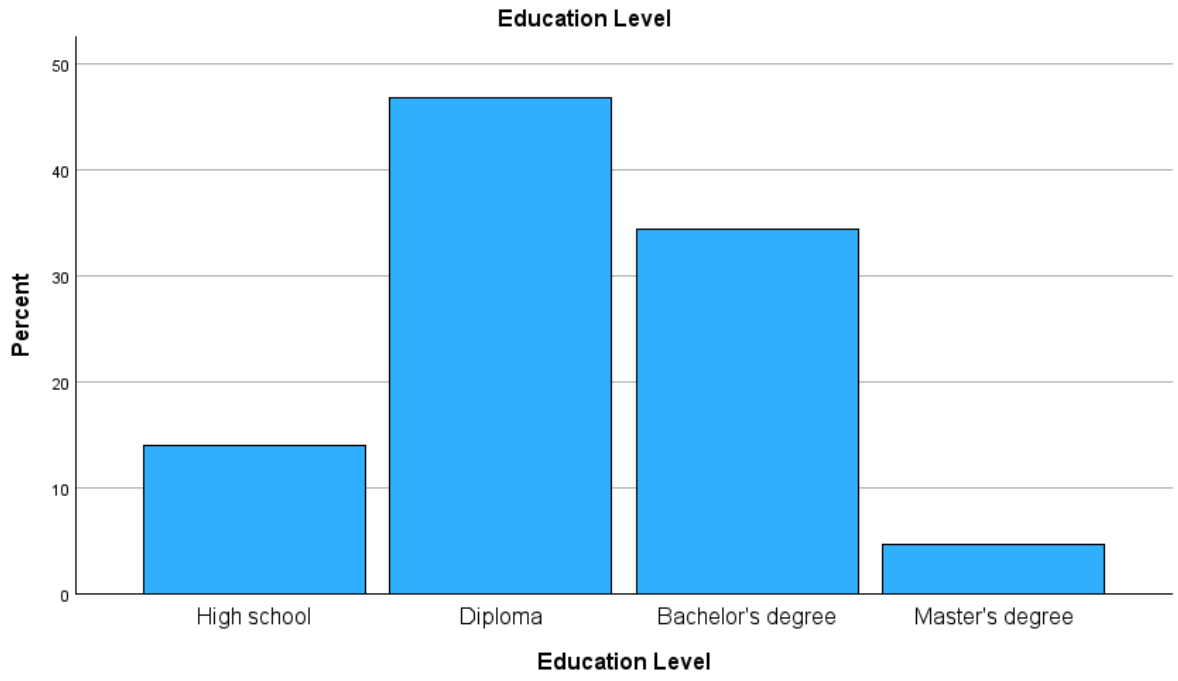

Figure 3 Educational level

Table 6: Educational Level

Education Level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	High school	54	14.1	14.1	14.1
	Diploma	180	46.9	46.9	60.9
	Bachelor's degree	132	34.4	34.4	95.3
	Master's degree	18	4.7	4.7	100.0
	Total	384	100.0	100.0	

The high level of education among consumers could also help to increase awareness about digital payment options, data security, and personalized digital services.

4.2.4 Occupation

The occupation of the respondents was distributed in such a way that most of the respondents were working people. Among all respondents, 68.8% (n=264) indicated that they were employed, and this meant that the majority of the respondents had a stable source of income and purchasing power. Also, 19.5% (n = 75) of the respondents were self-employed and 11.2% (n = 43) were students. The percentage of those who were unemployed were extremely low, 0.5% (n = 2).

The occupation distribution is illustrated in Figure 4 and the corresponding frequencies are presented in Table 7.

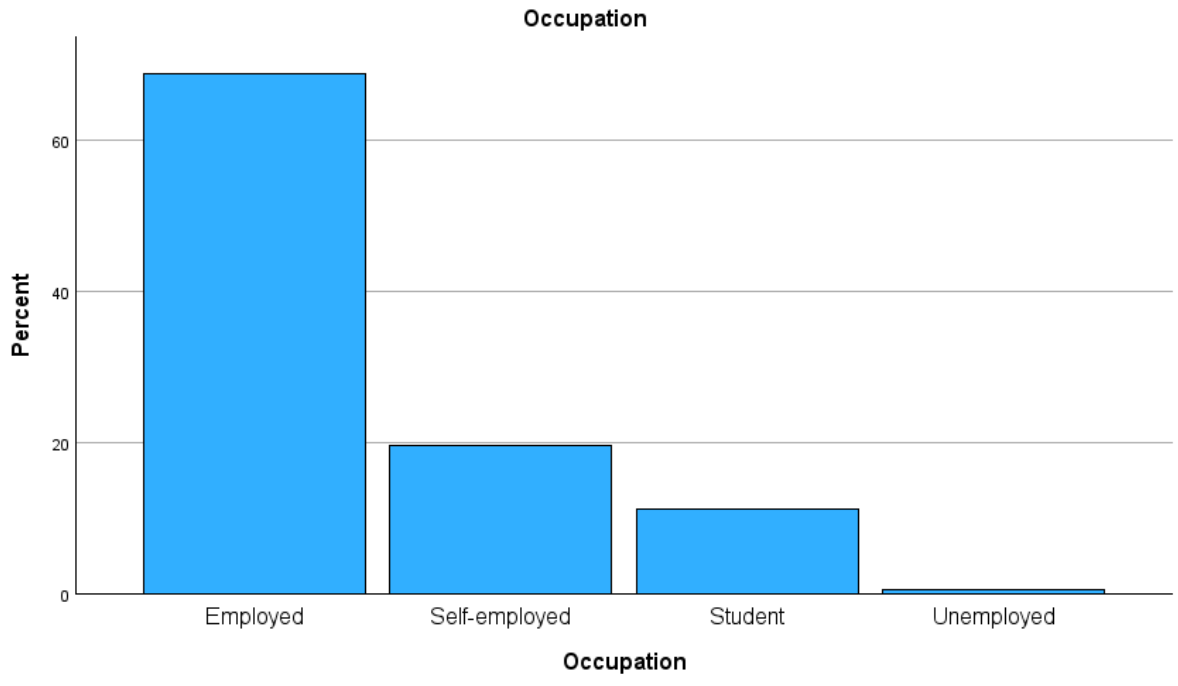

Figure 4 Occupation

Table 7: Occupation

Occupation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Employed	264	68.8	68.8	68.8
	Self-employed	75	19.5	19.5	88.3
	Student	43	11.2	11.2	99.5
	Unemployed	2	.5	.5	100.0
	Total	384	100.0	100.0	

The percentage of respondents who were employed indicated that the sample was active and consisted of consumers who engaged in retail purchases activities regularly. People who were employed and had stable jobs tended to utilize digital retailing services like online shopping platforms, online payment tools, and online channel retail experiences.

4.2.5 Online Shopping Frequency

The findings also indicated how often the respondents did online shopping. The highest percentage of the respondents indicated that they were online shoppers who made purchases at least once a month which was 40.9% (n = 157) of the sample. This was then succeeded by 34.4 percent (n = 132) of the respondents who did online shopping two to three times a month.

On another note, 15.9% (n = 61) of respondents stated that they did online shopping every week whereas 8.6% (n = 33) claimed to shop infrequently online. Only 0.3% (n=1) respondents indicated that they did online shopping daily.

The online shopping frequency distribution is illustrated in Figure 5 and the corresponding frequencies are presented in Table 8.

Figure 5 Frequency of online shopping

Table 8: Frequency of Online Shopping

Online Shopping Frequency

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Rarely	33	8.6	8.6	8.6
	Once a month	157	40.9	40.9	49.5
	2 - 3 times a month	132	34.4	34.4	83.9
	Weekly	61	15.9	15.9	99.7
	Daily	1	.3	.3	100.0
	Total	384	100.0	100.0	

These findings suggested that a majority of respondents were frequent consumers of online retail facilities, however, the majority of the respondents participated in online shopping on a monthly basis and not on a daily basis. This trend was indicative of consumer behavior in most of the retail markets where consumers periodically visit the online platforms to shop goods and services.

4.3 Descriptive Statistics

The key aspects of variables to be used in this study were summarized and described using descriptive statistics. Descriptive analysis provides the summary of central tendency and variability of the data in the form of statistical measures like the mean, the minimum value, the maximum value, and the standard deviation. These statistics were used to understand what the respondents in general thought about the

variables studied in the research, such as customer satisfaction, digital payment systems, AI-driven personalisation, omnichannel retailing and data privacy and security.

The outcome of the descriptive statistics demonstrated that all the variables were measured on a five-point Likert scale with points 1 (Strongly Disagree) to 5 (Strongly Agree). There were 384 valid responses in the analysis, which impliedd that all the responses were present in the analysis and no responses were missing in the dataset.

The descriptive statistics for all five composite variables are presented in Table 9.

Table 9: Descriptive statistics

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Customer Satisfaction	384	1.00	5.00	4.1755	.77394	-1.142	.125	1.903	.248
Digital Payment Systems	384	1.00	5.00	4.1865	.82153	-1.251	.125	1.706	.248
AI-driven Personalisation	384	1.00	5.00	4.1885	.80926	-1.345	.125	2.219	.248
Omnichannel Retailing	384	1.00	5.00	3.9630	.99921	-.826	.125	-.133	.248
Data Privacy & Security	384	1.20	5.00	3.9693	.94297	-.804	.125	-.026	.248
Valid N (listwise)	384								

The findings showed that the average scores of all the variables were in the range of 3.96 to 4.19. The mean of customer satisfaction was 4.1755, which indicated that the overall view of respondents about their satisfaction with digital retail services was positive. The standard deviation (SD = 0.77394) was rather moderate, which suggested that there was a fair degree of consistency in the views of respondents.

Similarly, the mean value of digital payment systems was 4.1865 (SD = 0.82153), which indicated that the respondents agreed a lot on the convenience, efficacy, and security of digital payment systems in retail outlets.

The mean of AI-driven personalization was also high, 4.1885 (SD = 0.80926), which meant that the respondents were likely to be favourable toward personalized recommendations and AI-based services offered by retailers.

The mean value of data privacy and security was slightly lower, 3.9693 (SD = 0.94297), which indicated that, although the respondents seem to held a positive view of data protection practices on average, there was a relatively larger difference in their viewpoints.

Lastly, omnichannel retailing had the lowest mean of 3.9630. Although this was still a fairly positive perception, a larger standard deviation (SD = .99921) showed that respondents had a wider range of experiences and views on the integration of online and offline retail channels.

The skewness and Kurtosis values reported in the Table 7 provide further insights about the distribution of responses. Skewness values ranged from -1.345 to -0.804 across all five constructs, indicating a slight negative skew which interprets responses clustered toward the Agree and Strongly Agree end of the scale, consistent with the high mean values reported. Kurtosis values ranged from -0.133 to 2.219, all within the acceptable thresholds of ±2 for skewness and ±7 for kurtosis (Hair et al., 2019, 46 - 72), confirming that the distributions were not severely non-normal.

The Kolmogorov-Smirnov and Shapiro-Wilk tests were conducted to formally assess normality for all five composite variables and the results of which are presented in Table 10.

Table 10: Tests of Normality

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Customer Satisfaction	.143	384	<.001	.872	384	<.001
Digital Payment Systems	.161	384	<.001	.859	384	<.001
AI-driven Personalisation	.168	384	<.001	.857	384	<.001
Omnichannel Retailing	.150	384	<.001	.888	384	<.001
Data Privacy & Security	.137	384	<.001	.899	384	<.001

a. Lilliefors Significance Correction

All variables returned statistically significant results ($p < .001$), formally indicating departure from normality. However, this outcome is expected in large samples where both tests become highly sensitive to minor deviations. Also, with N = 384, the Central Limit Theorem ensures that the sampling distributions of regression coefficients approximate normality, making the regression results robust and valid.

In general, the descriptive statistics indicated that respondents were positively oriented in all aspects of digital transformation that were considered in this study. Overall, this demonstrated positive customer perceptions toward digital transformation elements in the Dubai retail sector.

4.4 Correlation Analysis

In this study, correlation analysis was done in order to determine the strength and direction of the relationships of the independent variables on the dependent variable. The level of customer satisfaction and the four elements of digital transformation, namely digital payment system, AI-based personalization, omnichannel retailing, and data privacy and security, was measured using Pearson correlation coefficient. Pearson correlation coefficient has a value of -1 to +1, where closer to +1, the relationship is so positive, closer to -1, the relationship is so negative, and closer to zero, the relationship is non-existent. Moreover, the significance level of 0.001 ($p < .001$) was used in the determination of the statistical significance of the relationships.

The correlation analysis results indicated that customer satisfaction was positively and statistically significantly related to all independent variables. It was an indication that the greater the enhancement of the aspects of digital transformation, the greater the customer satisfaction within the retailing sector. Table 11 presents the Pearson correlation matrix for all variables.

Table 11: Pearson correlation matrix

Pearson Correlation Matrix					
	1	2	3	4	5
1. Customer Satisfaction	-				
2. Digital Payment Systems	.695***	-			
3. AI-driven Personalisation	.683***	.770***	-		
4. Omnichannel Retailing	.774***	.637***	.667***	-	
5. Data Privacy & Security	.734***	.594***	.655***	.848***	-

Note. N = 384. *** Correlation is significant at the $p < .001$ level (2-tailed)

The correlation between the privacy and security of data and customer satisfaction was r = .734 and represented the strong positive correlated relationship. This finding implies that the personal data of customers is perceived to be well secured by the retailers, and their privacy is transparent, which leads to higher customer satisfaction with digital retail services.

On the same note, the relationship between omnichannel retailing and customer satisfaction was

r = .774 which was the strongest of all variables. This suggested that a smooth customer experience with online and offline retail channels was a crucial factor in the increase of customer satisfaction. The customers were more satisfied with the whole shopping experience when they were able to make easy transitions between the digital platforms and physical stores.

Correlation between personalization based on AI and customer satisfaction was r = .683, which was also a strong positive correlation. This implicated the idea that individualized suggestions, artificial intelligence in customer services, and customized shopping experiences had a positive effect on customer satisfaction within the retail setting.

Moreover, the digital payment systems were positively correlated with the customer satisfaction with the coefficient of r = .695. Such an outcome showed that safe, comfortable, and effective online payment systems played a major role in enhancing customer satisfaction.

Moreover, significant positive correlations between the independent variables were also found in the results. Indicatively, data privacy and security and omnichannel retailing indicated a very strong correlation (r = .848), and digital payment systems and AI-driven personalisation also produced a notable correlation (r = .770). These positive correlations among independent variables are discussed further in section 4.5 in related to multicollinearity.

The correlation analysis, in general, supported the idea that all the aspects of digital transformation that are considered in this study had a strong connection with customer satisfaction. The results of these studies supported the hypotheses proposed in advance and provided sufficient reasons to consider regression analysis to investigate the cause effect relations between these variables.

4.5 Regression Analysis

It should be mentioned before discussing the regression results that the correlation analysis (Section 4.4) showed that there were high inter-predictor correlations, especially between omnichannel retailing and data privacy and security (r = .848) and between AI-driven personalization and digital payment systems (r = .770). These values are close to or beyond the generally accepted mark of r = .70 in the case of possible multicollinearity issues (Hair et al., 2019, 46 -72). Although the VIF analysis indicated that multicollinearity thresholds were not exceeded in any of the four predictors (VIF range: 2.63 to 4.01), the readers should interpret the single beta coefficients of the multiple regression model with due caution. The presence of high inter-predictor correlations can influence some of the coefficient stability and relative ranking of predictors, especially when one variable shares a significant portion of explanatory variance with other variables. Regression analysis was done to test the research hypotheses as well as to explore the effect of the independent variables on customer satisfaction. The regression analysis permitted establishing the strength and direction of the relationship between the variables and assessed the predictive capability of the independent variables on the dependent variable. This was conducted by

simple linear regression analysis to test the hypotheses individually and multiple regression analysis was applied afterwards to determine the overall effect of all the independent variables on customer satisfaction.

4.5.1 H1: Digital Payment Systems and Customer Satisfaction

The initial hypothesis of the research was that digital payment systems play an important role in influencing customer satisfaction. The regression model suggests that the model is statistically significant.

Table 12: Model summary for H1

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.695[a]	.483	.482	.5572312

a. Predictors: (Constant), Digital Payment Systems

As presented in Table 12, the model summary indicated that R = .695 hence a strong positive correlation between digital payment systems and customer satisfaction. The digital payment systems accounted for 48.3 percent of variance in customer satisfaction, indicating that the R^2 value is .483.

The overall model fit was further examined through ANOVA, as presented in Table 13.

Table 13: ANOVA test results related to H1

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	110.796	1	110.796	356.825	<.001[b]
	Residual	118.614	382	.311		
	Total	229.410	383			

a. Dependent Variable: Customer Satisfaction

b. Predictors: (Constant), Digital Payment Systems

As shown in Table 13, the results of the ANOVA also verify the importance of the model since the F-value was 356.825 and $p < .001$, which was lower than the acceptable level, $p < .05$. This showed that the regression model was statistically significant and it could be used in predicting customer satisfaction.

The regression coefficients are presented in Table 14.

Table 14: Coefficients related to H1

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	1.435	.148		9.703	<.001	1.144	1.725
	Digital Payment Systems	.655	.035	.695	18.890	<.001	.587	.723

a. Dependent Variable: Customer Satisfaction

The obtained coefficient values presented in Table 14 indicated that the coefficient (B) value of digital payment systems was B = .655, and the standardized beta was β =.695. Moreover, the t-value was 18.890 with the significance of $p < .001$, which meant that the impact of digital payment systems on customer satisfaction was statistically significant and positive. This study concluded that the retail industry could achieve better customer satisfaction in cases where the convenience, security and reliability of the online payment methods were increased.

Thus, Hypothesis H1 was accepted and it was proved that digital payment systems affect customer satisfaction to a great extent ($\beta = .695$, $p < .001$). The discovery had a specific implication within the retail setting of Dubai, where the Dubai Cashless Initiative 2022 initiated by the government had propelled the uptake of digital payments among the populace, increasing consumer demands of smooth, trustworthy, and secure online transactions (Alzaabi, 2023, 88). Reflecting on EDT's prediction, when such high expectations, shaped by Dubai's government- led cashless infrastructure, were repeatedly exceeded, the resulting positive disconfirmation produced greater satisfaction – a dynamic supported by the high $R^2 = .483$ of this study.

4.5.2 H2: AI-Driven Personalization and Customer Satisfaction

The hypothesis was that personalization implemented by AI has a significant effect on customer satisfaction.

Table 15: Model summary for H2

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.683[a]	.466	.465	.5662388

a. Predictors: (Constant), AI-driven Personalisation

As presented in Table 15, the results of the regression analysis showed that the correlation of AI-driven personalization and the customer satisfaction was strong and positive, R = .683. The AI-driven personalisation accounted for 46.6% of the variance in customer satisfaction, indicating that the R2 value is .466.

The overall model fit was further examined through ANOVA, as presented in Table 16.

Table 16: ANOVA test results related to H2

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	106.931	1	106.931	333.505	<.001[b]
	Residual	122.479	382	.321		
	Total	229.410	383			

a. Dependent Variable: Customer Satisfaction

b. Predictors: (Constant), AI-driven Personalisation

As presented in Table 16, the ANOVA results confirmed the model was statistically significant with a F-value of 333.505 and $p < .001$, which was lower than the acceptable level, $p < .05$. This showed that the regression model was statistically significant and it could be used in predicting customer satisfaction.

The regression coefficients are presented in Table 17.

Table 17: Coefficients related to H2

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	1.441	.153		9.446	<.001	1.141	1.741
	AI-driven Personalisation	.653	.036	.683	18.262	<.001	.583	.723

a. Dependent Variable: Customer Satisfaction

The results of the coefficients presented in Table 17 showed that the unstandardized coefficient was B = .653, whereas the standardized beta coefficient was $\beta = .683$. Moreover, the t-value was 18.262 with a significance of $p < .001$, which proved the validity of the hypothesis that the personalization based on AI had a significant positive impact on customer satisfaction. This suggested that personalized recommendations, AI-driven services, and customized customer experiences played a major role in enhancing customer satisfaction within the digital retail setup.

Thus, Hypothesis H2 was accepted, which meant that AI-based personalization had a considerable impact on customer satisfaction. This was important for Dubai with a consumer population from multiple countries and cultures. The relatively lower $R^2 = .466$ and the resultant drop in the beta of AI personalisation in the multiple regression model (from $\beta = .683$ to $\beta = .107$) implied that personalisation systems that were designed for a relatively homogenous consumer market might not offer similar recommendations to consumers with varied cultures and languages, thereby weakening the expected satisfaction effect that literature reports (Bhuiyan, 2024, 164; Karami et al., 2024, 1035–1084).

4.5.3 H3: Omnichannel Retailing and Customer Satisfaction

The third hypothesis was that omnichannel retailing played a significant role in customer satisfaction.

Table 18: Model summary for H3

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.774[a]	.599	.598	.4909255

a. Predictors: (Constant), Omnichannel Retailing

As presented in Table 18, the results of the regression analysis indicated that the omnichannel retailing had the strongest correlation with customer satisfaction among all independent variables. $R = .774$, indicated that there was a strong positive correlation between omnichannel retailing and customer satisfaction. Omnichannel retailing accounted for 59.9% of the variance in customer satisfaction, indicating that the R^2 value is .599.

The overall model fit was further examined through ANOVA, as presented in Table 19.

Table 19: ANOVA test results related to H3

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	137.345	1	137.345	569.877	<.001[b]
	Residual	92.065	382	.241		
	Total	229.410	383			

a. Dependent Variable: Customer Satisfaction

b. Predictors: (Constant), Omnichannel Retailing

As presented in Table 19, the results of the ANOVA proved the significance of the model with F-value of 569.877 and $p < .001$, which was lower than the acceptable level, $p < .05$. This showed that the regression model was statistically significant and it could be used in predicting customer satisfaction.

The regression coefficients are presented in Table 20.

Table 20: Coefficients related to H3

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	1.800	.103		17.549	<.001	1.599	2.002
	Omnichannel Retailing	.599	.025	.774	23.872	<.001	.550	.649

a. Dependent Variable: Customer Satisfaction

The results of the coefficients presented in Table 20 showed that the unstandardized coefficient was $B = .599$, and the standardized beta coefficient was $\beta = .774$. Moreover, the t-value was 23.872 with a significance of $p < .001$, which confirmed that omnichannel retailing had a strong and statistically significant impact on customer satisfaction. This suggested that a smooth incorporation of online platforms, mobile applications, and physical retail stores was important in improving customer experience and satisfaction in the retail sector.

Thus, the hypothesis H3 was supported and the conclusion was that the omnichannel retailing had the strongest predictive effect on customer satisfaction ($\beta = .774$, $p < .001$). Reflecting on EDT's prediction that positive disconfirmation occurs when perceived performance exceeds prior expectations, this finding was particularly relevant in the framework of the hybridized retail setting in Dubai, where customers routinely switched between the high-touch luxury shops and online platforms in one shopping experience. The strongest $R^2 = .599$, as compared to the other four independent variables, implied that the possibility to easily change channels was not just a convenient feature but a core expectation among the digitally literate consumer segment of Dubai, in line with the results obtained by Hee et al. (2021, 696 - 707) but applied in a non-Western and luxury-focused retail setting of the mass segment.

4.5.4 H4: Data Privacy and Security and Customer Satisfaction

The fourth hypothesis was that data privacy and security significantly predicted customer satisfaction.

Table 21: Model summary for H4

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.734[a]	.538	.537	.5264606

a. Predictors: (Constant), Data Privacy & Security

As presented in Table 21, The regression findings confirmed that there was a strong positive relationship between data privacy & security and customer satisfaction. The correlation between the variables was strong, $R = .734$.

Data privacy and security accounted for 53.8% of the variance in customer satisfaction, indicating that the R^2 value is .538.

The overall model fit was further examined through ANOVA, as presented in Table 22.

Table 22: ANOVA test results related to H4

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	123.534	1	123.534	445.714	<.001[b]
	Residual	105.875	382	.277		
	Total	229.410	383			

a. Dependent Variable: Customer Satisfaction

b. Predictors: (Constant), Data Privacy & Security

As shown in Table 22, the results of the ANOVA confirmed that the model was significant with $F = 445.714$ and $p < .001$, which was lower than the acceptable level, $p < .05$. This showed that the regression model was statistically significant and it could be used in predicting customer satisfaction.

The regression coefficients are presented in Table 23.

Table 23: Coefficients related to H4

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	1.785	.116		15.337	<.001	1.556	2.014
	Data Privacy & Security	.602	.029	.734	21.112	<.001	.546	.658

a. Dependent Variable: Customer Satisfaction

The results of the coefficients presented in Table 23 indicated that the unstandardized coefficient was B = .602, and the standardized beta coefficient was β =.734. Moreover, the t = 21.112 with a significance of p < .001, confirmed that customer satisfaction was strongly and statistically significantly influenced by the data privacy and security. This outcome underscored the value of ensuring that customer data was secured and that there were clear data handling practices in the online retailing contexts. Customers who perceived that retailer handled their personal data responsibly were more likely to report higher levels of trust and satisfaction.

Thus, Hypothesis H4 was supported, and data privacy and security significantly predicted customer satisfaction (β =.734, p < .001). The discovery was especially relevant in the UAE regulatory environment. In 2021, the Personal Data Protection Law (PDPL) was introduced and had become one of the strictest data protection systems in the region that had increased consumer awareness about their data rights and had established a competitive environment based on compliance (Alzaabi, 2023, 88). The positive disconfirmation that translated into the strong satisfaction effect was created by retailers who confirmed in practice such regulatory standards, by transparent data policies and secure systems, a dynamic reflected in the R^2 = .538 of this study.

4.5.5 Multiple Regression Analysis

To investigate the overall impact of omnichannel retailing, the digital payment system, AI-based personalization, and data privacy and security on customer satisfaction, a multiple regression analysis was performed.

Table 24: Model summary related to multiple regression

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.827[a]	.684	.681	.4372178

a. Predictors: (Constant), Data Privacy & Security, Digital Payment Systems, AI-driven Personalisation, Omnichannel Retailing

As presented in Table 24, the summary of this model showed that there was a strong overall relationship between the independent variables and customer satisfaction, R = .827. The combination of the four predictors produced a coefficient of determination R^2. = 684, which indicated that the joint effect of the four predictors explained 68.4% of the variation in customer satisfaction. This was an indication of a fairly strong explanatory power of the model.

The overall model fit was further examined through ANOVA, as presented in Table 25.

Table 25: ANOVA test results related to multiple regression

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	156.960	4	39.240	205.274	<.001[b]
	Residual	72.449	379	.191		
	Total	229.410	383			

a. Dependent Variable: Customer Satisfaction

b. Predictors: (Constant), Data Privacy & Security, Digital Payment Systems, AI-driven Personalisation, Omnichannel Retailing

As shown in Table 25, the results of the ANOVA confirmed that the model was statistically significant (F = 205.274 and p < .001), and the independent variables, when taken in combination, had significant predictive power over customer satisfaction.

The regression coefficients are presented in Table 26.

Table 26: Coefficients related to multiple regression

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	.946	.126		7.529	<.001	.699	1.193		
	Digital Payment Systems	.246	.044	.261	5.577	<.001	.159	.332	.381	2.627
	AI-driven Personalisation	.102	.047	.107	2.172	.030	.010	.195	.343	2.916
	Omnichannel Retailing	.289	.045	.373	6.456	<.001	.201	.377	.250	4.006
	Data Privacy & Security	.158	.046	.192	3.438	<.001	.068	.248	.266	3.757

a. Dependent Variable: Customer Satisfaction

As presented in Table 26, The standardized beta coefficients indicated that customer satisfaction was statistically significantly predicted by all four variables. Omnichannel retailing was the most influential among them (β = .373), followed by digital payment systems (β = .261), data privacy and security (β = .192) and AI-driven personalisation (β = .107*).*

Nevertheless, one important observation was that the beta coefficient of AI-based personalization dropped significantly, from β = .683 in the simple regression analysis to β = .107 in the multiple regression model. The significant decrease was an indication of the multicollinearity phenomenon, especially between the AI-driven personalization and digital payment systems (r = .770). When this occurred, the independent variables competed to explain overlapping variance in the dependent variable, and thus each lost some of its ability to predict independently. Consequently, the comparatively small beta of AI-driven personalization could not be viewed as a sign of the low significance of this factor, but rather as a reflection of the similar explanatory capacity it shared with other variables in the model.

Moreover, the existence of high correlations among independent variables, in particular, between omnichannel retailing and data privacy and security (r =.848) supported the occurrence of multicollinearity. This could influence the regression coefficient stability and interpretation. It was also worth mentioning that despite the fact that the combined model explained 68.4% of the variance in customer satisfaction, the omnichannel retailing accounted for 59.9% in the simple regression model. This meant that the further addition of the other three variables represented a relatively modest addition to the overall amount of explanatory power, which again indicated that the other three variables defined overlapping features of the digital transformation. Under these circumstances, it was prudent to take the order of predictors in terms of standardized beta coefficients with caution. In cases of high levels of

correlation, minor changes in the data or model could have a significant impact on the relative importance of the predictors.

In general, though the findings supported the assumption that all four components of digital transformation played a very important role in customer satisfaction, the data also suggested the complexity and interdependence of these variables in the retail environment.

4.6 Interpretation of Results and Theoretical Contributions

4.6.1 Interpretation of Results

The results of the study clearly showed that the four aspects of digital transformation had a significant impact on customer satisfaction, but the relative strength of these influences offered valuable insights into the assessment of the digital retail experience by the customers.

Among the aspects of digital transformation, the study found that omnichannel retailing had the highest impact on customer satisfaction across both simple and multiple regression models. In the simple regression models, data privacy and security ranked second ($R^2 = .538$), followed by digital payment systems ($R^2 = .483$) and AI-driven personalisation ($R^2 = .466$). In the multiple regression model, which accounted for shared variance among predictors, digital payment systems ranked second ($\beta = .261$), data privacy and security third ($\beta = .192$), and AI-driven personalisation fourth ($\beta = .107$). The difference in ordering reflected the high inter-correlations among predictors, and the multiple regression betas were used as the primary basis for conclusions throughout this thesis. The high importance of omnichannel retailing could be attributed to the fact that the retail environment in Dubai was a hybrid model, where luxury retail experiences were offered through brick-and-mortar stores, accompanied by the development of ecommerce platforms, where the customers often transitioned between these channels during the shopping experience. This result directly answered the theoretical gap in Chapter 1 where Wolf & Steul-Fischer (2023, 1610) found that only six of the 127 omnichannel studies analyzed were set in luxury retail settings, and none were dealing with Middle Eastern markets. The present research confirmed empirically that omnichannel integration was not only applicable in efficiency-driven mass-market retail settings, but also, more importantly, it is also determined in the hybrid luxury-mass markets like Dubai, where the anticipation of switching channels is enhanced by the high-touch service culture of the luxury retail, and the high digital literacy of the target consumers (Faccia et al., 2023,1- 29). Interpreted through the lens of the Expectancy-Disconfirmation Theory, this result indicated that Dubai consumers had developed high expectations of channel integration due to being exposed to omnichannel

retailers, that were leaders in their country of origin, and that positive disconfirmation took place when retailers could provide channel integration across the physical and digital touchpoints (Hee et al. 2021, 696).

The results also substantially confirmed the literature on the subject that has been reviewed in Chapter 2 which identified digital payment systems, personalization technologies, omnichannel integration, and data privacy as the main sources of customer satisfaction in the digital retail setting. The fact that data privacy and security were ranked as the second strongest predictor of customer satisfaction was a rather interesting observation which extended further than a simple replication of the global literature. As determined in Chapter 1, the majority of the literature regarding the personalization-privacy paradox was carried out in Western retail settings, in which privacy issues and acceptance of personalization are often at odds with each other (Cloarec, 2020,11). The existing evidence indicated that in the city of Dubai, where the UAE Personal Data Protection Law had made consumers more conscious about their data rights and had established a regulatory framework, where data privacy practices became a key competition factor, data privacy practices were not simply a task to comply with but a direct determinant of satisfaction (Alzaabi, 2023,88). This could be explained by the fact that Jawabri et al. (2025, 60) found that a consumer in the UAE is both more privacy-conscious and open to personalization than one in a less-regulated market, indicating that the PDPL model had created a market dynamic where a transparent data practice created positive disconfirmation and not the neutral effect observed among less regulated markets.

The other notable result in the correlation analysis was the high correlation that was observed between data privacy practices and omnichannel retailing. This could be taken to mean that the customers who were accustomed to multiple channel retailing would also be more aware of how data was used and therefore valued data privacy more than the others. It could also be used to imply that the customers with good experience within an omnichannel retail setting were also those who were at ease with a high level of data utilization and, consequently, for whom data privacy was of high priority. Such kind of relationship could be the structural reality of omnichannel retailing as such, which presupposed data sharing across channels to provide a consistent experience. Stated differently, consumers who were concerned with the integration of omni channels could equally be concerned with the data privacy practices that enabled the integration to be credible. The stated finding had not been commonly addressed in the available literature and could be deemed a market-specific mechanism peculiar to the regulated, multicultural setting of Dubai and has to be explored in the course of the future studies.

One more interesting observation was that, relatively to other constructs, AI-based personalization did not affect customer satisfaction to such an extent. Put differently, the concept of personalization was not as important as it was perceived in the literature. To some extent, this discovery refuted the suppositions of the current literature, in which AI personalization was often mentioned as one of the leading sources of satisfaction in online retailing (Bhuiyan 2024, 164; Karami et al. 2024, 1035–1084). This could be due to the fact that the Dubai consumer base was multicultural, and AI-based recommendation systems that were optimized to suited for homogenous groups of consumers might have generated less pertinent recommendations to a heterogeneous sample size with a multicultural, multinational, and multilingual shopping population. This interpretation was backed up by Akour et al. (2022,14) who pointed out that in the UAE context, expectations of privacy softened consumer reaction to personalization. Nonetheless, it must be mentioned that the nationality data was not measured in this research, and the multicultural factor of the comparatively lower impact of AI-based personalization was thus not an empirically proven conclusion but an intuitive assumption. This relationship could be directly tested by using nationality as a demographic variable in future studies. Moreover, the potentially offered reason was that the sample of this study contained more female than male respondents. In fact, women have been found to be more sensitive to their privacy as regards to personalized marketing. Combined with the factors described above, it could be argued that personalization-satisfaction relationship in Dubai could be more conditional than the rest of the world models indicated, mediated by cultural background, sensitivity to privacy, and the extent to which the systems of AI could explain the diversity of a multicultural consumer base.

It should also be noted that the individual R^2 values reported of each simple regression model, including $R^2 = .466$ for the AI-driven personalisation, $R^2 = .483$ for the digital payment systems, $R^2 = .538$ for data privacy and security and $R^2 = .599$ for the omnichannel retailing, represent the variance in customer satisfaction which was accounted by each variable when none of the other three variables were considered. It should be mentioned that these individual R^2 values could not be added together since the sum will be 2.086 that is larger than 1.0. The reason behind this is that each simple regression model will absorb the same overlap of variance The same shared relations between the four predictors are included in more than one model. The values reflect the explanatory power of each predictor on its own and not on a cumulative basis. A multiple regression analysis, that concurrently included all four variables, generated an overall R^2 of 0.684, or an expression of the combined and non-overlapping explanatory power of the entire model. Such a difference was crucial to proper interpretation of findings and it goes to prove that digital transformation had significant overall effect on the degree of customer satisfaction that none of the components can be explained in isolation.

Demographic characteristics of the sample also gave some ground to interpret the results on the study. It was clear that majority of the respondents were within the 25-44 age group. This was the age group that has been deemed to be the most active across the globe in multichannel shopping. Perhaps, this was the reason why omnichannel retailing was a highly significant predictor of customer satisfaction. Moreover, it may also be that due to the large proportion of respondents who were holding a diploma or a bachelor's degree may have contributed to the high impact of the data privacy practices, since it indicated that the more educated consumers have been more digitally literate and more knowledgeable on their rights to data protection.

In general, the results indicated that digital transformation became a significant aspect of customer satisfaction in the Dubai retail market, and the role of each element of digital transformation differed based on the particular features of the local market context of Dubai, including the availability of developed digital infrastructure and friendly policies towards consumers of other cultures. In a much wider context, the findings presented empirical data that the universal models of digital retail satisfaction could not be transferred equally to the markets with different regulatory systems, multicultural populations, and hybrid combinations of luxury and mass retail organization. The policy-driven digital transformation that had shaped Dubai retail context via the Dubai Cashless Initiative 2022 and the PDPL resulted in a satisfaction architecture that had significant differences with the crisis-driven or competitively driven digital transformation studied within mainstream literature (Redda, 2024, 386; Kraus et al. 2022, 2). These findings could be useful to retailers working in similar markets, in the Gulf region, Southeast Asia, or other policy-participatory digital economies, in balancing their priorities in digital investments.

4.6.2 Theoretical Contributions

This research made a valuable contribution to the current literature on the theme of digital transformation and customer satisfaction in several ways. Firstly, the results could be compared to the main predictions of Expectancy-Disconfirmation Theory (EDT), which states that the satisfaction of customers is achieved through the comparison of expectations and perceived post- consumption performance (Schiebler et al., 2025, 124). It was necessary to take into consideration the fact that this research did not directly test customer expectations and disconfirmation process as independent variables - the survey reflected the perceived performance and general satisfaction. In this sense, the study could not purport to test or to validate EDT in a strict sense. Instead, the positive correlations found between all four dimensions of digital transformation and customer satisfaction were, as expected by EDT: when digital systems were functioning well, high expectation customers more frequently reported satisfaction. Such

a pattern of outcomes contextually supported the applicability of EDT to digitally transformed retail settings, and added to the expanding literature on implementing EDT out of its customary consumer behavior settings (Lemon & Verhoef, 2016, 76-80; Azzahra and Salim, 2025, 1895-1910).

Second, the study expanded the body of literature in omnichannel retailing by offering a piece of evidence in a non-Western and multicultural retailing setting. Prior studies had paid much attention to the developed western markets, where the role of the integrated customer journeys in different channels had been highlighted (Verhoef et al., 2015, 17–76; Hee et al., 2021, 696–707). The current research established that omnichannel retailing played the most significant role in customer satisfaction in Dubai, and it was critical in hybrid-type retailing whereby the customer practiced both online and offline shopping. This observation contributed to the literature by showing that the advantages of omnichannel integration were not specific to Western markets but also played a major role in both emerging and globally differentiated retail environments (Wolf & Steul-Fischer, 2023, 1590).

Third, the research added to the increasing body of research on the topic of digital payments and customer experience. In line with the previous research, the findings indicated that effective and safe payment systems were the ones that contributed to customer satisfaction to a high extent by eliminating friction in transactions and enhancing convenience (Celestin & Sujatha, 2024, 66-73; Kumar and Pardeep, 2024, 2869). In the highly developed retail environment like Dubai where the digital transactions were highly implemented, access to payment systems that were reliable was a determining factor when it came to customer experience.

Moreover, the results showed that data privacy and security were vital in influencing customer satisfaction. This was in line with the existing studies that underscored the importance of customer trust in the digital realm, where the issues of data abuse and data security violations were becoming more pronounced (Martin & Palmatier, 2020, 449; Yadav et al., 2024, 35; Akour et al., 2022, 3-9). The major impact of data privacy and security implied that customers became more content when they believed that their personal data was safe.

Another interesting and, to some extent, unexpected observation of this research was that AI-based personalization, despite being statistically significant, had the least strong relative effect on customer

satisfaction. This differed from some of the earlier studies that focused on personalization as a significant source of customer experience (Bhuiyan, 2024, 16-66; Ifekanandu et al. 2023, 1936; Karami et al., 2024, 1035–1084). The first reason could be that Dubai retail environment customers considered convenience, integration, and security more important than highly personalized experiences. The finding added to the literature as it implied that the relative significance of personalization could differ, depending on the market conditions and degree of digital maturity (Mahhmud et al., 2025, 72–75).

4.7 Summary of Key Findings

This chapter examined how the major aspects of digital transformation affected customer satisfaction in the Dubai retail industry. The survey data consisted of 384 respondents and the analysis included reliability analysis, descriptive statistics, correlation analysis, and regression analysis.

The reliability analysis revealed that all the measurement scales in the study were internally consistent where Cronbach alpha values exceeded the acceptable threshold of $\alpha = .70$. This implied that the constructs were reliable for assessment.

The demographics indicated that most of the respondents were aged 25 to 44, mostly employed, and held a diploma or bachelor's degree. These traits also indicated that the sample was mostly comprised of active consumers familiar with online shopping platforms and digital technologies.

The descriptive statistics showed that all variable means fell between 3.96 and 4.19, placing all constructs firmly in the Agree range and substantially above the neutral midpoint of 3.0. This indicated that respondents held consistently strong and positive views of digital transformation across all four dimensions. Omnichannel retailing showed the greatest response variability (SD = .999), reflecting more diverse experiences with channel integration, while AI-driven personalisation and digital payment systems showed the lowest variability among independent variables (SD = .809 and SD= .822 respectively).

The analysis of correlation showed that customer satisfaction was positively and significantly correlated with all the independent variables, including digital payment systems, AI-driven personalization, omnichannel retailing, and data privacy and security. Nevertheless, there were also high correlations between certain independent variables which were evidence of the possibility of multicollinearity.

The regression analysis also supported the fact that the four variables significantly affected customer satisfaction in a positive manner and that all the hypotheses presented were accepted. omnichannel retailing emerged as the strongest predictor of customer satisfaction among variables in both simple and multiple regression analyses.

Nevertheless, important analytical considerations were also identified by the multiple regression results. The beta coefficient of AI-driven personalization dropped substantially from $\beta = .683$ in simple regression to $\beta = .107$ in the multiple regression model implying that its effect was not independent

but rather overlapped with other variables, especially digital payment systems. Also, the fact that the addition of the three remaining variables to the omnichannel retailing model did not result in a significantly greater explanatory power suggested that these predicters were strongly related to each other and could denote similar dimensions of digital transformation.

In summary, the results showed that digital transformation was a vital factor in defining customer satisfaction within the Dubai retail sector. Concurrently, the findings emphasized the need to interpret the relative impact of individual factors with some care, because of the multicollinearity and overlapping effects between variables.

5 CONCLUSIONS

This chapter presents the conclusions of the study following the findings made after the analysis of the data. The research set out to examine the impacts of digital transformation on customer satisfaction within the retail sector in Dubai with respect to four main aspects namely: omnichannel retailing, digital payment systems, AI-based personalisation, and data privacy and security. This was analyzed by quantitative data obtained on 384 retail customers using a structured questionnaire and statistical methods such as reliability analysis, descriptive statistics, correlation and regression analysis were conducted using SPSS.

Based on the findings, all four dimensions of digital transformation had statistically significant and positive influence on customer satisfaction. The strongest predictor was omnichannel retailing (β = .373), followed by digital payment systems (β = .261), data privacy and security (β = .192), and AI-driven personalization (β = .107). It was also revealed that the overall fit of the regression model (R = .827, R2 =.684) was strong, showing that digital transformation contributed significantly to explaining the changes in customer satisfaction. These set of findings substantiated the fact that, although all these four factors were essential, the relative impact was not equal, and the importance of integration and convenience was stronger than that of personalization.

5.1 Practical Recommendations

Resting on the results of the conducted research, it is possible to offer several practical recommendations to retail organizations that want to increase customer satisfaction in the sphere of digital transformation.

First, retailers need to focus on the formulation of robust omnichannel retail strategies. Omnichannel retailing, according to the analysis, affected customer satisfaction the most (β = .373). This underscores the need to offer a connected and smooth shopping experience on both online customer platforms, mobile applications, and physical stores. Retailers ought to ensure consistency in pricing, stock availability and customer service in all the channels to optimize the total customer experience. Any inconsistency can have a negative impact on customer perceptions and satisfaction in a dynamic retail setting like Dubai, where customers often alternate between digital and physical platforms (Verhoef et al., 2015, 17–76; Hee et al., 2021, 696–707; Wolf & Steul-Fischer, 2023, 1590)

Second, retail organizations should focus on strengthening their data privacy and security policies. The results demonstrated that the customer satisfaction was highly influenced by data privacy and security (β = .192), which indicates that customers value the safety of their personal data. Retailers should invest in the effective cybersecurity systems, introduce clear data policies, and ensure that all the relevant regulations are followed. An open dialogue regarding the collection, storage, and use of customer data

can also be an additional aspect of enhancing trust and confidence and, subsequently, increase satisfaction (Martin & Palmatier, 2020, 449; Yadav et al., 2024, 35-48; Akour et al., 2022, 3-18).

Third, retailers should focus on enhancing the digital payment systems. The findings showed that the digital payment systems had a very strong positive impact on customer satisfaction (β = .261). The retailers must provide numerous safe and convenient payment methods, such as mobile wallets, contactless payments, and online payment gateways. Effective payment systems save time and effort, which helps to make the customer experience smoother and more satisfying (Celestin & Sujatha, 2024, 66-73; Kumar and Pardeep, 2024, 2869).

Lastly, AI-based personalization needs to be applied carefully, although it can improve customer experiences. Personalization had a statistically significant impact (β = 0.107), but its impact was lower than the other factors. This implied that personalization alone might not be enough to motivate customer satisfaction. Furthermore, the lower coefficient may be due to multicollinearity among the variables and thus this result ought to be considered with caution. The relative significance of AI-driven personalization still needs research in the future before definitive strategic recommendations can be made. The retailers are encouraged to prioritize providing meaningful and relevant personalization without breaching customer privacy and excessive use of data (Bhuiyan, 2024, 14-66; Ifekanandu et al. 2023, 1936; Mahhmud et al., 2025,72-75).

5.2 Future Research Directions

Even though this research is valuable, there are several research opportunities that can be explored in the future. To enhance the generalizability of the findings, first, the respondents from regions or countries that were not represent can be enlisted in future research. The comparative analyses of various cultural and economic settings would offer more profound information about the impacts of digital transformation on customer satisfaction in different markets.

Second, a study can be conducted in the future to address other aspects of digital transformation that were not considered in this one, including augmented reality (AR), virtual reality (VR), voice commerce, and social commerce platforms. These new technologies are changing the retail environment at a very high rate and may have significant effect in customer experience.

Third, a longitudinal research design would be applicable in investigating the changes in customer perception of digital transformation over time. This would give a clearer picture of how digital strategy in the long run affects customer satisfaction and loyalty.

Lastly, the research could be done in the future to explore the role of moderating factors including age, digital literacy and cultural background in determining the relationship between digital transformation

and customer satisfaction. Such aspects could affect the perception and reaction of customers to online shopping experiences, which gives a more detailed insight into consumer behavior.

SUMMARY

This thesis examined the effects of digital transformation on customer satisfaction in the Dubai retail sector of the United Arab Emirates. The analysis was driven by the accelerated use of digital technologies in international retail and the increasing significance of customer satisfaction as a key competitive differentiating factor. Although the previous studies had mostly considered Western retail backgrounds, the multicultural nature of Dubai, its high level of digital infrastructure, the luxury retail focus, and the regulatory climate justified localized research.

The study was informed by Expectancy-Disconfirmation Theory according to which customer satisfaction is achieved through the attempt to make a comparison between the expectations and the actual experiences. Within digital retail, the quality of digital systems, the convenience of payment procedures, the personalization of customers through AI, the availability of omni channel integration, and the security of personal information were the qualities that customers were found to expect.

This study examined four main aspects of digital transformation, including digital payment systems, AI-driven personalization, omnichannel retailing, and data privacy and security. Digital payment systems are supposed to simplify the process of transactions; AI personalization is supposed to offer customized recommendations to enhance interactions; omnichannel retailing combines online and offline shopping experiences; and strict data privacy is supposed to earn customer trust.

The quantitative research strategy was used, and it was based on the positivist philosophy and a deductive approach. Structured questionnaires were used to gather primary data on 384 retail customers in Dubai. Relationship and impact were studied using statistical tests such as reliability analysis, descriptive statistics, correlation analysis, and regression analysis.

The descriptive analysis confirmed that respondents expressed strong positive agreement across all four digital transformation dimensions, with corrected mean scores ranging from

3.96 to 4.19 on the standard 1 (Strongly Disagree) to 5 (Strongly Agree) scale — all well above the neutral midpoint of 3.0. AI-driven personalisation (M = 4.19) and digital payment systems (M = 4.19) attracted the strongest positive ratings, while omnichannel retailing (M = 3.96) recorded the highest variability (SD = 1.00), suggesting more diverse experiences of channel integration across the sample. These results confirmed that Dubai retail consumers viewed digital transformation positively overall, which is consistent with Dubai's advanced digital infrastructure and the high digital literacy of the sample.

The regression analysis confirmed that all four hypotheses were supported. Omnichannel retailing emerged as the strongest predictor of customer satisfaction (β = .373), followed by digital payment

systems (β = .261), data privacy and security (β = .192), and AI-driven personalisation (β = .107). The overall model demonstrated strong explanatory power (R2 = .684), indicating that the four dimensions of digital transformation collectively explained 68.4% of the variance in customer satisfaction. Notably, the beta coefficient of AI-driven personalisation dropped from β = .683 in simple regression to β = .107 in the multiple regression model, reflecting the presence of multicollinearity among the predictors and suggesting that its effect on satisfaction overlapped considerably among other variables.

The cultural and regulatory considerations were also observed to play a role, and the customers were found to be conscious of data privacy concerns and valued the open reporting of protection policies. The fact that Dubai is a multicultural city supports the significance of the availability of an omnichannel strategy to meet the expectations of various customers.

The research made valuable contributions to theory and practice. From the theoretical perspective, it offered findings consistent with Expectancy-Disconfirmation Theory predictions in the context of digital transformation in a multicultural retail sector that exists in a highly technological environment. In practice, it offered advice to retailers in Dubai, including the necessity of safe digital payment solutions, clear data privacy policies, successful AI personalization, and unified omnichannel services to enhance customer satisfaction. Limitations included the survey-based methodology and the coverage of one geographical setting. Further studies are proposed in the future to examine other variables or influence, to study other Middle Eastern retail markets, and to use qualitative research that will allow to understand customer experiences in digitally transformed retail settings better.

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Appendices

Appendix 1 Survey Questionnaire

Section A: Demographic Information

(Please select the most appropriate response)

1. Age:
   - 18 – 24
   - 25 – 34
   - 35 – 44
   - 45 – 54
   - 55 and above
2. Gender:
   - Male
   - Female
3. Education level:
   - High school
   - Diploma
   - Bachelor's Degree
   - Master's Degree or Higher
4. Occupation:
   - Student
   - Employed
   - Self-employed
   - Unemployed

5.How frequency do you shop online?

   - Rarely
   - Once a month
   - 2 – 3 times a month
   - Weekly
   - Daily

Section B: Digital Retail Experience

(Please indicate your level of agreement with the following statements using a **5-point Likert scale:** 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree.)

	1	2	3	4	5
Customer satisfaction					
1. I am satisfied with the overall digital retail experience					
2. The online retail platforms I use are user-friendly					
3. Online transactions are fast enough to meet my expectations					
4. Online retailers have effective customer support					
5. I would recommend my favourite online shopping site					
Digital Payment Systems					

6. Digital payment methods are convenient for online shopping					
7. I believe in digital payment systems that offer safe transactions					
8. Money transfer is fast and efficient					
9. I appreciate the variety of digital payment methods available					
10. I trust the accuracy of online payment systems					
AI-driven personalization					
11. Personalised recommendations improve my shopping experience					
12. My expectations are satisfied with AI-powered customer service					
13. I believe in AI-powered suggestions in e-commerce					
14. Forecasting analytics come in handy in decision making					
15. I prefer to have control over personalisation features					
Omnichannel Retailing					
16. I can seamlessly switch between online and physical stores					
17. I receive consistent service quality across channels					
18. Inventory availability is transparent at online platforms					
19. My orders are completed efficiently using combination of channels					
20. Omnichannel makes my shopping experience more convenient					
Data privacy and security					
21. I understand how online retailers use my personal data					
22. I am confident my data is securely protected					
23. I trust online retailers to protect my privacy					
24. I am willing to share personal data for personalised recommendations					
25. Online retailers maintain good balance between security and usability					

Appendix 2 Operationalization Table

Variable	Indicator	Scale	Source
Customer Satisfaction	I am satisfied with the overall digital retail experience	5-point Likert scale	Fornell et al. (1996, 7)
	The online retail platforms I use are user-friendly	5-point Likert scale	Oliver (1987, 218)
	Online transactions are fast enough to meet my expectations	5-point Likert scale	Reichheld and Sasser (1990, 105)
	Online retailers have effective customer support	5-point Likert scale	Anderson et al. (1997, 129)
	I would recommend my favourite online shopping site	5-point Likert scale	Verhoef et al. (2009, 31)
Digital Payment Systems	Digital payment methods are convenient for online shopping	5-point Likert scale	Chawla and Joshi (2019, 1590)
	I believe in digital payment systems that offer safe transactions	5-point Likert scale	Rachapudi (2022, 228)
	Money transfer is fast and efficient	5-point Likert scale	Kumar and Pardeep (2024, 2869)
	I appreciate the variety of digital payment methods available	5-point Likert scale	Csiszarik-Kocsir and Lentner (2023, 266)
	I trust the accuracy of online payment systems	5-point Likert scale	Rachapudi (2022, 228)
AI-driven Personalisation	Personalised recommendations improve my shopping experience	5-point Likert scale	Bhuiyan (2024, 162)
	My expectations are satisfied with AI-powered customer service	5-point Likert scale	Bhuiyan (2024, 164)
	I believe in AI-powered suggestions in e-commerce	5-point Likert scale	Bhuiyan (2024, 164)

	Forecasting analytics come in handy in decision making	5-point Likert scale	Ajiga et al. (2024, 307)
	I prefer to have control over personalisation features	5-point Likert scale	Smith et al. (2011, 989)
Omnichannel Retailing	I can seamlessly switch between online and physical stores	5-point Likert scale	Hee et al. (2021, 696)
	I receive consistent service quality across channels	5-point Likert scale	Hee et al. (2021, 696)
	Inventory availability is transparent at online platforms	5-point Likert scale	Pantano and Viassone (2015, 106)
	My orders are completed efficiently using combination of channels	5-point Likert scale	Pantano and Viassone (2015, 106)
	Omnichannel makes my shopping experience more convenient	5-point Likert scale	Grewal et al. (2020, 96)
Data Privacy and Security	I understand how online retailers use my personal data	5-point Likert scale	Bleier et al. (2020, 466)
	I am confident my data is securely protected	5-point Likert scale	Choi et al. (2018, 42)
	I trust online retailers to protect my privacy	5-point Likert scale	Bleier et al. (2020, 473)
	I am willing to share personal data for personalised recommendations	5-point Likert scale	Bleier et al. (2020, 473)
	Online retailers maintain good balance between security and usability	5-point Likert scale	Acquisti et al. (2015, 509)

Appendix 3 Collinearity Statistics (VIF Values)

The table below presents the Variance Inflation Factor (VIF) values obtained from the collinearity diagnostics in IBM SPSS Statistics version 27 for the multiple regression model (Table 26). All VIF values fall well below the threshold of 5.0 recommended by Hair et al. (2019, 46 - 72), confirming that multicollinearity was not a significant concern in the model.

Predictor Variable	Tolerance	VIF
Digital Payment Systems	.381	2.627
AI-driven Personalisation	.343	2.916
Omnichannel Retailing	.250	4.006
Data Privacy and Security	.266	3.757

Note: VIF = Variance Inflation Factor. Values above 5.0 indicate problematic multicollinearity (Hair et al., 2019, 46 - 72). All values in this model fall within acceptable range (2.63–4.01), confirming the stability of the regression coefficients reported in Table 26.

Appendix 4 Data management plan

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Research data management plan for students

This document will help you plan how to manage your research data. More detailed instructions for each section are available online in the Research Data Management Guide for Students.

1. Research data

Research data refers to all the material with which the analysis and results of the research can be verified and reproduced. It may be, for example, various measurement results, data from surveys or interviews, recordings or videos, notes, software, source codes, biological samples, text samples, or collection data.

In the table below, list all the research data you use in your research. Note that the data may consist of several different types of data, so please remember to list all the different data types. List both digital and physical research data.

Research data type	Contains personal details/information*	I will gather/produce the data myself	Someone else has gathered/produced the data	Other notes
Survey Responses	No	x		Primary quantitative data collected through online and field-based surveys.
Demographic Data	No	x		Age ranges, gender, educational level, Occupation categories and Shopping Frequency.

* Personal details/information are all information based on which a person can be identified directly or indirectly, for example by connecting a specific piece of data to another, which makes identification possible. For more information about what data is considered personal go to the Office of the Finnish Data Protection Ombudsman's website

2. Processing personal data in research

If your data contains personal details/information, you are obliged to comply with the EU's General Data Protection Regulation (GDPR) and the Finnish Data Protection Act. For data that contains personal details, you must prepare a Data Protection Notice for your research participants and determine who is the controller for the research data.

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I will prepare a Data Protection Notice** and give it to the research participants before collecting data ☒

The controller** for the personal details is the student themself ☒ the university ☐

My data does not contain any personal data ☒

** More information at the university's intranet page, Data Protection Guideline for Thesis Research

3. Permissions and rights related to the use of data

Find out what permissions and rights are involved in the use of the data. Consult your thesis supervisor, if necessary. Describe the use permissions and rights for each data type. You can add more data types to the list, if necessary.

3.1. Self-collected data

You may need separate permissions to use the data you collect or produce, both in research and in publishing the results. If you are archiving your data, remember to ask the research participants for the necessary permissions for archiving and further use of the data. Also, find out if the repository/archive you have selected requires written permissions from the participants.

Necessary permissions and how they are acquired

Data type 1: Survey Responses Permission obtained via informed consent

Data type 2: Demographic Data Covered under General survey Consent

3.2 Data collected by someone else

Do you have the necessary permissions to use the data in your research and to publish the results? Are there copyright or licencing issues involved in the use of the data? Note, for example, that you may need permission to use the images or graphs you have found in publications.

Rights and licences related to the data

Data type 1: Literature Sources Used under academic fair use / educational exceptions

Data type 2: Theoretical Framework Public domain academic theories

(Expectancy-Disconfirmation Theory (Oliver, 1997), SERVQUAL model (Parasuraman et al., 1988) are established theoretical frameworks in public academic domain

Data type 3: Secondary Statistics Publicly Available data

4. Storing the data during the research process

Where will you store your data during the research process?

In the university's network drive ☐
In the university-provided Seafile Cloud Service ☐
Other location, please specify: ☒ Researcher's Personal Password protected computer.

The university's data storage services will take care of data security and backup files automatically. If you choose to store your data somewhere other than in the services provided by the university, please specify how you will ensure data security and file backups. Remember to make sure you know every time where you are saving the edited/modified data.

If you are using a smartphone to record anything, please check in advance where the audio or video will be saved. If you are using commercial cloud services (iCloud, Dropbox, Google Drive, etc.) and your data contains personal data, make sure the information you provide in the Data Protection Notice about data migration matches your device settings. The use of commercial cloud services means the data will be transferred to third countries outside the EU.

5. Documenting the data and metadata

How would you describe your research data so that even an outsider or a person unfamiliar with it will understand what the data is? How would you help yourself recall years later what your data consists of?

5.1 Data documentation

Can you describe what has happened to your research data during the research process? Data documentation is essential when you try to track any changes made to the data.

To document the data, I will use:

A field/research journal ☒
A separate document where I will record the main points of the data, such as changes made, phases of analysis, and significance of variables ☒
A readme file linked to the data that describes the main points of the data ☐
Other, please specify: ☐

5.2 Data arrangement and integrity

How will you keep your data in order and intact, as well as prevent any accidental changes to it?

I will keep the original data files separate from the data I am using in the research process, so that I can always revert back to the original, if need be. ☒

Version control: I will plan before starting the research how I will name the different data versions and I will adhere to the plan consistently. ☒

I recognise the life span of the data from the beginning of the research and am already prepared for situations, where the data can alter unnoticed, for example while recording, transcribing, downloading, or in data conversions from one file format to another, etc. ☐

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5.3 Metadata

Metadata is a description of you research data. Based on metadata someone unfamiliar with your data will understand what it consists of. Metadata should include, among others, the file name, location, file size, and information about the producer of the data. Will you require metadata?

I will save my data into an archive or a repository that will take care of the metadata for me. ☐

I will have to create the metadata myself, because the archive/repository where I am uploading the data requires it. ☐

I will not store my data into a public archive/repository, and therefore I will not need to create any metadata. ☒

6. Data after completing the research

You are responsible for the data even after the research process has ended. Make sure you will handle the data according to the agreements you have made. The university recommends a general retention period of five (5) years, with an exception for medical research data, where the retention period is 15 years. Personal data can only be stored as long as it is necessary. If you have agreed to destroy the data after a set time period, you are responsible for destroying the data, even if you no longer are a student at the university. Likewise, when using the university's online storage services, destroying the data is your responsibility.

What happens to your research data, when the research is completed?

I will store all data for xx years.

I will destroy all data immediately after completion, because:

I will destroy part of the data, but store part of it for 05 years, because: raw survey responses are no longer needed once results are verified and Thesis accepted but cleaned, fully anonymized dataset will be stored in compliance with university research data retention recommendation.

If you will store the data, please identify where: University provided cloud facility

Remember to keep the data management plan updated throughout the research project.

Appendix 5 Explanation of the use of AI

The researcher declares that Artificial Intelligence (AI) tools were used in a minimal, ethical, and transparent manner during the preparation of this study. Their use was limited to supportive tasks such as literature search and language refinement. All core elements of the research—including analysis, interpretation, and conclusions—were conducted independently by the researcher.

The following tools were used:

Google Scholar was used solely to search for and access relevant academic literature. All sources were independently selected, evaluated, and analysed by the researcher.

ChatGPT (OpenAI) was used in a limited capacity to improve clarity of language, refine sentence structure, and organise text. It was not used to generate original research content, theoretical arguments, or analytical findings. All suggestions were critically reviewed, and the researcher maintained full control over the final content.

Grammarly was used only for basic proofreading, including correcting grammar, spelling, and punctuation. All corrections were reviewed and accepted by the researcher.

Examples of tool usage include:

- Google Scholar: Searching for peer-reviewed articles using relevant keywords
- ChatGPT: Improving clarity of sentences and checking grammar
- Grammarly: Correcting spelling and punctuation errors

The use of these tools complies with the ethical standards of academic research and aligns with the University of Turku's guidelines. All intellectual contributions presented in this study are the original work of the researcher.