Impact of AI on Customer Experience in E-commerce in Egypt

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Abstract

In a world shifting from being product centric to become customer centric, customers are at the center of attention for each company since they are the key to any desired success and profitability. The e-commerce industry is exponentially growing with rising number of customers shifting to the online shopping experience as opposed to the physical one, causing challenges for businesses to sustain their competitiveness while addressing the diversified tastes of their increasing customer base. With the change in consumer behavior, offering a unique customer experience tailored according to each customer requirements and needs can be an added value & a main differentiator in a rapidly growing and competitive market in order to retain current consumers as well as attracting new ones. Shoppers moving to the virtual experience are looking for convenience which differs in perspective according to each one and this requires understanding of their decision-making drivers and purchase motivators that varies from one customer to another that entail the need for personalization. Artificial intelligence allows businesses to have deep understanding of clients' requirements providing insights derived from different resources like historical data & customers behavior providing accordingly personalized experiences realizing the desired convenience. This paper can assist businesses to comprehend the impact of AI on the customer experience in e-commerce industry & how it influences the personalization efforts an organization use in its process as well as the convenience with focus on Egypt as a country and for population of age ranging from 15-59 years old.

Keywords: customer experience, personalization, artificial intelligence, e-commerce, convenience

1. Introduction

E-commerce business is growing drastically yet the challenges in the industry are growing as well, there are many touchpoints with the customer including navigating the platform, product selection, making payment & delivering the order, the increasing complexity of the process makes it challenging for companies to retain customer interest throughout the journey & guarantee repurchase, especially with a competitive landscape of numerous companies that are continuously increasing. This is why several companies are looking to differentiate themselves by providing a unique customer experience, yet it is hard to stand out among the crowd & this is where the technology comes in to give the needed boost, the artificial intelligence has changed how business is done & revolutionized the industry, its footprint in the e-commerce business has been remarkable in the last few years.

Using the nine elements model, which is a model that help have deeper understanding of a certain problem through investigating 9 main elements as shown in figure 1 developed by Dr Ashraf Elsafty, 2018, 2019, 2020, 2021, 2022, 2023, thus we shall be able to better inspect, gain insights from all angles to be able to have full understanding of the problem & reach a clear definition.

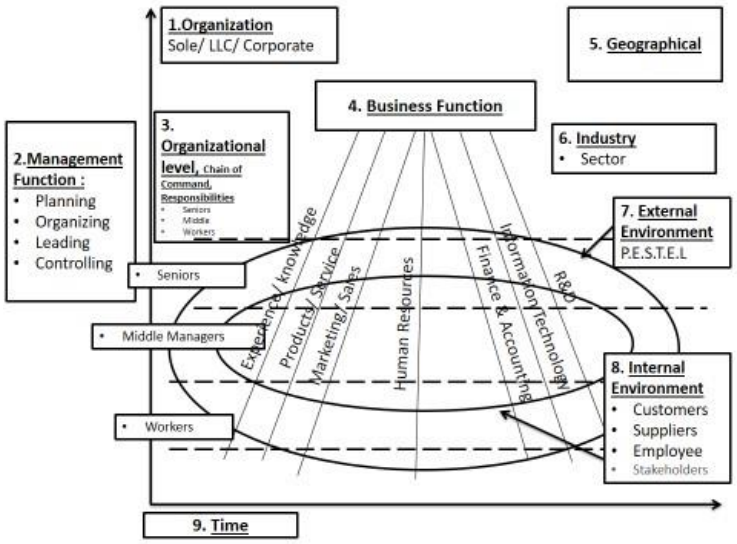

Figure 1. Elements business model (Elsafty & AlNawaly, 2020)

E-commerce industry is one of the fast-growing industries in Egypt, it is foreseen that it will continue to grow on a spectrum of 10 years starting from 2017 & extending till 2027 as statistics predict (Galal S. , 2023), the rapid growth of the market potential serves as an opportunity for the industry to engender and to attract investors to come & seize the opportunity for successful business. The expected revenue from this market has risen from $ 1.47 billion in 2017 & expected to reach around $18 billion by 2029 (Galal S. , 2023) (E-Commerce Market in Egypt Size & Share Analysis - Growth Trends & Forecasts (2024 - 2029) , 2024), which highlights the significant development of the market & how dynamic it has been throughout the last couple of years & how big it is expected to grow in the years to come.

This exponential growth of the e-commerce industry is because of several factors & the most important among them is the rising adoption of the digitalization, the increase of internet penetration as well as mobile utilization are key drivers for the market growth, across MENA region Egypt has the highest rates of internet penetration showing around 53.5 million users in 2019 yet only 8% out of this number are regular users (Egypt - Country Commercial Guide, 2022), with internet penetration acting as a powerful driver of e-commerce growth since it helps increase customer base while enhancing convenience since the whole process needs few clicks in a matter of minutes & better accessibility to various options. Also, “Mobile devices account for more than 70% of e-commerce website traffic” (Mourice, 2023) with the high mobile penetration it can be deduced that mobile utilization help leading to a complete transformation of the online shopping landscape driving customers towards the e-commerce platforms which means that both mobile & internet penetration have positively correlated relation with the e-commerce growth.

The e-commerce product offerings in Egypt are characterized by being diverse since multiple categories can be found, they range from the top categories as fashion or clothing products representing 48.8% followed by food representing 29.7% then transportation application which are Uber & Careem with 28.3% (Ministry Of Communications & Information Technology, 2022), then other categories like medicine, cosmetic, electronic devices, computer books & Newspapers, also some of the emerging categories like second hand good, organic & health products (Galal S., 2023), this emphasizes on how e-commerce has been widely spread in different categories becoming a norm and an essential part of the shopping experience, among the rising trends is the social commerce through social media platforms like Facebook & Instagram, around 80% of social media users seek to search for reviews & information in different communities about products they are looking to purchase (Mourice, 2023), it is expected that it will grow aggressively by 36.4% on annual basis to reach $1,016.8 million in 2023 and continue increasing to reach $3,327.1 million by 2028. (Egypt Social Commerce Market Intelligence Report to 2028: Market to Grow by 36.4% to Reach $1016.8 Million in 2023, 2023), which contributes to the overall growth of e-commerce industry.

The total population in Egypt in 2023 was 105.6 million with forecasting of increase to reach 116.6 million by 2028 (O'Neill, 2023), with 41.3% living in urban cities since the population density is focused in the main cities which are

Cairo, Alexandria & Giza (Egypt Population, 2024), the growing population serves as a great potential for the e-commerce business in Egypt specially with the fact the 59.1% of the population is of age between 15-59 (The National Population & Development Strategy 2023-2030, 2023), which represents several customers segments that are mostly targeted in the e-commerce businesses so that's yet another reason why Egypt as a country is an attractive potential for investors aiming to invest in e-commerce, another fact is that age group from 15 to 29 years old represents 42.5% of online shoppers followed by age group from 30 to 44 representing 34.70% (Ministry Of Communications & Information Technology, 2022), which makes the two the biggest segments with higher potential and appeal to be selected by e-commerce companies to target for the marketing activities. According to statistics men uses internet more than women since 79.3% of men vs 65.2% of women uses internet & they also uses internet more for online purchases representing 57.11% vs 42.89% for females (Ministry Of Communications & Information Technology, 2022), despite women being famous for the shopping desires yet men use the online platforms for their purchases more than women in Egypt, the mentioned statistics gives highlights how gender difference can influence the internet usage for online shopping.

Tailored experiences and product recommendations are gaining lots of interests & grabbing the attention of customers in a way that helps differentiate one company from the other competition by offering customer personalized experience, tailoring the customer experience based on customer preferences & recent researches as well as their purchase history can help companies offer customized service to each customer (3 ways to personalize your e-commerce business, 2020), 62% of shoppers believe that companies can offer better experience through tailored services (Soerensen, 2023) this is believed to be the future of e-commerce to offer convenient & personalized experience to all customer since it leads to increased customer satisfaction and engagement, higher conversion rates as customized recommendations can align with customer requirements leading to more purchases, the conversion rate increase can be up to 8% (Soerensen, 2023), also it contributes to an improved brand loyalty since customers can always find what the need & look for easily. Personalization can influence shoppers' behavior towards more sales & accordingly better profitability to the company while maintaining customer satisfaction & brand loyalty. Empowered by technological advance specially the artificial intelligence, personalization & hyper personalization are possible for better shopping experience (Mourice, 2023), with the aim to provide improved & more convenient customer experience.

The artificial intelligence (AI) has been one of the fast growing phenomena on a global scale, Egypt first paid attention to the importance of AI in 2014 as part of the sustainable development strategy and established National Council for Artificial Intelligence (NCAI) in 2019 to develop this technology (Hafez, 2022), It is foreseen that by 2023 AI will contribute in the GDP by 7.5% positively impacting the Egypt's economic performance (Hafez, 2022), the aim was to understand AI & work on developing it to be used in the different sectors across the country, since Egypt doesn't live in isolation of the world & AI is becoming an essential part of all industries, having a plan to use it responsibly in various domain has become key to the economy advancement (National Council Of Artificial Intelligence, 2023), it is expected be part of all industry & e-commerce is no exception to that.

This study aims at focusing on a specific country which is Egypt, the research will be testing the e-commerce environment within the country & how it has developed in the recent years specially with the influence of technology as a factor and how it transformed the industry in Egypt with a focus on artificial intelligence and the way it influenced the customer journey revolutionizing it, reshaping the experience customer can have. The time horizon that will be covered is mainly the present, which is year 2024, yet in order to better understand the variables we might need to investigate what happened in the last couple of year to start from year 2018 to cover the development across 8 years till we reach 2024 to understand the progress that taken place & to predict what can be expected to occur in the future.

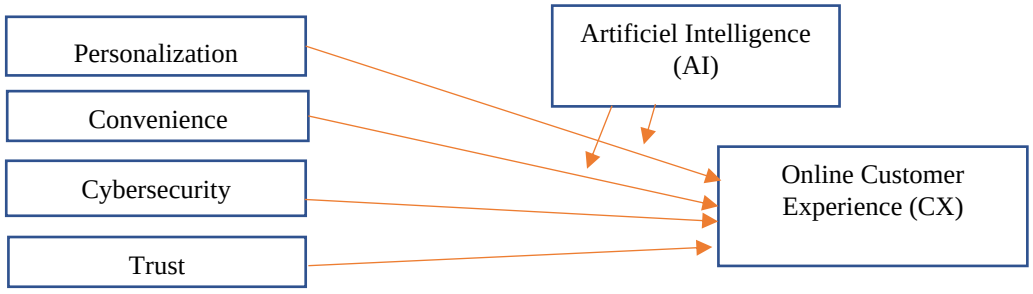

Figure 2. Conceptual Model (developed by author)

2. Literature Review

A customer experience is an intricate concept with multidimensions & holistic in nature, encompassing several aspects at the same time which can be emotional, social, cognitive, sensory as well as spiritual (Ameen, Tarhini, Reppel, & Anand, 2021), all these interactions with a firm regardless of their nature form the customer experience and help shape the way he views the company & by extension its products. As per Trawnih, Al-Masaeeda, Alsouda, & Alkufahy (2022) customer experience has three dimensions which are customer engagement with employees and functionality represented in technical aspects of the product & finally the mechanical or sensory dimension and all contribute in shaping both customer cognitive & emotional perspective of the brand (Trawnih, Al-Masaeeda, Alsouda, & Alkufahy, 2022), the customer experience that the customer has affects the way he assess the brand & his tendency to repeat this experience in the future, experience in its own is a salable product that a customer would pay to enjoy, 85% of business managers believes that building a differentiated brand position based on the 4Ps is no longer efficient as it used to be & the focus should be toward competitiveness in providing best customer experience (Gentile, Spiller, & Noci, 2007). There is a strong relation between the experiential component of the customer journey & the consumer perception of value, the more one enjoy the experience with the product the more perceived value is, thus CX plays a critical role in the success of a presented product leading to the conclusion that experiential vectors of a product can out weight the functional ones when valuated (Gentile, Spiller, & Noci, 2007).

The commerce business is shifting toward the virtual world due to the various benefits that it can offer the customer as well as the company (Haidery, Kamran, Syed, & Rizvi, 2020), The retail business has transformed from its traditional form to the online world and e-commerce is booming on a global scale, with the social media getting influential more and more every day a new stream of e-commerce which is social commerce has emerged (Beyari & Ghouth, 2018), numerous businesses had to ensure they have online presence to capitalize on the market potential in this space. With that in consideration customer experience is getting complex each day due to the increasing number of points of interaction which companies doesn't have control on (Lemon & Verhoef, 2016), companies can control the channels they over look like frontliners, yet they can't control other channels like informal social media platforms, product communities that customers have to exchange opinions & experiences & many more other channels that can impact the customer perception of a certain brand in a negative way impacting the customer experience, so companies are facing several challenges with channel fragmentation & the emerging on new unconventional channels which lead to appearance of new norms like omnichannel management (Lemon & Verhoef, 2016), omnichannel management aims at having a unified channel that consolidates all other to have better & more efficient communication with the customer avoiding any confusion that might distort the intended message. There are several factors that impact customer satisfaction & accordingly the customer online experience, in order to understand the success factors for e-commerce brands it is needed to understand what affect customer satisfaction throughout their online shopping experience to be able to enhance the experience & accordingly drive more business (Haidery, Kamran, Syed, & Rizvi, 2020), since the dynamics of the market and the consumer behavior are continuously changing creating new trends, how online business is being done is accordingly changing to accommodate the rising new purchasing patterns.

One way to overcome the complexity of the customer experience & ensure customer have a satisfying experience is through offering convenient & personalized service. Convenience is about how a task can be performed in the easiest way, to leverage the minimum resources possible this is how customer perceive online shopping vs physical shopping that required more resources represented in time & effort (Ameen, Tarhini, Reppel, & Anand, 2021), e-commerce platforms offer more flexible shopping experience since the customer can navigate various platforms

with few clicks without need to move from his location, easy access to information in real time, ability to view multiple options in matter of minutes rather than hours, availability of reviews & ratings for products, possibility to compare quality & prices to arrive at the best offer, all these factors & other contribute to the perceived convenience by customers.

Personalization mean modifying a service to be adopted for a certain customer preferences (Sujata, Aniket, & Mahasingh, 2019), this refers to the extent of adjustment done according to customer liking that contributes to successful experience, this can be done by gathering the customer data then perform analysis for this data to gain insights accordingly to which personalization can be done, this indicated that for personalization to happen, thorough understanding of the customer requirements & preferences is needed, this can be derived from the customer inputs across multiple touchpoints such as research history, previous purchases& likes on specific products.

Artificial intelligence has become intertwined in different aspect reshaping the way things are being done & perceived, having a huge impact in different business aspects, in a dynamic market & continuously growing customer expectations, providing better enhanced customer experience has become necessity not just an added value, one way to this is through artificial intelligence that can have a great positive impact on the experience customers have (Abu Daqar & Smoudy, 2019), companies need to adopt AI technology to enhance the customer experience to be a unique one for each customer, customers compare different brand & prefer the one providing better customer journey.

AI tools can contribute to a better and enhanced perosnlaization like sentiment analysis which is concerned with understanding and analyzing the customer emotion throughout his process so it can be modified accordingly then emotion detection is focused on understaning how a person feels from his facial expersions using technology like advanced impage processing so experience can be altered and enhanced, another tool is the smart content creation to derive data from several resources then digest them to produce a personalized content that suit each perosn and also the virtual assistant or bot which is a software agent that process customer data, accordingly provide customized service, this service can include chat and voice support and among famous examples of virtual assistants are Siri & cortana (Sujata, Aniket, & Mahasingh, 2019).

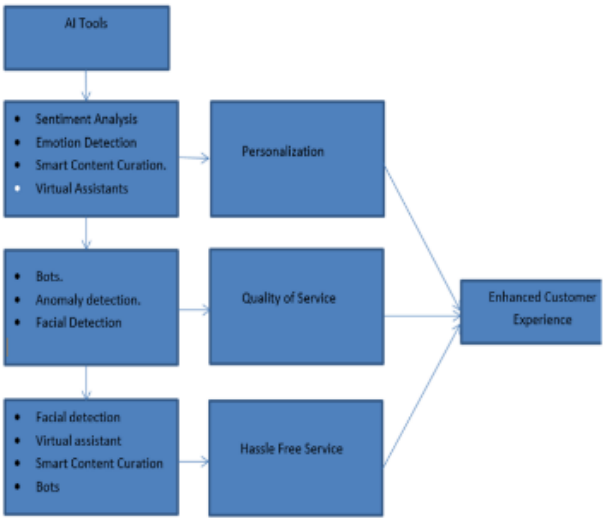

Figure 3. Framework (Sujata, Aniket, & Mahasingh, 2019)

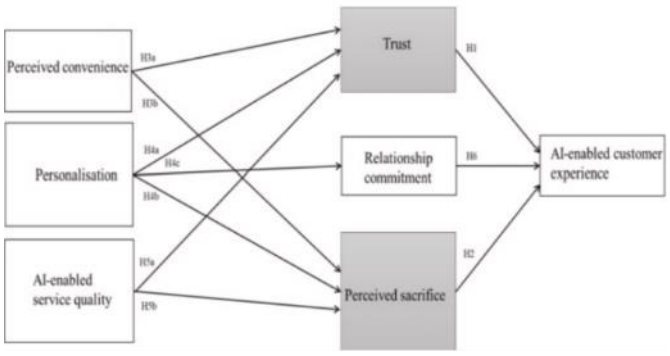

Figure 4. Framework (Ameen, Tarhini, Reppel, & Anand, 2021)

Customer experience covers the whole experience a customer has with a certain brand including all touchpoints he goes through, the decisions he makes, emotions felt and interaction he has with each & every step of the process, with AI revolutionizing the experience to better analyze the customer sentiments it can also provide insights to enhance it for more satisfies customers & enhanced experience with the least resources possible (Ameen, Tarhini, Reppel, & Anand, 2021), with AI involved the convenience is achievable at higher levels & how it is perceived & evaluated by customers changed that before, expected product availability, speed, delivery, flexibility & ease standards have increased since the services is powered by technology like AI & it contributes to customer future repurchase to repeat the successful experience. Having a unified customer experience that customer can enjoy using different devices revolutionize the online retail business, offering customers with omnichannel journey through which they can enjoy seamless experience with their interests at the center of attention and have the ability to have one unified view across multiple channels can make the customer shopping experience a unique and enjoyable one, this can lead to better customer engagement & positively influence the customer brand relationship. There are multiple variables that can be considered the antecedents of a unified customer experience that customer can have on online platform which can impact how they assess their experience from hedonic, utilitarian & social perspectives (Bilgihan, Kandampully, & Zhang, 2015), when fulfilled in the right way the customer can enjoy a satisfying customer experience.

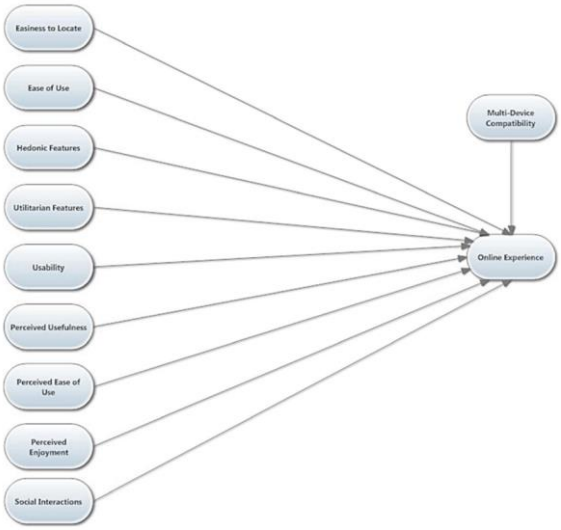

Figure 5. Towards a unified customer experience in online shopping environments: Antecedents and outcomes (Bilgihan, Kandampully, & Zhang, 2015)

Reviewing the literature, it can be deduced that customer experience is a key differentiator that all companies need to focus on if they want to grow & be profitable in an industry with tough competition landscape. The emotional

aspects & the employee engagement in a customer experience with a certain product is not only equivalent in weight but can also out-weight a product functionality in some scenarios and consequently the brand positioning & value in a customer mind, thus dedicating the maximum effort & using the latest technologies & techniques to make it significant is the approach that e-commerce companies are seeking, on top of these technologies is the AI that can enables companies to make the experience more personalized & convenient for the end user.

All the studies found didn't consider Egypt or MEA region which has its own unique environment & it's different PESTEL (political, economic, social, technological, environmental & legal) aspects if compared with the other regions where the studies were conducted, therefore this study would be the first to focus on Egypt, one of MEA region countries.

3. Methodology

After reviewing numerous models from the literature, It was decided that this research will be built on the conceptual framework of Towards a unified customer experience in online shopping environments: Antecedents and outcome by Bilgihan, Kandampully, & Zhang (2015) since it is the closest model to the case under study & provides an elaborative view about the online customer experience and the different variables affecting it. Taking into consideration the addition other two variables to be added to the framework as moderating variables which are personalization and Artificial Intelligence, Convenience as a variable is already covered in the variables mentioned above which are ease of use, usability & utilitarian features, it is what customers are looking for when he choose online shopping over the physical one, to save time and effort & money while achieving maximum possible outcome, thus convenience will not be added since the mentioned variables encompass the same meaning.

The aim of our conceptual model is to judge whether the presence of the artificial intelligence will have an impact on GenZ females' online customer experience. From the observation of the previously mentioned conceptual model, Bilgihan, Kandampully, & Zhang (2015) theorized the relation between ten variables which are the perceived enjoyment, perceived ease of use, hedonic and utilitarian features, easiness to locate the Web site/app, ease of use, social interactions, perceived usefulness, and multi-device compatibility, usability & how they impact the online customer experience. This model aims to shed the light on model for unified online customer experience taking into consideration customer behavior & its impact on the whole experience in online context. Through this application we are going to focus on ten variables as independent variable & two moderating variables as shown below:

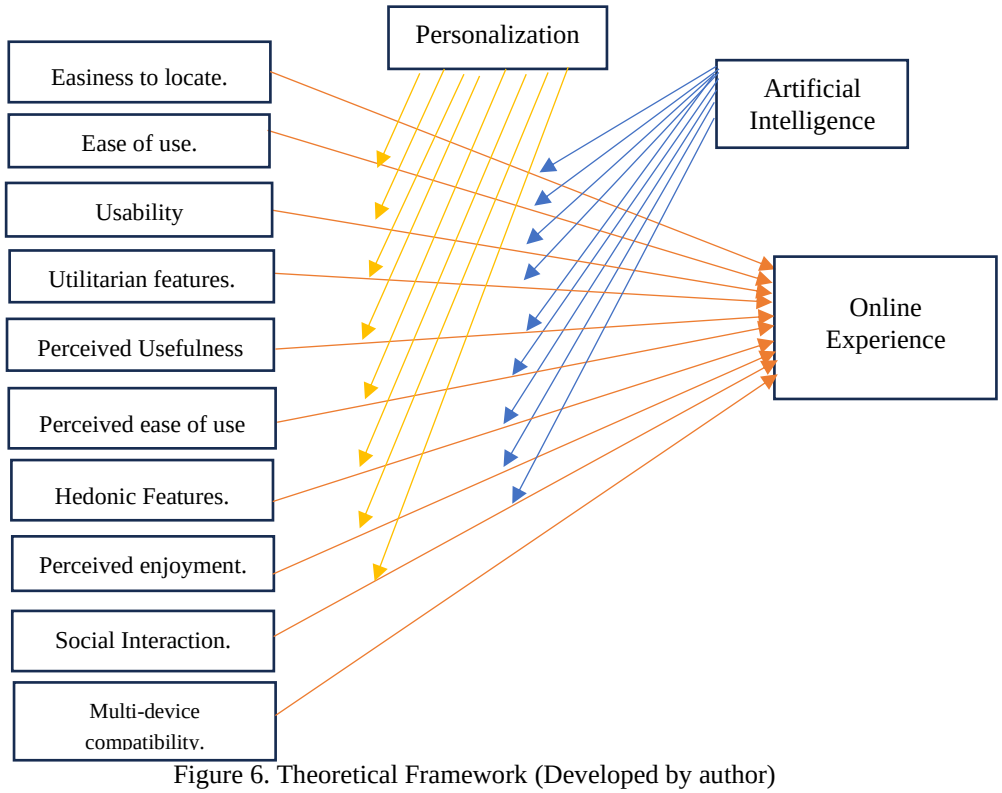

Figure 6. Theoretical Framework (Developed by author)

3.1 Variables

3.1.1 Dependent Variable

Online customer experience is the one that customers have across the different interaction touchpoints they have with a certain brand while they are trying to acquire a product, it encompasses the customer perception of a certain company from emotional, social & cognitive perspective affecting his behavior during this experience.

3.1.2 Independent Variables

I1: Easiness to locate a website or application is an independent variable indicating the importance of ensuring that the online platform whether a website or application can be easily found by the customers

I2: The Ease of use of a certain platform refers to how easy a certain customer can navigate through it & how user-friendly it can be

I3: Usability Ensuring the website or app can fulfill the customer requirements on the online platform to have a fruitful experience.

I4: The utilitarian features of a platform can indicate the value a customer can expects to get out of a certain platform when he invests time, effort, or money. The speed, flexibility & diversity of options are all utilitarian features that a customer can get.

I5: Perceived usefulness refers to the degree to which a person believes that using a particular product, service, or system will enhance their ability to achieve a specific goal or improve their performance in some way.

I6: Perceived ease of use represents a user's individual belief about how easy or difficult they think it will be to use something which can be affected by their previous experiences, expectations, skills & abilities.

I7: Hedonic features of an online platform are those that focus on creating a pleasurable and enjoyable user experience, going beyond just meeting basic needs, they tap into the emotional side of users

I8: Perceived enjoyment refers to a user's subjective experience of how much they find something enjoyable or fun.

I9: Social interaction in an online platform refers to the way people connect, communicate, and share information with each other through the digital space.

I10: Multi device compatibility in online customer experience refers to how seamlessly a business can deliver a positive experience across the various devices a customer might use.

Moderating Variables:

M1: Artificial Intelligence is the simulation of human intelligence processes by machines, applied to enhance various aspects of online shopping using various tools.

M2: Personalization is the extent of adjustment done according to customer liking that contributes to successful experience.

3.2 Research Questions

Major question:

MjRQ1: What are the determinants of customer experience?

Minor questions:

- **MinRQ1:** How does easiness to locate a website/app affect customer experience in e-commerce?
- **MinRQ2** How does ease of use affect customer experience in e-commerce?
- **MinRQ3** How does hedonic features affect customer experience in e-commerce?
- **MinRQ4** How does utilitarian features affect customer experience in e-commerce?
- **MinRQ5** How does usability affect customer experience in e-commerce?
- **MinRQ6** How does perceived ease of use affect customer experience in e-commerce?
- **MinRQ7** How does perceived usefulness affect customer experience in e-commerce?
- **MinRQ8** How does perceived enjoyment affect customer experience in e-commerce?
- **MinRQ9** How does social interaction affect customer experience in e-commerce?
- **MinRQ10** How does multi-device compatibility affect customer experience in e-commerce?

- **MinRQ11** What is the influence of AI on the relation between easiness to locate a website/app & customer experience in e-commerce?
- **MinRQ12** What is the influence of AI on the relation between ease of use & customer experience in e-commerce?
- **MinRQ13** What is the influence of AI on the relation between hedonic features & customer experience in e-commerce?
- **MinRQ14** What is the influence of AI on the relation between utilitarian features & customer experience in e-commerce?
- **MinRQ15** What is the influence of AI on the relation between usability & customer experience in e-commerce?
- **MinRQ16** What is the influence of AI on the relation between perceived ease of use & customer experience in e-commerce?
- **MinRQ17** What is the influence of AI on the relation between perceived usefulness & customer experience in e-commerce?
- **MinRQ18** What is the influence of AI on the relation between perceived enjoyment & customer experience in e-commerce?
- **MinRQ19** What is the influence of AI on the relation between social interaction & customer experience in e-commerce?
- **MinRQ20** What is the influence of personalization on the relation between ease of use & customer experience in e-commerce?
- **MinRQ21** What is the influence of personalization on the relation between hedonic features & customer experience in e-commerce?
- **MinRQ22** What is the influence of personalization on the relation between utilitarian features & customer experience in e-commerce?
- **MinRQ23** What is the influence of personalization on the relation between usability & customer experience in e-commerce?
- **MinRQ24** What is the influence of personalization on the relation between perceived ease of use & customer experience in e-commerce?
- **MinRQ25** What is the influence of personalization on the relation between perceived usefulness & customer experience in e-commerce?
- **MinRQ26** What is the influence of personalization on the relation between perceived enjoyment & customer experience in e-commerce?
- **MinRQ27** What is the influence of personalization on the relation between social interaction & customer experience in e-commerce?

3.3 Hypothetical Statement

- **H10:** Easiness to locate website/app affects the online experience.
- **$H1_a$**: Easiness to locate website/app minorly affects the online experience.
- **$H2_0$:** Ease of use affects the online experience.
- **$H2_a$:** Ease of use positively affects the online experience.
- **$H3_0$:** Hedonic features affects the online experience.
- **$H3_a$:** Hedonic features significantly affects the online experience.
- **$H4_0$:** Utilitarian features affects the online experience.
- **$H4_a$:** Utilitarian features positively affects the online experience.
- **$H5_0$:** Usability affects the online experience.
- **$H5_a$:** Usability positively affects the online experience.
- **$H6_0$:** Perceived usefulness affects the online experience.

- **$H6_a$:** Perceived usefulness significantly affects the online experience.
- **$H7_0$:** Perceived ease of use affects the online experience.
- **$H7_a$:** Perceived ease of use positively affects the online experience.
- **$H8_0$:** Perceived enjoyment affects the online experience.
- **$H8_a$:** Perceived enjoyment positively affects the online experience.
- **$H9_0$:** Social interaction affects the online experience.
- **$H9_a$:** Social interaction positively affects the online experience.
- **$H10_0$:** Multi-device compatibility affects the online experience.
- **$H10_a$:** Multi-device compatibility positively affects the online experience.
- **$H11_0$:** Artificial Intelligence doesn't affect the relationship between easiness to locate the website/app & online experience.
- **$H11_a$:** Artificial Intelligence affects the relationship between easiness to locate the website/app & online experience.
- **$H12_0$:** Artificial Intelligence doesn't affect the relationship between ease of use & online experience.
- **$H12_a$:** Artificial Intelligence positively affects the relationship between ease of use & online experience.
- **$H13_0$:** Artificial Intelligence doesn't affect the relationship between hedonic features & online experience.
- **$H13_a$:** Artificial Intelligence affects the relationship between hedonic features & online experience.
- **$H14_0$:** Artificial Intelligence doesn't affect the relationship between utilitarian features & online experience.
- **$H14_a$:** Artificial Intelligence positively affects the relationship between utilitarian features & online experience.
- **$H15_0$:** Artificial Intelligence doesn't affect the relationship between usability & online experience.
- **$H15_a$:** Artificial Intelligence affects the relationship between usability & online experience.
- **$H16_0$:** Artificial Intelligence doesn't affect the relationship between perceived usefulness & online experience.
- **$H16_a$:** Artificial Intelligence affects the relationship between perceived usefulness & online experience.
- **$H17_0$:** Artificial Intelligence doesn't affect the relationship between perceived ease of use & online experience.
- **$H17_a$:** Artificial Intelligence significantly affects the relationship between perceived ease of use & online experience.
- **$H18_0$:** Artificial Intelligence doesn't affect the relationship between perceived enjoyment & online experience.
- **$H18_a$:** Artificial Intelligence affects the relationship between perceived enjoyment & online experience.
- **$H19_0$:** Artificial Intelligence doesn't affect the relationship between social interaction & online experience.
- **$H19_a$:** Artificial Intelligence affects the relationship between social interaction & online experience.
- **$H20_0$:** Personalization doesn't affect the relationship between ease of use & online experience.
- **$H20_a$:** Personalization positively affects the relationship between ease of use & online experience.
- **$H21_0$:** Personalization doesn't affect the relationship between hedonic features & online experience.
- **$H21_a$:** Personalization positively affects the relationship between hedonic features & online experience.
- **$H22_0$:** Personalization doesn't affect the relationship between utilitarian features & online experience.
- **$H22_a$:** Personalization positively affects the relationship between utilitarian features & online experience.
- **$H23_0$:** Personalization doesn't affect the relationship between usability & online experience.
- **$H23_a$:** Personalization affects the relationship between usability & online experience.
- **$H24_0$:** Personalization doesn't affect the relationship between perceived usefulness & online experience.

- **$H24_a$:** Personalization positively affects the relationship between perceived usefulness & online experience.
- **$H25_0$:** Personalization doesn't affect the relationship between perceived ease of use & online experience.
- **$H25_a$:** Personalization significantly affects the relationship between perceived ease of use & online experience.
- **$H26_0$:** Personalization doesn't affect the relationship between perceived enjoyment & online experience.
- **$H26_a$:** Personalization positively affects the relationship between perceived enjoyment & online experience.
- **$H27_0$:** Personalization doesn't affect the relationship between social interaction & online experience.
- **$H27_a$:** Personalization affects the relationship between social interaction & online experience.

3.4 Research Design

This research adopted a quantitative approach, designed with both exploratory and descriptive purposes. The primary aim was to uncover the relationships and determine the direction of correlations among the independent variables, moderating variables, and the dependent variable within the context of applied research. The choice of this research design was informed by an extensive review of existing literature, ensuring a robust theoretical foundation.

To achieve its objectives, the research employed a variety of statistical methods. Descriptive statistics were used to summarize and describe the main features of the collected data. Correlational statistics helped in identifying and measuring the strength and direction of relationships between variables. Inferential statistics were utilized to make predictions or inferences about a population based on a sample of data.

The investigation was conducted with a non-contrived approach, as it took place in a natural setting with minimal interference or control from the researchers. Specifically, the study operated under a 0% control condition, emphasizing the authenticity of the data collected.

Data collection was carried out through a questionnaire survey, administered as part of a field study. This survey was conducted in a cross-sectional manner, since data was collected at a single point in time, providing a snapshot of the variables and their relationships at that moment.

Convenience sampling was used in this research as it involves selecting participants based on their availability and accessibility. This method is often used in situations where resources or time are limited and in this case access to target segment was challenging thus convenience sampling was used since it offers quick and easy data collection.

3.5 Questions

Question	Variable	Variable Type
1-4	Profiling question	
5-8	Online shopping experience	Dependent variable
9-10	Easiness to locate	Independent variable
11-12	Ease of use	Independent Variable
13	Usability	Independent Variable
14	Utilitarian features	Independent Variable
15	Perceived usefulness	Independent Variable
16	Perceived Ease of use	Independent Variable
17	Hedonic features	Independent Variable
18-19	Perceived enjoyment	Independent Variable
20-21	Social interaction	Independent Variable
22-24	Multi-device compatibility	Independent Variable
25-29	Artificial Intelligence	Moderating Variable
30-31	Personalization	Moderating Variable

Figure 7. Table of questions

4. Analysis

The analysis section of this paper presents the results of this empirical study on the impact of AI on customer experience in e-commerce in Egypt. Several statistical reports were employed to analyze the data collected from the questionnaire distributed to the targeted segment as well as to validate the used instruments.

The questionnaire was distributed on a total of 122 people, 78 of them were females wile 44 of them were males with age ranges as shown below:

Age Range	Number of respondents
15-25	15
25-35	76
35-45	26
More than 45	5
Grand Total	**122**

A Cronbach alpha test A Cronbach's alpha test was conducted to provide valuable insights into the reliability and internal consistency of the measurement instrument used in this study, which is the questionnaire. This statistical test is crucial for assessing how well the items within each scale of the questionnaire measure the same underlying construct, ensuring that the instrument is both reliable and valid.The results of the Cronbach's alpha test indicated that all the scales used in the questionnaire were reliable. Specifically, the Cronbach's alpha coefficient for each scale was found to be 0.70 or higher, which is considered acceptable according to the standards set by (Nunnally, 1978). This threshold signifies that the items within each scale are consistently measuring the intended construct, providing confidence in the stability and consistency of the responses.

In practical terms, a Cronbach's alpha coefficient of 0.70 or above means that the questionnaire items are sufficiently correlated with each other, reflecting a coherent and unified measurement of the construct. This level of internal consistency is essential for ensuring that the data collected through the questionnaire is dependable and can be used to draw meaningful conclusions. Overall, the Cronbach's alpha test confirmed that the measurement instrument used in this study is reliable, supporting the validity of the research findings and reinforcing the robustness of the study's methodology.

Normality test was conducted on the collected data using the Shapiro-Wilk test, which is a widely used method for assessing whether a dataset is normally distributed. The results of this test indicated that the data for the dependent, independent, and moderating variables did not follow a normal distribution. This lack of normality means that the data deviates from the bell-shaped curve typically associated with a normal distribution. Despite this, the study leveraged the central limit theorem, which is a fundamental principle in statistics. According to the central limit theorem, when the sample size is sufficiently large (generally more than 30 or 40 observations), the distribution of the sample means tends to be normal, regardless of the shape of the original data distribution (Ghasemi & Zahediasl, 2012).

This theorem provides a rationale for using parametric statistical tests, which assume normality, even when the individual data points are not normally distributed. Given the large sample size in this study, it was concluded that parametric statistical tests, such as correlation and regression analysis, could be appropriately applied. These tests are essential for examining the relationships between variables and making inferences about the population.

The findings revealed a positive **correlation** between the dependent variable and all the independent and moderating variables. Most of the variables exhibited correlation coefficients ranging between 0.1 and 0.3, indicating a small but significant correlation. However, certain variables stood out with higher coefficients. Specifically, social interaction and the ease of locating independent variables had the highest correlation coefficients, at 0.49 and 0.41 respectively, indicating a stronger positive correlation.

Following these, perceived usefulness showed a correlation coefficient of 0.37, which signifies a medium level of significance in the positive correlation. Additionally, personalization, which served as a moderating variable, also demonstrated a medium significance with a correlation coefficient of 0.36. These findings suggest that while most variables have a small but significant impact, factors such as social interaction, ease of locating information, and

perceived usefulness play a more substantial role in influencing the dependent variable. Personalization, as a moderating factor, also contributes significantly to the positive correlation observed.

		IV_1	IV_2	IV_3	IV_4	IV_5	IV_6	IV_7	IV_8	IV_9	IV_10	MV_1	MV_2
DV	Pearson Correlation	.415**	.271**	.252**	.180*	.377**	.287**	.205*	.191*	.490**	.216*	.228*	.367**
	Sig. (2-tailed)	0.000	0.002	0.005	0.044	0.000	0.001	0.022	0.033	0.000	0.016	0.011	0.000
	N	125	125	125	125	125	125	125	125	125	125	125	125

Figure 8. Table of correlations

To test the hypothesis that MV1 (artificial intelligence) and MV2 (personalization) moderate the relationship between the dependent variable (DV) and the independent variables (IVs), a hierarchical multiple regression analysis was performed. This analysis utilized the PROCESS version 3.4 macro for SPSS, developed by Andrew Hayes in 2013 (Hayes, Montoya, & Rockwood, 2017). The PROCESS macro is a powerful tool designed to assess mediation and moderation effects within statistical models, providing a comprehensive understanding of the interactions between variables.

The overall interpretation of the results indicated that there was no significant moderation by MV1 for several independent variables, specifically IV1, IV2, IV3, IV4, IV5, IV8, and IV9. This suggests that artificial intelligence may not be a relevant moderator for these particular variables. Consequently, it implies that other factors or moderators might play a more influential role in these relationships, warranting further exploration to identify these potential moderators. On the other hand, the analysis revealed significant interactions for certain variables. Specifically, IV6 (perceived ease of use) and IV7 (hedonic features) demonstrated significant interactions with MV1, indicating that artificial intelligence plays a role in moderating their effects on the dependent variable.

Similarly, the analysis showed a lack of significant moderation by MV2 for IV1, IV2, IV4, IV5, IV6, IV7, IV8, and IV9. This indicates that personalization may not significantly moderate the effects of these independent variables on the dependent variable. However, there was a significant interaction for IV3 (usability) with MV2, suggesting that personalization moderates its effect on the dependent variable.

These findings suggest that while artificial intelligence and personalization may not be relevant moderators for all independent variables, they do play a significant role in moderating the effects of specific variables. This highlights the importance of further investigation into the nature of these moderations, as understanding these interactions could provide valuable insights into how artificial intelligence and personalization can be leveraged to enhance the outcomes of interest.

Simple linear regression analyses was conducted to evaluate the effects of various independent variables (IVs) on a dependent variable (DV). The results demonstrated that all the independent variables had a positive and significant regression relationship with the dependent variable. Among these, IV9, which represents social interaction, exhibited the strongest relationship with the dependent variable, explaining 24% of the variance. This finding suggests that interventions or strategies aimed at enhancing social interaction could have a substantial impact on the outcome, making it a critical area for focus.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.490[a]	0.240	0.234	1.84863

a. Predictors: (Constant), IV_9

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	132.825	1	132.825	38.867	.000[b]
	Residual	420.343	123	3.417		
	Total	553.168	124			

a. Dependent Variable: DV

b. Predictors: (Constant), IV_9

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	0.910	1.025		0.888	0.376
	IV_9	1.578	0.253	0.490	6.234	0.000

Figure 9. Simple Regression Analysis for IV9 (Social Interaction)

Additionally, the analysis revealed that IV1, IV5, and IV6, which correspond to the ease of locating a website, perceived usefulness, and perceived ease of use respectively, also had notable effects on the dependent variable. These variables showed significant positive regression coefficients, indicating that improvements in these areas could also positively influence the outcome.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.415[a]	0.172	0.165	1.92974

a. Predictors: (Constant), IV_1

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	95.130	1	95.130	25.546	.000[b]
	Residual	458.038	123	3.724		
	Total	553.168	124			

a. Dependent Variable: DV

b. Predictors: (Constant), IV_1

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	0.730	1.295		0.564	0.574
	IV_1	1.501	0.297	0.415	5.054	0.000

a. Dependent Variable: DV

Figure 10. Simple Regression Analysis for IV1 (Easiness to Locate a Website)

While the remaining independent variables had minor yet significant positive regression relationships with the dependent variable, their impact was less pronounced compared to IV9, IV1, IV5, and IV6. Nonetheless, these findings highlight the importance of considering all the independent variables in the overall strategy, as even minor positive effects can contribute to the desired outcome.

In summary, the analysis underscores the critical role of social interaction, ease of locating information, perceived usefulness, and perceived ease of use in influencing the dependent variable. By focusing on these key areas, it is possible to achieve significant improvements in the outcome. These results are consistent with previous research by (Bilgihan, Kandampully, & Zhang, 2015) However, the used sample was convenient one thus more investigations may be needed to shed the light on the nature of moderation relation to identify if there are other variables affecting the relation & also to further understand the discovered moderating relations.

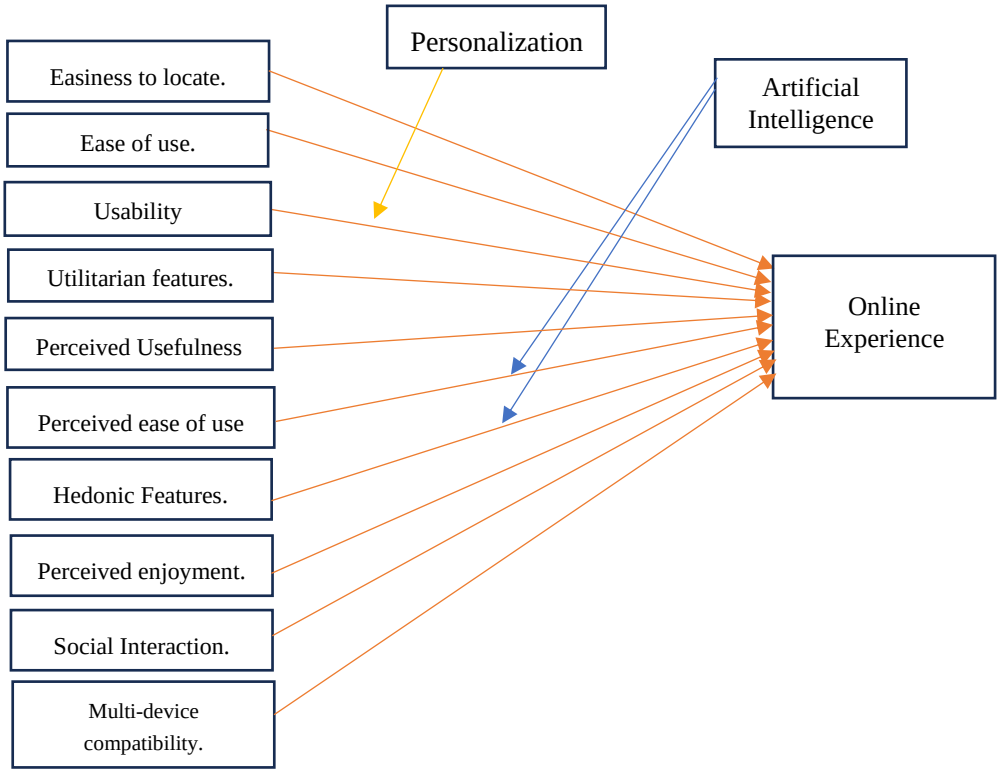

Figure 11. Results Framework

5. Conclusion

This empirical study has provided valuable insights into the impact of artificial intelligence (AI) on customer experience in the e-commerce sector in Egypt. The research has established a solid foundation for understanding how various independent variables influence customer experience with the aim to focus on how advanced technology like artificial intelligence & personalization can enhance the overall e-commerce experience & positively impact the industry.

The study was able to prove that all variables has positive correlation with customer experience as dependent variable, yet social interaction stands out since the more social interaction there is -like product communities & social media interactions- the better experience customer can enjoy while using a certain platform which indicates that companies can invest in social engagement activities to attract more customers. Also how easy customers can find a specific website can impact their customer experience, which leads to deducing that techniques like search engine optimization to ensure customers will be able to locate the website in the easiest way possible can have a positive impact on the customer experience that customers have with their e-commerce purchases.

Also, it was noted that AI had a moderating effect on the relationship between customer experience & both perceived

ease of use and hedonic features were significant which means that whenever AI is involved in the customer experience the customer perceived ease of use for the selected platform increases emphasizing the impact AI can have to make the experience facilitated from customer point of view, similarly the hedonic features of the experience as sensory satisfaction, emotional fulfillment increases also enhancing the overall customer experience as well. Additionally, personalization as a moderating variable enhances the relationship between customer experience & usability indicating that the more personalized the customer experience is the more the customer usability is of the platform or website he is using, meaning his requirements will be met & his experience will be deemed a fruitful one.

Overall, this study contributes to the growing body of literature on AI in e-commerce, offering practical implications for businesses aiming to enhance customer experience. and delve deeper into the dynamics of the different variables relationships to further enrich our understanding of customer experience in the digital marketplace.

6. Recommendations

The findings underscore the importance of focusing on social interaction as a key factor in enhancing customer experience, suggesting that e-commerce platforms should **prioritize strategies that foster engagement**. Further research in this area can result in clear steps to be followed to harness the fruits of successful social interactions for more profitability to companies while elevating customer experience.

Additionally, the significant effects of AI on the relation between customer experience with perceived usefulness highlight **areas for potential improvement in user experience design** leveraging AI models that can contribute to a successful customer experience & accordingly more future purchases thus further investigations in this area can shed light on improvements to be performed

In addition to the significant effects of AI on the relation between customer experience with ease of use how business owners can **facilitate the usage of the website** by using more AI to make it more user friendly to their customers by developing user interface, so they can be able to recognize the usefulness of the website can be an interesting area to investigate.

Personalization impact on the customer experience & usability can indicate how customized user experience can be a key differentiator & accordingly better understanding of how deep personalization can go can be essential to business improvement & growth.

Future research should explore additional variables like the cybersecurity. Using e-commerce platforms customer has to share sensitive data like name, phone, bank details, address & others, in order for an e-commerce purchase to be successfully conducted, thus the security of customer data as well as the security of the platform used can be crucial for a successful customer experience,

Furthermore**, the used sample of the research was convenient,** it can introduce bias as the sample may not be representative of the entire population. This can impact the generalizability of the findings and limit the ability to draw definitive conclusions about the broader population**.** It didn't allow full understanding of all the relationships, thus widening the sample can contribute to further enriched results.

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Authors' contributions

Ashraf Elsafty[1] full study supervision, methodology development, full writeups editing, revising data anlaysis and interpretation, research head of the full project and paper development.

Saga Hesham[2] full study implementation, writing and paper development on all sections, including contextual analysis, literature review, data collection analysis and interpretation

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