Review

E-Commerce Challenges, Definitions, Solutions and Evaluation

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Abstract: In the e-commerce [business-to-consumer] domain, where the number of options is overwhelming. New enterprises must filter, prioritize and use important information efficiently in order to compete effectively and achieve a competitive advantage. There are numerous inventive solutions available to assist new firms in succeeding in the fast-paced worldwide expansion of e-commerce and overcoming these hurdles. This study examines the various obstacles and potentials of various innovative solutions in the business-to-consumer field in order to serve as a guide for e-commerce research and practice. And also provide researchers with a proposed solution to each of these challenges.

Keywords: B2C E-Commerce, E-Commerce Dimensions, E-Commerce Challenge, E-Commerce Technologies

Introduction

The explosive growth, adaption and penetration of information and communication technology (Turkowski and Szudarek, 2019) are transforming the dynamics of business and competition around the world. People can communicate and share information online because of the internet's growth and new modes of communication and business transactions have emerged. Electronic commerce (E-commerce) is one of these shifts, which has replaced business words like brick-and-mortar and retail storefronts with online shopping and e-stores (İrantaj, 2018).

The use of an electronic platform to accept consumer orders, receive and process payments, provide customer support, collect market data and conduct marketing and promotional activities is referred to as e-commerce (Goyal *et al*., 2019).

E-commerce is a massive revolution that has made everyone's life easier and more innovative. Online shopping has grown in popularity in the business-to-consumer sector and e-retailer competition has increased (İrantaj, 2018). Customers expect high-quality items or services when they shop online and if they don't get what they want, they can quickly move on to another store. Businesses must maintain and develop the satisfaction levels of diverse types of customers with cultural diversity, distinct opinions, requirements, and needs in order to compete correctly and achieve competitive advantages in this challenging market.

Businesses in the e-commerce industry are constantly challenged by a slew of issues caused by rapid changes in business environments, technology, and customer preferences. Many new business owners face numerous challenges, including a lack of knowledge about how to design and update their websites in order to attract customers and gain a competitive advantage (Song *et al*., 2019).

Most B2C e-commerce research focuses on consumers and makes recommendations based on their preferences in order to increase their satisfaction while ignoring the pressure on businesses to remain competitive. As a result, understanding and visualizing the issues that businesses face in the e-commerce environment, particularly in the business-to-consumer sector, as well as identifying and evaluating potential solutions, is critical.

E-Commerce Definition and Dimensions

Business-to-Consumer (B2C) e-commerce has exploded in popularity in recent years. This category includes products and services that directly include two-way information exchange between the client and the company. Many clients prefer purchasing on B2C e-commerce websites for a variety of reasons, including ease, a wide range of products, reduced costs, and the availability of promotions (Sukendia and Harianto, 2021).

E-commerce from a business point of view entails not only the sale and purchase of a product or service but also the management of a real-time communication platform and system for delivering pre-purchase information, post-buy feedback, and support (Goyal *et al*., 2019).

Managers in e-commerce are usually in charge of making critical decisions that will lead to a successful company outcome. Their decisions entail recognizing and selecting from a variety of different solutions to their challenges. Making a successful decision, on the other hand, is not an easy undertaking in today's fast-paced and difficult corporate world (Khatun and Miah, 2019).
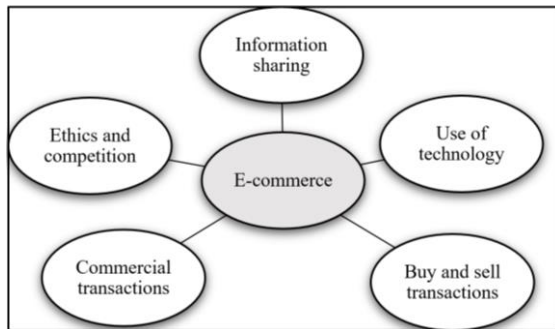
Fig. 1: E-commerce dimensions

Because of the many different definitions of e-commerce, it was discovered that it is based on five main dimensions, as illustrated in Fig. 1.

As indicated below, each of these aspects gives e-commerce specific characteristics.

Information Sharing

Relevant to information sharing, e-commerce is the electronic capture, processing, storage, communication, and delivery of information using information and communication technologies (Goyal *et al*., 2019).

Use of Technology

Relevant to the use of technology, e-commerce refers to the exchange of goods, services, and information using computer networks, especially the Internet (Goyal *et al*., 2019).

Buy and Sell Transactions

Relevant to buy and sell transactions, e-commerce is the term used to describe the buying, selling, and trading of products, services, and information over the Internet (Goyal *et al*., 2019).

Commercial Transactions

Relevant to commercial transactions, e-commerce refers to the transfer of money for business transactions using an electronic network, primarily the Internet (Goyal *et al*., 2019).

Ethics and Competition

Relevant to ethics and competition, e-commerce involves using ethical practices when conducting business online and allocating resources to gain and keep a competitive advantage in virtual markets (Goyal *et al*., 2019).

Challenges Faced by Businesses in the Business-to-Consumer Field

E-commerce firms encounter a variety of obstacles that have an impact on their capacity to compete, how they use their resources, and how they make strategic decisions in general. The key issues that firms encounter is highlighted via an analysis of research papers on e-commerce.
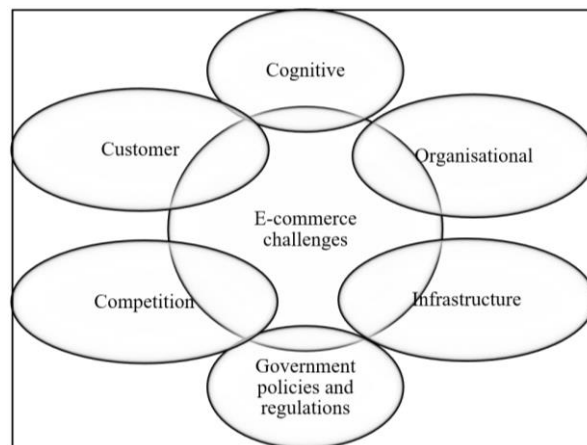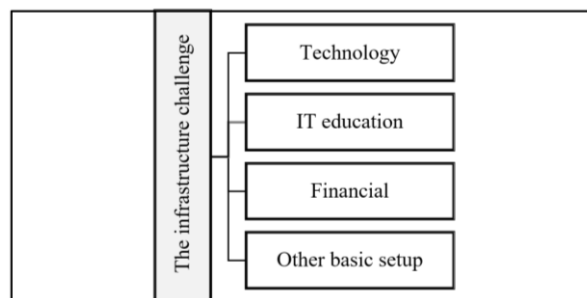

Fig. 2: E-commerce challenges

Fig. 3: Infrastructure sub-challenges

This explains the importance of understanding the features and potentials of the different challenges. Fig. 2 shows the different challenges.

Infrastructure Challenge

Infrastructure challenge is related to a deficiency in technology, IT education, finances, etc., as illustrated in Fig. 3.

Each of these sub-challenges relates to specific types of problems.

Technology: Including the internet's slow speed, insufficient connectivity, and Low adoption of the internet (Ariansyah *et al*., 2021).

IT education: Include Ignorance of technological education and Skills among the general public (Ariansyah *et al*., 2021).

Financial: This includes little financial participation (access to banking) and the bulk of the target market does not use credit cards (Ariansyah *et al*., 2021).

The other infrastructure: Including a lack of reliable roads, warehouses, transit, and electricity (Ariansyah *et al*., 2021).

Government Policies and Regulations Challenge

The issue with government policies and regulations is that they are ineffective and related to the areas, as shown in Fig. 4.
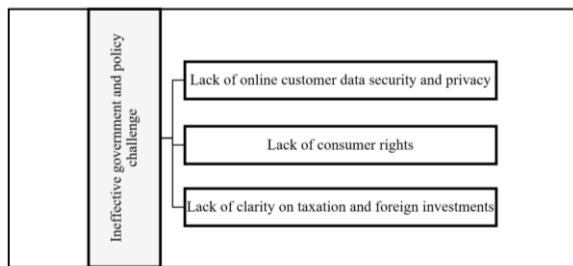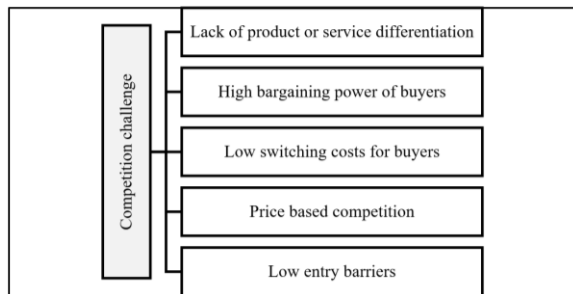
Fig. 4: Regulation sub-challenges

Fig. 5: Competition sub-challenges

Each of these sub-challenges relates to specific types of problems.

Lack of online customer data security and privacy: Refers to threats impacting e-commerce sites that have the potential to steal visitors' personal information. Phishing, card data misuse or theft, and hacking are some of the most common security and privacy issues (Martin *et al.*, 2017).

Lack of consumer rights: Refers to consumers' rights to be informed, the right to choose, the right to safety, the right to be heard, the right to have problems corrected, the right to consumer education, and the right to service (Yuthayotin, 2015).

Lack of clarity on taxation and foreign investment: Refers to more capital is taken from the hands of the business and given to the government as the tax rate rises. Accordingly, the argument claims that higher tax rates prevent business owners from reinvesting as much in their companies, which in turn results in fewer jobs (Sidik, 2022).

Competition Challenge

Competition in business refers to the rivalry between businesses that sell comparable goods and/or target the same market in an effort to outsell the competitors and grow sales, profits, and market share. Fig. 5 highlights competition sub-challenges.

As indicated below, each of these problems targets an important area in e-commerce.

Lack of product or service differentiation: Lack of what makes your goods or services distinctive to your intended market (Engelke, 2020).

High bargaining power of buyers: The pressure that consumers and customers can exert on companies to

push them to offer lower prices, better customer service, or higher-quality goods (Zhang *et al.*, 2018).

Low switching costs for buyers: Refers to Businesses that provide goods or services that are inexpensive for competitors to duplicate and provide at comparable pricing, indicating low switching costs. Low switching costs relate to the buyer. If the buyer can swiftly compare prices by walking from one store to another and locating similar deals easily (Evanschitzky *et al.*, 2022).

Price based competition: Is a marketing tactic in which price adjusts in response to changes in competitors' prices. Product pricing is only tied to competitor prices and is unattached from a customer's desire to pay or the worth of the product (Choi *et al.*, 2018).

Low entry barriers: A term used in economics and business to describe variables that can prevent or make it difficult for newcomers to enter a market or industry sector and so limit competition is "barriers to entry." These might include costly startup fees, regulatory obstacles, or other barriers that make it difficult for rival companies to enter a market (Ariansyah *et al.*, 2021).

Customer Challenge

This challenge is related to situational factors. Situational factors include things like people's circumstances, the quality of a website, merchant incentive strategies, and product characteristics (Febrilia and Warokka, 2021). Figure 6 shows its different sub-challenges.

As indicated, each of these problems targets an important area in e-commerce.

Need for Affordability: Refers to the willingness of customers to adopt price reductions, return policies, and other sales incentives while making purchases online (Bandyopadhyay *et al.*, 2021).

Accessibility and Availability: Customers like to buy when they need something and anticipate free delivery to their location (Vasić *et al.*, 2019).

Lack of Awareness of Customers: Lack of knowledge of how things actually feel and look, as well as access to accurate information about the products that various e-commerce companies offer (Billewar *et al.*, 2021).
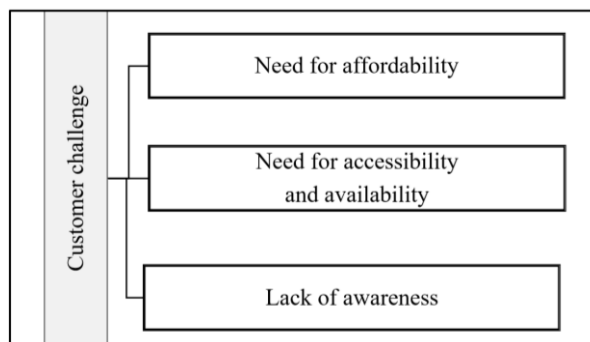
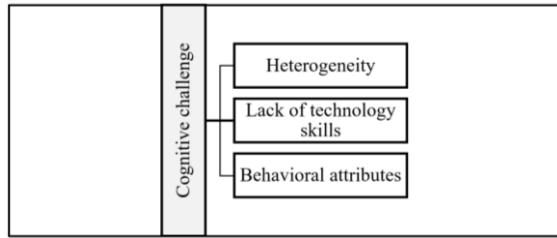

Fig. 6: Customer sub-challenges

Fig. 7: Cognitive sub-challenges

Cognitive Challenge

This challenge is related to the following factors, as illustrated in Fig. 7.

As indicated below, each of these problems targets an important area in e-commerce.

Heterogeneity: Related to the design of offerings, value creation, delivery, and value capture costs and revenues based on customers 'language, religion, culture, beliefs, and society (Zheng *et al*., 2018).

Lack of technology skills: Related to adequate language and computer skills (Rosário and Raimundo, 2021).

Behavioral attributes: Related to a lack of trust, confidence, and reliability in online media in cases like sharing private information online and making online payments (Ventre and Kolbe, 2020).

Organizational Challenge

This challenge is caused by a lack of sufficient capital and trained labor, (Schiemann *et al*., 2018) which complicates businesses' ability to meet:

- Delivery commitments
- Accessibility
- Increasing prices

Therefore, in order for a business to remain sustainable and obtain a competitive advantage, it is crucial to identify the best solution for each of these challenges.

Technologies Employed in the B2C Sector

E-commerce enterprises encounter a variety of difficulties that have a negative impact on their overall operational efficiency. As a result, a wide range of technologies and methods have been studied to address these problems. In this section, an entire body of research relevant to different technologies and methods used in this field was reviewed to find out and understand the role of each of them in solving challenges.

Personalization, website features, the internet of things, big data analytics, mobile internet, cloud computing, social media, and last-mile delivery solutions are just a few of the technologies and methodologies that have been examined to address commercial difficulties in business to consumer.

Therefore, it is essential to understand the role of each of them in the Business-to-Consumer (B2C) area.

Personalization in B2C

The key advantages of personalization in e-commerce include increase client acquisition and buy intent and a better consumer experience (Dzulfikar *et al*., 2018). According to Fig. 8, personalization features are categorized into four groups.

Architectural personalization features: It influences digital buyers' trust and makes it simple for them to complete the purchase (Dzulfikar *et al*., 2018). Figure 9 highlights its features.

Instrumental personalization features: Creating systems that are effective and usable in accordance with user requirements. Also, how to deal with information overload (Dzulfikar *et al*., 2018). Figure 10 highlights its features.
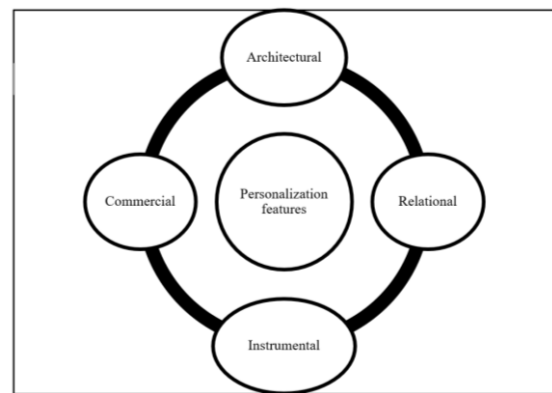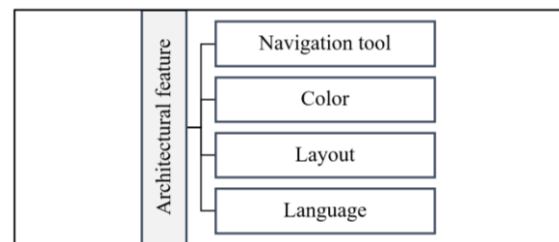

Fig. 8: Personalization features

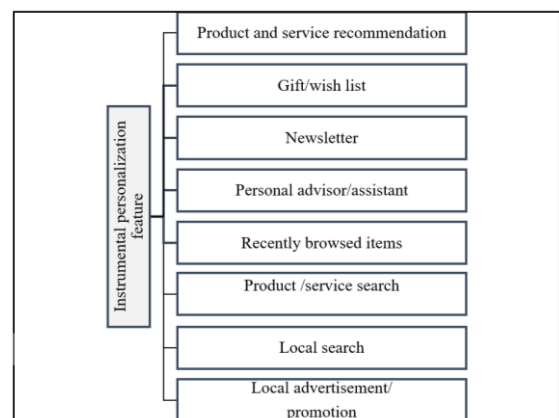**Fig. 9:** Architectural personalization features

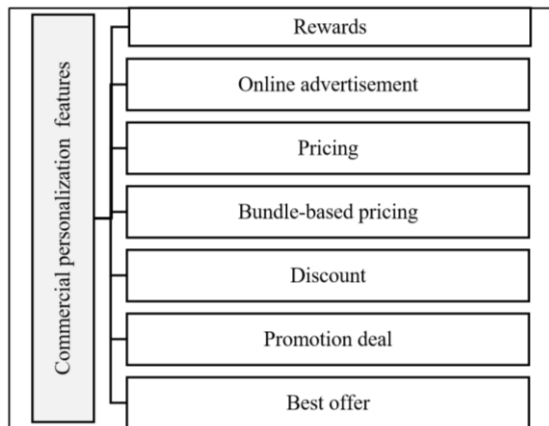**Fig. 10:** Instrumental personalization features

Fig. 11: Commercial Personalization features

- Product and service recommendations: Refers to recommended products/services based on user profiles
- Gift/wish list: A personalized wish list
- Newsletter: Personalized news or promotions to be emailed
- Personal advisor/assistant: Virtual personal assistant that serves user needs
- Recently browsed items: Displaying relevant products based on previous search history
- Product/service search: The product search feature allows users to get relevant search results
- Local search: Product/service searching based on location
- Local advertisement/promotion: Advertisement or promotional Advertisement/ feature that matches the user's GPS location (Dzulfikar *et al.*, 2018)

Relational personalization features: Encourage the development of social connections. Users are more likely to accept recommendations from social networking sites (from reliable friends or popular trends). It also contains a summary of product reviews and ratings or socially-based recommendations (Hou *et al.*, 2020).

Commercial personalization features: Figure 11 highlights its features:

- Rewards: A feature that rewards customers based on their spending or loyalty behavior
- Online advertisement: A feature in online advertising that modifies the content of advertisements in accordance with user preferences
- Pricing: Customized price based on a user's character, past purchases, or purchasing power
- Bundles-based pricing: Offering bundle-based pricing according to user preferences
- Discount: A feature that allows for the customization of discount prices based on customer loyalty, purchasing power, and past purchases

- Promotion deal: A customized feature that advertises a product depending on consumer behavior or past purchases
- Best offer: A feature that delivers a product's best deals based on user preferences (Dzulfikar *et al.*, 2018)

Last-Mile Delivery Solutions in B2C

The "final stage in order fulfillment, with the goal of getting the online-ordered goods to the final consumer" is known as last-mile delivery. It is quite costly and serves as the intermediary between retailers and customers (Mangiaracina *et al.*, 2019).

According to businesses, last-mile delivery is the least cost-effective and most expensive step in the delivery process, with prices that can reach 50% of overall logistic expenditures. Therefore, B2C e-commerce companies must be both efficient and cost-effective in order to succeed (Mangiaracina *et al.*, 2019).

Numerous studies on last-mile delivery are examined. The investigation revealed that several performance metrics relevant to effectiveness, such as delivery speed, Time leads, Punctuality, Security, and Delivery personalization had been taken into account (Patowary *et al.*, 2023)

There are numerous methods for boosting last-mile delivery. As displayed in Table 1.

Any of these solutions can be used to address a variety of issues that pertain to e-commerce delivery.

Internet of Things (IoT) in B2C

IoT, which has been characterized as a new generation of the internet contains sensing, processing, communication, and actuation capabilities that allow computation units and physical items to interact constructively, which in turn helps the development of e-commerce transactions (Hoffman and Novak, 2018).

Scale, context awareness, and reconfigurability are three key e-commerce elements that the IOT helps progress. Table 2 outlines each one's significance and benefits.

As illustrated in Table 2 Businesses that successfully deploy IoT technologies get additional benefits and acquire a competitive edge (Klisenko and Serral Asensio, 2022).

Big Data Analytics in B2C

In the B2C sector, a lot of data is produced from several sources. All of those data is offered in a variety of structured, semi-structured, and unstructured formats as a result of the heterogeneity of the data sources, which puts pressure on businesses to figure out how to use and profit from the data. Big Data Analytics (BDA) is a revolutionary innovation that presents a significant potential to get over these challenges (Cakir, 2022).

Table 1: Last-mile delivery solutions, their definition and advantages

Solution	Definition	Advantage
Reception boxes	Boxes are placed at the customers' homes, typically in the garage or the home yard, where packages are delivered (Boysen *et al.*, 2021)	• Dec. failed delivery • Inc. delivery automation
Parcel lockers	Boxes owned by a company and used by several consumers; commonly seen in public settings like supermarkets (Torma *et al.*, 2018)	• Dec. failed delivery • Inc. customer density, customer automation, and delivery home distribution
Pick-up points	Sites that offer delivery services: Clients can go there to pick up their purchases after they have been delivered (Boysen *et al.*, 2021)	• Dec. failed delivery • Inc. customer density and delivery home distribution
Drones	Unmanned aerial vehicles carrying filled with packages. Using the on-board GPS. The container is left behind when it has arrived at its destination (Boysen *et al.*, 2021)	• Dec. Traffic obstacles, resource consumption, customer density, failed delivery • Inc. transport automation and delivery automation
Trunk-parcels	Are placed in the customer's vehicle's trunk: Using a one-time-use digital key linked to the specific order, couriers unlock the trunk (Rodriguez and Reyes, 2018)	• Inc. customer density and delivery automation
Dynamic pricing	Assigning various delivery costs to various time frames (Rodriguez and Reyes, 2018)	• Dec. failed delivery and customer density
Mapping customer behavior	Data mining-based mapping of customer presence entails examining a certain parameter that is associated with the customer's presence at home (Mangiaracina *et al.*, 2019)	• Dec. Failed delivery
Underground delivery	Capsules carrying the packages are travelling through a network of underground pipelines (Turkowski and Szudarek, 2019)	• Dec. traffic obstacles, resource consumption, and customer density • Inc. transport automation
Robots	Autonomous road cars that travel along predetermined and controlled routes arrive at the consumers, who then exit the vehicle and retrieve their packages (Kocsis *et al.*, 2022)	• Inc. transport automation and delivery automation • Dec. resource consumption and customer density

Table 2: Role of IoT in B2C

Element	Definition	Advantage
Scale	It relates to four dimensions which are scope, size, space and time (Song *et al.*, 2019)	• By incorporating massive things from physical space into systems, IoT straddles the boundaries between cyberspace and physical space and explodes system scale • IoT-based e-commerce platforms have access to a greater variety of data assets (Song *et al.*, 2019)
Context awareness	Refers to the utilization of the present context to give users relevant information or services (Qiu *et al.*, 2020)	• IoT provides consumers with access to important information in cyberspace through a variety of methods, including searches and subscriptions (Qiu *et al.*, 2020)
Reconfigurability	Is the capability to refactor system elements to promptly meet needs (Song *et al.*, 2019)	• With the aid of time-effective, adaptable, and self-organized negotiation, IoT enables failing items to change their attitudes or locations (Song *et al.*, 2019)

The following list of benefits outlines the advantages of big data analytics for businesses in the B2C field:

• Intelligent deduction of short to long-term client expectations. Customers may also be given access to

personalize or neighborhood-based real-time marketing services and recommendations
- It is feasible to develop better solutions for businesses in terms of product design, resource configuration, preventative maintenance, and supply chain management by automatically evaluating the operational conditions of businesses
- Utilized to aid in decision-making and action (Song *et al.*, 2019)

Mobile Internet in B2C

The utilization of mobile devices, wireless networks, and internet services to serve customers and businesses is referred to as "mobile internet" (Taneja, 2021).

The characteristics of mobile internet include mobility, ubiquity, instantaneity, localization, and convenience (Taneja, 2021).

The following are some benefits of mobile internet for B2C:

- Businesses can use mobile devices to fulfill their respective responsibilities and to engage with their clients in a mobile way
- Working from a fixed location is no longer an option thanks to mobile internet
- By enabling businesses to function in more locations with fewer time limitations, mobile internet increases scale
- Customers can undertake e-commerce operations on their own mobile devices wherever and whenever they choose (Wong *et al.*, 2020)

Cloud Computing in B2C

A concept for providing accessible, on-demand access to a pool of configurable computing resources (such as servers, storage, and applications) is known as cloud computing. These resources can be quickly deployed and released (Song *et al.*, 2019). Systems built on cloud computing are:

- Easily available
- Highly scalable
- Economical
- Risk-averse

The following list of benefits outlines the advantages of cloud computing for businesses in the B2C field:

- A cloud computing infrastructure, platforms, and software are not only available to specific businesses but are available to others. This

example shows that cloud computing increases scale by giving businesses access to a pool coming from external resources (Sunyaev, 2020)
- Context awareness is made possible by cloud computing, which eliminates problems with computation and storage and enables clients to find optimal products or services at the optimal time (Sunyaev, 2020)
- The problem of heterogeneity between hardware and software is solved by cloud computing (Song *et al.*, 2019)

Social Media in B2C

The following list of benefits outlines the role of social media in the B2C field:

- Enables interaction between companies and their stakeholders (e.g., customers and suppliers)
- Beneficial for production, marketing, and design purposes
- Allow workers to share best practices, update on job progress and ask and respond to queries
- Assist businesses in using social networks to advise their upstream and downstream partners and to exchange information about their own operating statuses
- Assist businesses in greater customer listening, which is unattainable in the traditional model
- Connect a solitary client to a community or communities
- Help clients evaluate products before buying them, as well as assist customers with shopping choices and post-purchase actions
- Assist customers in sending requests for incoming goods and services or comments on such goods and services (Song *et al.*, 2019)

Proposed Guidance for Solving B2C Challenges

The difficulties that businesses in the B2C sector confront have an essential and crucial impact on business decision-making and its success in general, as was indicated in this study. By examining research articles, we noticed that the researchers concentrated on identifying many difficulties and a few technologies without relating which technology resolves which challenge. Therefore, as a guide for other researchers working in this sector, a solution was proposed for some of these problems. Each challenge is listed along with the suggested solutions in Table 3. This section has summarized the different technologies that can be used by researchers to solve different challenges that face businesses in the B2C area.

Table 3: A summary of various challenges' suggested solutions

Challenge	Sub challenges	Tool	Proposed solutions
Infrastructure	Financial	Mobile apps	Applications that the banks have created to promote online transactions. Customers using these apps should conduct the majority of their transactions online, eliminating the need for them to physically visit banks (Wayne *et al.*, 2020)
	Other imperfections (electricity, warehouses, Transportation roads network)	Mobile internet	Avoid working at a fixed location and reduce costs (Gillwald and Mothobi, 2019)
Government policies and regulation	Lack of online customer data security and privacy	Cloud computing with multi-level encryption	It makes it impossible for an unauthorized person to read or obtain client data without a valid key, given that they would require both encryption and decryption keys (Sharma *et al.*, 2019)
Competition	Lack of product or service differentiation	Big data analytics	Big data can be used to help clients communicate demands that have gone unsatisfied. And then Managers can create possibilities to create customer-centered goods by gathering this information. Big data is employed to engage, communicate with, and involve customers in the creation of new products that fit their preferences (Zhan *et al.*, 2018)
	High bargaining power of buyers'	Fuzzy expert system	Assessing client bargaining power aids businesses in making the best decision related to the quality of products or services provided to customers
	Low switching costs for buyers	Machine learning	Assist businesses in identifying churning consumers (Ullah *et al.*, 2019)
	Price-based competition	OR-IDSS based fuzzy logic and machine learning	Used to offer the right consumer the right pricing (Zong *et al.*, 2021)
Customer	Lack of Awareness	Internet of things	Bridges the distinction between online and offline buying and offers customers online shopping along with the essential information, they need to make purchasing decisions in the form of inquiries (Hoffman and Novak, 2018)
	Need for availability and accessibility	Last-mile delivery solutions	These technologies can increase customer involvement and provide customers with complete order status insight. Everything is available to the a customer at their fingertips, including the ability to place orders, shipping details, and delivery estimates. This enhances customers' trust and speeds up the delivery process (Mangiaracina *et al.*, 2019)
	Need for affordability	Commercial personalization features	Provide users with rewards, personalized pricing, the greatest offers on a product, and the ability to customize the discount price based on the user's purchasing power, loyalty, and past purchases (Dzulfikar *et al.*, 2018)
Cognitive	Heterogeneity	Architectural personalization features	Provide customers with a user interface tailored based on their cognitive styles which enables the color combinations of e-commerce websites in order to give aesthetic impressions, and customize the website layout and website language based on the preferences of each user (Vila *et al.*, 2021)
	Behavioral attributes	Social media	Connect an isolated customer to one or more communities, assist customers in analyzing products before purchase, and help customers to send their needs relating to incoming products and services, or to provide feedback regarding products and services. These functions are all made possible by social networking (Chekima *et al.*, 2020)
Organizational	The scarcity of organizational resources	Cloud computing using 2 tuples fuzzy linguistic decision making customers	Increase business's productivity and reduce businesses cost while providing products to (Sohaib *et al.*, 2019)

Materials and Methods

This study demonstrates the concept of e-commerce, its dimensions, and its challenges. It also identifies the various technologies that can be used to overcome these challenges such as the internet of things, cloud computing, big data, mobile internet etc. And provides proposed solutions for each challenge.

Results

Several analyses were conducted on different research in e-commerce. The first one to understand e-commerce dimensions, and to determine the challenges that face businesses in that field. The results indicated that there are various challenges that affect business sustainability in e-commerce. The second analysis was conducted on the different technologies that were used in this domain. The result indicates that there are many technologies and concepts that can be used to solve these challenges, such as personalization, Big Data, Cloud computing, the Internet of Things, social media, and mobile Internet. Finally, solutions based on the described technologies were suggested for how to deal with these challenges.

Conclusion

E-commerce has embedded itself into our daily lives and activities. In order to facilitate, enhance and improve their quality of life, people now frequently substitute online transactions for traditional ones. Understanding and defining the difficulties faced by B2C businesses is significant as a key field of research in e-commerce. This study explored the various difficulties that B2C companies have and suggested some potential solutions. The usage of various technologies to address such problems was considered. This information will enable researchers and act as a road map for resolving some of the problems businesses confront with e-commerce.

Future work: Orientation toward applying a decision support system to assist businesses in identifying e-commerce challenges that face them. And maximizing their ability in solving it.

Acknowledgment

I'd like to express our gratitude to the researchers who contributed to this study. Their invaluable contributions allowed us to complete this study successfully. I appreciate and thank them for their efforts and support, as well as their time and dedication.

Funding Information

Author's Contributions

Yehia Helmy: Reviewed article critically for significant intellectual content and gave final approval of the version to be submitted and any revised version.

Merna Ashraf: Worked on all the analyses and demonstrated them and write the article.

Laila Abdelhamid: Manuscript Proofread, edited and corrected grammar and paper flow.

Ethics

This article is original and contains unpublished material. The corresponding author confirms that all of the other authors have read and approved the manuscript and that no ethical issues are involved.

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