E-COMMERCE SYSTEM FOR E-COMMERCE BUSINESS: A CASE STUDY

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Abstract. The paper includes a study of works on technology for constructing online stores, platforms, and applications, along with the methodology in which the evaluating process used for the effectiveness of ecommerce systems. The approach is to build a mathematical model of the online store. The researchers calculated the efficacy of the strategy for organization using the mathematical equipment. Another approach is based on the practical use of e-commerce platforms. The main purpose of this study is to uncover essential design aspects that have a significant impact on e-commerce application performance. This research proposes that investigates the links between specific design aspects, actual service, and e-commerce system end achievement. To test the theoretical paradigm, an empirical investigation was done. The study found that the information phase, out of all the transaction stages, had the greatest impact on the base productivity of e-commerce systems. Product-related information, depth and variety of the system structure, variety of product list view, consistency of product and background presentation, and variety of product information presentation were all found to be closely related to the perceived quality level among the innumerable design factors related to the information phase. The study's theoretical and practical consequences are discussed towards the end of this study.
Keywords: *online store, effectiveness, e-commerce, efficacy, performance, consistency*

Introduction

In a short period of time, the Internet and the World Wide Web (WWW) have surpassed all other technological advances in our history. They've grown enormously in terms of research and application, affecting every aspect of our lives (Berners-Lee et al., 1994). A lot of fields just like manufacturing, travel and hospitality, finance, education, and government are among the industries that use the internet to develop and expand their operations. E-commerce has developed rapidly and has crossed national borders. Also, legacy information and database systems have made the transition to the internet. A new wave of mobile web apps is being sparked by advances in cellular technology and web-enabled appliances. As a result, the researchers are becoming more focused on a number of web applications. Since they rely on web-based systems and applications, they must be dependable and preferment. Web developers would need a sound methodology, a disciplined and repeatable process, better development tools, and a set of good guidelines to create these systems and applications. These criteria are fulfilled by the modern field of web engineering. It designs, deploys, and manages high-quality web systems and applications using science, engineering, and management concepts and systematic approaches. Its goal is to put the current state of chaos in web based system

creation under control, and risks, and increase the maintainability and quality of web sites (Laudon and Traver, 2014; Tian and Stewart, 2008; King and King, 2004).

In today's business climate, e-commerce is booming. Electronic trade is referred to as e-commerce. It is entails the purchasing and sale of goods and services, as well as the transmission of funds and data, over an electronic network, most commonly the internet. It is a paradigm change that affects both marketers and customer's clientele (shopping experience). On the other hand, e-commerce is more than a form of improving current market practices. It is bringing about a full shift in business practices. Around the world, this major shift in business model is exploding. A special event e-commerce has evolved as a result of widespread internet use. This alternative has become increasingly popular among start-ups as a differentiating business model. Furthermore, e-commerce has a major environmental impact. Despite the fact that the model is while commonly used in today's business setting, the alternative has yet to be fully explored. The aim of this study is to identify the current state of e-commerce and examine its trends. The study goes on to look at the main factors that decide the performance of e-commerce business models (Harn et al., 2006; Damanpour and Damanpour, 2001; Kalakota and Robinson, 2000).

The rapid spread of the internet spawned the idea and practice of e-commerce, which has since developed into a global phenomenon. Organizations and individuals alike appreciate the convenience of buying through internet-based economic systems and knowledge groups. Foreign-sourced products and services the majority of developed countries, on the other hand, are still far from this fact (Rye, 2009). The goal of the study is to look at how developing countries like Pakistan use e-commerce websites as a developing nation. The e-commerce website has been described as having a big influence on market operations, with an emphasis on resolving the geographic problem. The website is once more known as a very effective marketing tool. The main purpose of the system is to make the online e-commerce store for selling and purchasing electronics products. This will provide the easiness to the staff of the organization that will manage record at automate system instead of manual. The users can access their accounts from anywhere and can perform shopping at door step instead of going out. AMPA electronics store is a system that gives a plate-form for online selling and purchasing electronics products. Every user will be able to perform a specific job according to their needs. It's "Admin" members who will be able to perform a specific job according to the company requirements. Users will be able to get shopping services at door step and save time and effort.

The aim of this research is to evaluate the current state of the art nature of the subject by disclosing research accomplishments in the scientific literature and to identify potential future directions. According to the research, there is a vital requirement for new usability assessment techniques that are specifically designed for e-commerce applications.

Literature review

This paper addresses the various aspects of creating an e-commerce website, as well as the best approach to the problems that come with it. It is made up of the planning process, which begins with deciding the use case, domain modeling, and web application architectural pattern. The front-end development and the back-end development are the two key parts of the development process. The database architecture is also discussed, with a focal point on relational connectivity. This no-

nonsense approach to building an e-commerce website can be easily repeated and followed in developing e-commerce websites in developed and under-developed countries where computing resources are limited and costly due to socio-economic factors (Zhao et al., 2008). The number and variety of organizations producing websites is rapidly expanding. Many of these Web pages are created in-house, despite the fact that the expertise and resources needed to build a successful site might not be available. It is argued that by following an informal website development model and effective usability strategies, some of the limitations in terms of resources and expertise inherent in the small-scale in-house development environment can be overcome (Goi, 2012). An analysis of development case studies and published web research literature was used to establish an informal development model. The key stages and tasks of growth are defined by this model. An analysis of existing information collection and usability practices is incorporated into the model. It is addressed how important it is to consider the needs of both consumers and information providers. Following that, a range of traditional usability strategies are discussed in greater depth. The model and methods are tested for their suitability in a small-scale in-house development environment (Lee and Koubek, 2010).

The usability and assurance that it will suit its function, as well as how simple it is to be user friendly, reliable, and successful, are all important aspects of interface web creation. Non-responsive architecture is widely used in interface web creation by the majority of usability standards. Responsive web design is a recent trend in interface web creation. Because of the high demand for user-friendly interfaces in websites, the responsive web design methodology is gaining popularity. A collection of techniques used during the layout stage of a project is known as responsive web design. As a consequence, it is vital to dive deeper into the best usability theory for interface web creation that can be applied to responsive web design. The aim of this research is to discuss the most relevant usability concepts in responsive web design, which is a recent trend in web interface creation. The data in this study was analyzed using the content analysis tool like consistency, familiarity, versatility, efficient input, and aesthetically appealing are the five usability standards most suitable for responsive web design, according to the findings. The established usability principles assist in the development of a website that is more visually pleasing, reliable, and customized to various devices when browsing without zooming in, and all pages are sized appropriately (Wang and Emurian, 2005; Udo and Marquis, 2002).

Any e-commerce venture will be incomplete without a corporate website. If users find electronic transactions challenging, they may turn to another online source or go to a physical location. While there has been some attention paid to assessing the output of e-commerce web sites in recent years, there is still a pressing need for a more systematic approach (Chang et al., 2003). This study fill the void by introducing an e-commerce web site evaluation structure and approach based on sound business concepts, as well as using multi-dimensional scaling to appraise evaluation data and present the findings graphically for easy understanding (Bezes, 2009; Joia and de Oliveira, 2008). Despite numerous guidelines for adaptive interaction strategies and technologies from researchers and, more recently, commercial companies, there is no experimental evidence of their usefulness to consumers. For an e-commerce web site that sells and funds computing equipment, user studies are conducted to assess the perceived importance of a range of personalization features. The findings of this research have implications for the creation of user-adaptive apps (Dzulfikar et al., 2018; Alotaibi,

2013). Users also had mixed feelings about collaborative filtering in the e-commerce scenarios. As a result, personalization features that are common in one e-commerce environment might not be successful or useful in another. Users shared a deep desire to have total control of their data and interactions. Finally, users want to be able to easily interpret site behavior (Jiang et al., 2019).

Materials and Methods

Visual Studio (VS) 2019 is an integrated, complete solution with development tools, cloud services and extensions that enables you and your team to create great applications and games for desktops, the web, Windows Store, Android and iOS. So, the VS are used for the logical models of the e-commerce project. C# is used as a backend language while Java script is also used for front design and HTML, CSS and bootstrap is used for front end. For the description of working flow, use cases are used for every flow. There are two types of relations in which Include and Extend properties are used as use-cases. *Figure 1* shows the relationship in between both of the properties of use cases. *Figure 2* describes the research according to the domain model along its features such as admin, customer, company-detail, product, order, category and account.
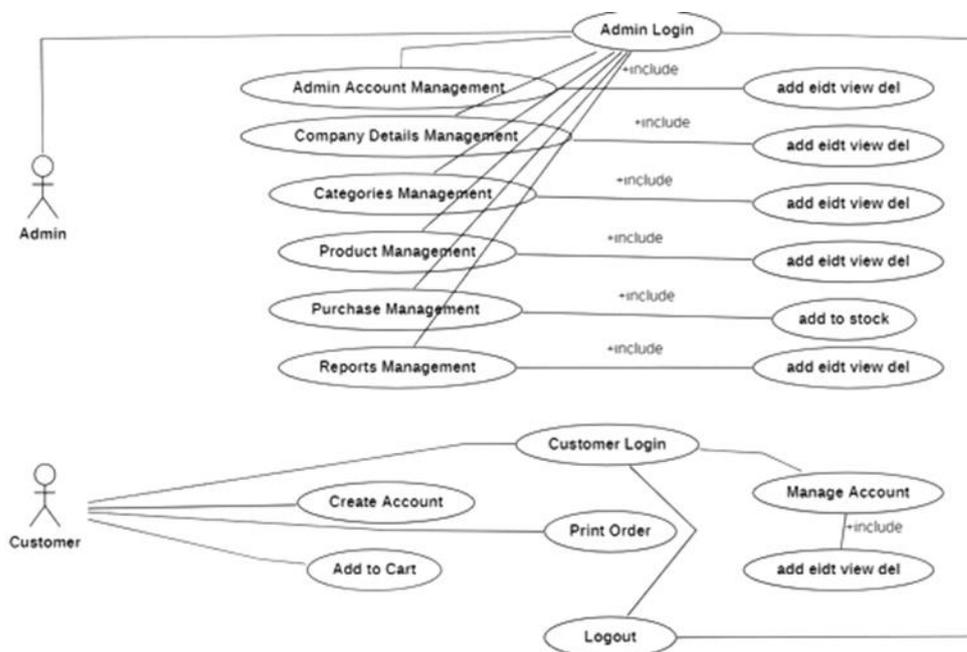

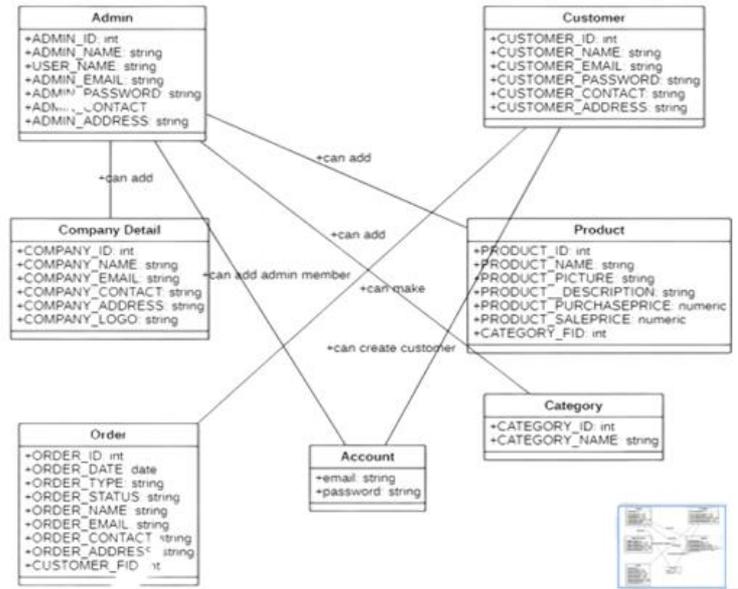***Figure 1.*** *The admin login procedure.*

Figure 2. *E-commerce procedure regarding domain model.*

Figure 3 to *Figure 12* as sequence flow of working is illustrated their results as their own categories for the ordering along purchasing terms.
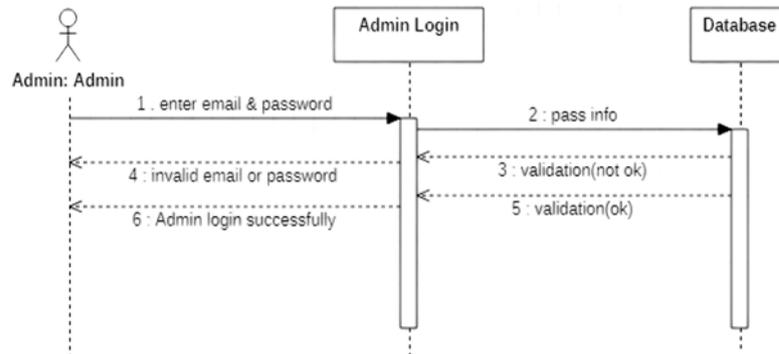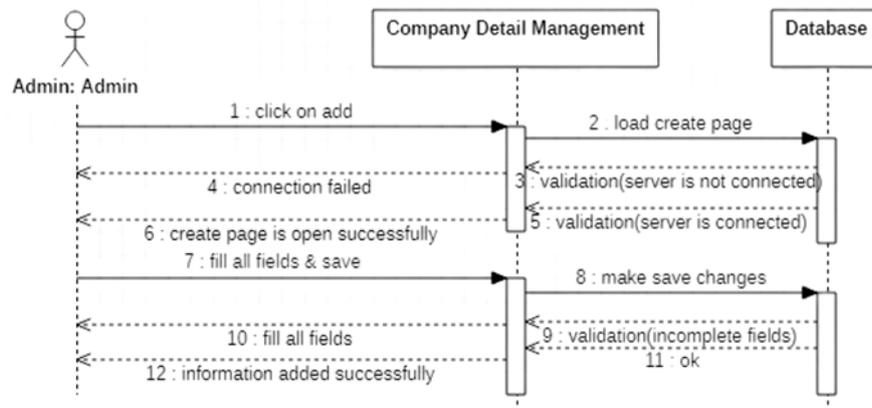

Figure 3. *Admin login sequential flow.*

Figure 4. *Company details management sequential flow.*

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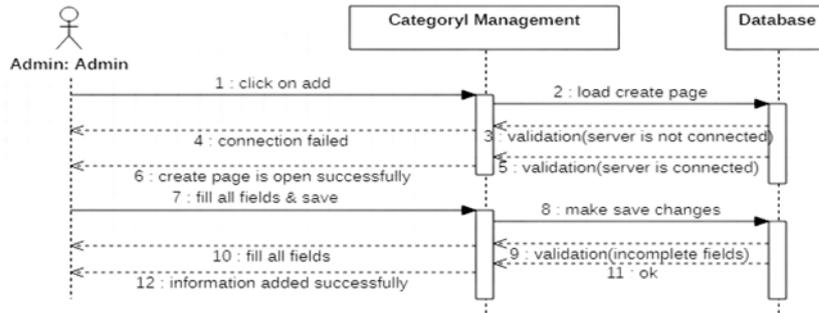
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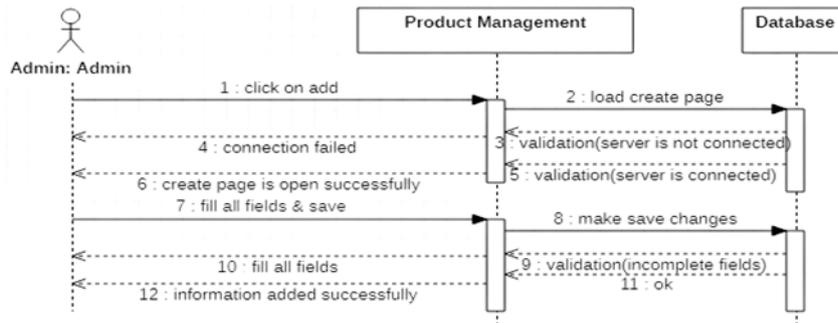**Figure 5.** *Category management sequential flow.*

Figure 6. *Product management sequential flow.*
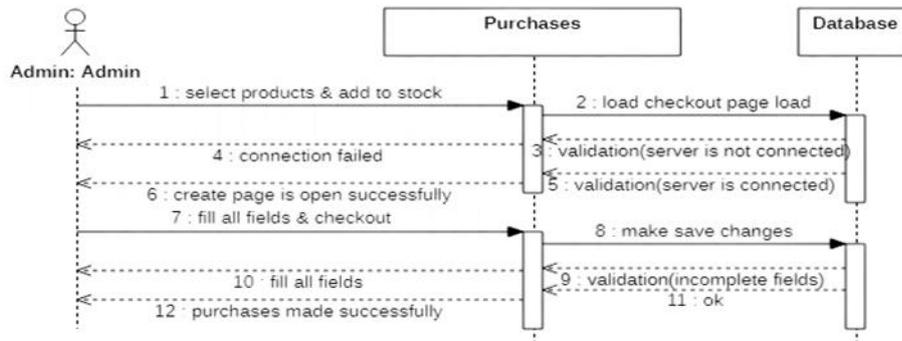

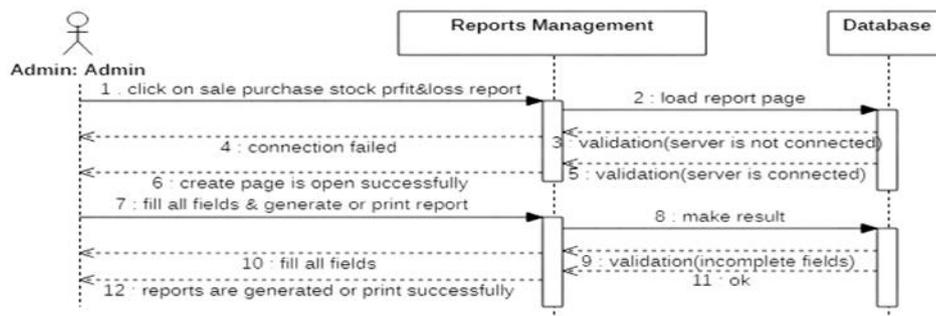**Figure 7.** *Purchases as sequential flow.*

Figure 8. *Reports management sequential flow.*
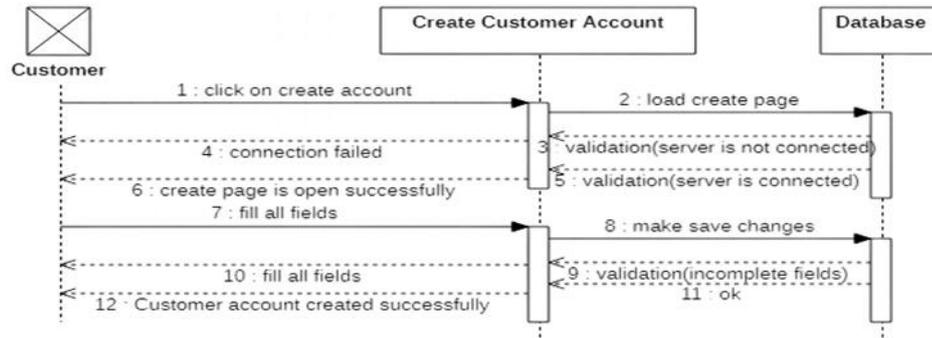
Figure 9. Customer create account sequential flow.
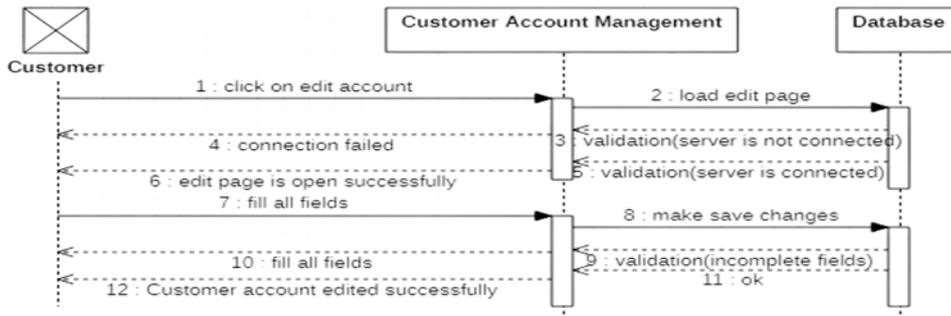
Figure 10. Customer account management sequential flow.
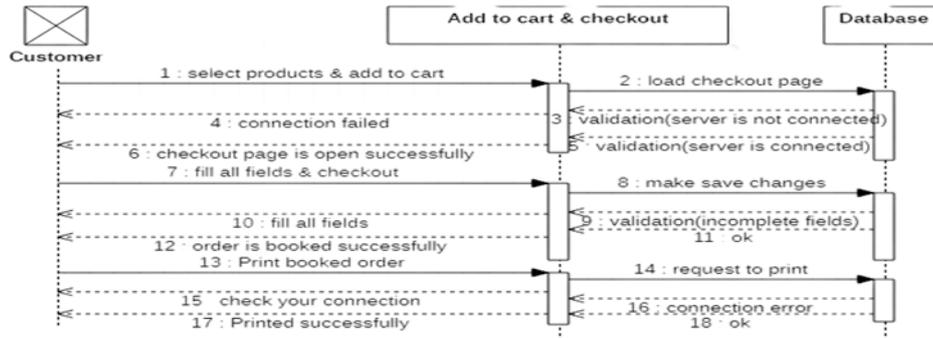
Figure 11. Add to cart, check-out and printing order sequential flow.
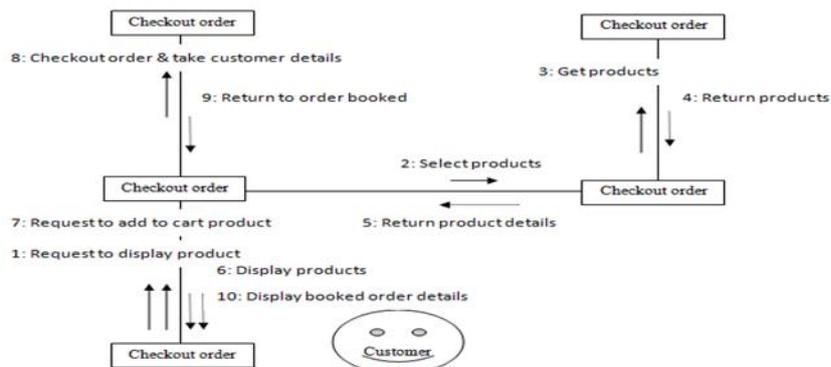
Figure 12. Collaborated flow of the different entities.

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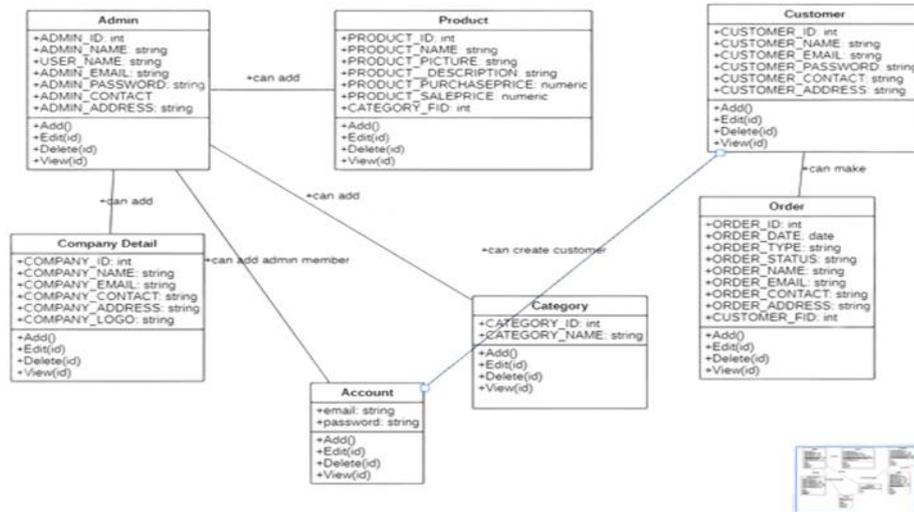
Figure 13. *Class diagram for AMPA electronics store.*

For data model, *Figure 14* and *Figure 15* described the flow of the activities with their own operations in which the procedures are used to take the good results.
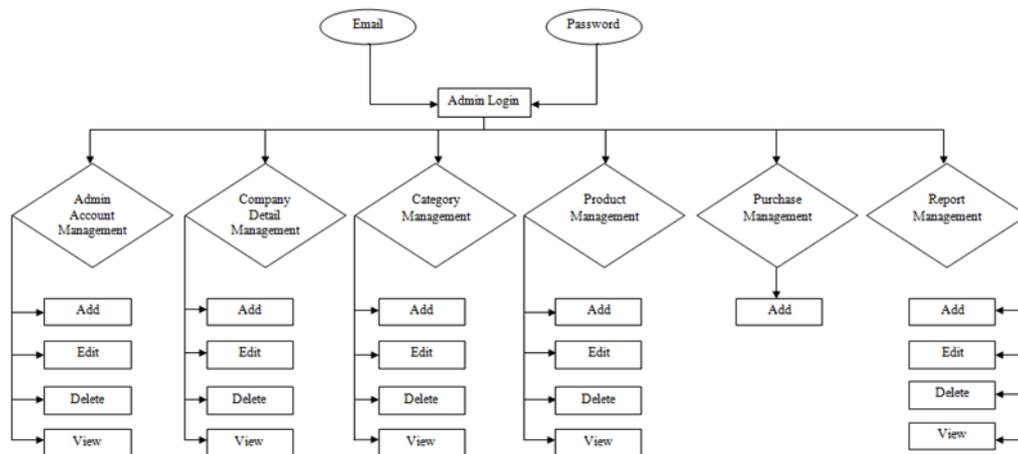
Figure 14. *Data model for Admin.*
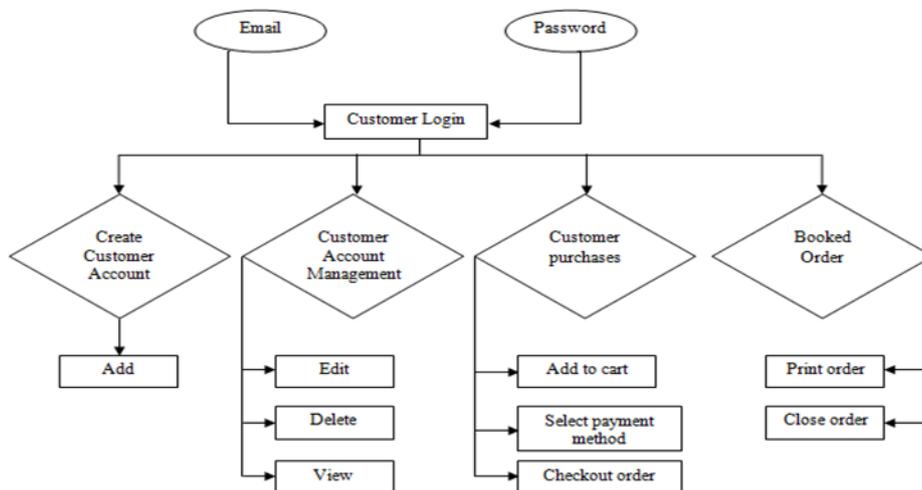
Figure 15. *Data model for customer.*

Results and Discussion

This section is start with the use cases of admin and customer along their operations. On the foundation of these operations, different types of pre and post conditions applied on the system and get the classical and alternative flows which described in *Table 1*. The process by which admin log into the respective account gives basic and alternative flow as illustrated in *Table 2*.

Table 1. *The use cases of admin entity along its main operations.*

| Name	Operations	Primary actor	Pre-conditions	Post-conditions
Admin account	Admin login	Administrator	-Actor is registered -Server is on -Login page is successfully loaded	-Admin login successfully
	Admin add new admin account	Administrator	-Actor is logged in -Server is on -Add new accout form which is provided to admin	-New admin account is added successfully
	Admin edit account	Administrator	-Add account form must be provided with saved information	-Account is updated succeffully
	Admin delete account	Administrator	-Account must be registered first	-Account is deleted successfully.
	Admin view account	Administrator	-Account must be added in database	-Account is displayed successfully
Categories	Admin add new catagories	Administrator	-Actor is logged in -Server is on -Add new categories from which is provided to admin	-New category is added successfully
	Admin edit categories	Administrator	-Categories form must be provided with saved information	-Category is updated successfully
	Admin delete categories	Administrator	-Category must be registered first	-Category is delete successcully
	Admin categories view	Administrator	-Category must be added in database	-Category is displayed successfully
Products	Admin add products	Administrator	-Actor is logged in -Server is on -Add product form which is provided to admin	-Product is added successfully
	Admin edit products	Administrator	-Product form must be provided with saved information	-Product is updated successfully
	Admin delete products	Administrator	-Product must be registered first	-Product us deleted successfully
	Admin view products	Administrator	-Product must e added in database	-Product is displayed successfully.
Company's details	Admi add company's details	Administrator	-Actor is logged in -Server is on -Add company's details form which is provided to admin	-Company's details are added successfully.
	Admin edit company's detail	Administrator	-Company's details form must be provided with saved information	-Company's details are upldated successfully
	Admin delete company's details	Administrator	-Company's detail must be registered first	-Company's details are deleted successfully.
	Admin view company's details	Administrator	-Company'd details must be added in database	-Company's details are

				displayed successfully
Purchase products	Admin purchase products (add to stock)	Administrator	-Actor is logged in -Server is on -Add stock form which is provided to admin	-Product is added to stock successfully
Sale report	Admin generate sale report	Administrator	-Actor is logged in -Server is on -Manage sale report page which is provided to admin	-Sale report is generated successfully
	Admin print sale report	Administrator	-Actor is logged in -Server is on -Manage sale report page which is provided to admin	-Sale report is printed successfully
Purchase report	Admin generate purchase report	Administrator	-Actor is logged in -Server is on -Manage purchase report page which is provided to admin	-Purchase report is generate successfully
	Admin print purchase report	Administrator	-Actor is logged in -Server is on -Manage purchase report page which is provided to admin	-Purchase report is printed successfully
Stock report	Admin generate stock report	Administrator	-Actor is logged in -Servier is on -Manage stock report page which is provided to admin	-Stock report is generated successfully
	Admin print stock report	Administrator	-Actor is logged in -Server is on -Manage stock report page which is provided to admin	-Stock report is printed successfully
Profit & loss report	Admin generate profit & loss report	Administrator	-Actor is logged in -Server is on -Manage profit and loss report page which is provided to admin	-Profit and loss report is generated successfully
	Admin print profit & loss report	Administrator	-Actor is logged in -Server is on -Manage profit and loss report page which is provided to admin	-Profit and loss report is printed successfully

Table 2. *Use-case of admin login basic and alternative flow.*

Basic flow	Alternative flow
-The use starts when the actor opens login page from the website. -The website will display the login screen. -Admin provides the admin email and password. -The website validates and admin email and password. -The website will set access permissions. -The website will display the main screen.	-Error message will be displayed. If admin email or passwaord fields are empty. -Error message will be displayed if admin email or password is invalid.

Admin add new admin account use-case describes the process by which admin can add new admin account to the system shows in *Table 3*. This procedure is same for the Admin when admin add new categories and Admin add products use-case describes the process by which admin can add products to the system. Admin add company's details use-case describes the process by which admin can add company's details to the system.

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Admin purchase products (add to stock) use-case describes the process by which admin can add stock to the system.

Table 3. Use-case of admin add new admin account of basic and alternate flow.

Basic flow	Alternative flow
-The use starts when the actor opens add new account page from the website. -The website will display along add new account screen. -Admin provides the new account's information. -The system will save the new admin account information and update the database.	-Error message will be displayed. If admin does not fill the required fields.

Admin edit account use-case describes the process by which admin can modify the account as presents in *Table 4* and also same as for when Admin edit the categories. Besides this, when edit categories design for alternate flow than Error message will be displayed if category is not found. Admin edit products use-case describes the process by which admin can modify the product and if the product is not found than error message will be displayed. Admin edit company's details use-case describes the process by which admin can modify the company's details when its details not found than the error message will be displayed.

Table 4. Use-case of admin edit account of basic and alternate flow.

Basic flow	Alternate flow
-Admin selects the desired account. -Modify the specific account information. -The system saves the updated information and updates the database.	-Error message will be displayed. If admin does not fill the required fields.

Admin delete account use-case describes the process by which admin can delete the account according to the *Table 5*. Same procedure is followed for Admin delete category whereas the use-case describes the process by which admin can delete the category. Admin delete products use-case describes the process by which admin can delete the product. Admin delete company's details use-case describes the process by which admin can delete the company's details.

Table 5. Use-case of admin delete account of basic and alternate flow.

Basic flow	Alternate flow
-Admin selects the desired account. -Admin deletes the selected account. -The system saves changes and updates the database.	-Error message will be displayed. If account is not found.

Admin view account use-case describes the process by which admin can view the specific account and this procedure shows in *Table 6*. Admin view category use-case describes the process by which admin can view the specific category same procedure can follow up. Admin view products use-case describes the process by which admin can view the specific product as the process of Table 6. Admin view company's details use-case describes the process by which admin can view the company's details.

Table 6. Use-case of admin view account of basic and alternate flow.

Basic flow	Alternate flow
-Admin selectes the desired account.	-Error message will be displayed. If account is not found.

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-View the specific account information.

Admin generate/print sale/purchase/stock/profit-loss report use-cases describe the process by which admin can generate/print sale/purchase/profit-loss report from the system described in *Table 7*. Besides Admin, Customer entity have different types of pre and post conditions which applied on the system and get the classical and alternative flows whereas illustrated in *Table 8* with full set of description.

Table 7. *Use-case of admin generate/print sale/purchase/stock/profit-loss report of basic and alternate flow.*

Basic flow	Alternate flow
-The use starts when the actor opens manage sale/purchase/stock/profit-loss report page from the website. -The website will display to manage sale/purchase/stock/profit-loss report screen. -Admin provide the sale/purchase/stock/profit-loss report information and click the generate/print report button. -The system will generate/print the sale/purchase/stock/profit-loss report.	-Error message will be displayed. If admin does not fill the required fields.

Table 8. *Use-cases of customer entity along its main operations.*

Name	Operations	Primary actor	Pre-conditions	Post conditions
Customer account	Customer create account	Customer	-Server is on -Customer create account page is successfully loaded.	-Customer is created account successfully.
	Customer login	Customer	-Actor is registered -Server is on -Customer login page is successfully loaded	-Customer login successfully
	Customer edit account	Customer	-Actor is logged in -Server is on -Edit account form is provided to user	-Customer is modified account successfully
	Customer delete account	Customer	-Actor is logged in -Server is on -Delete account page is provided to user	-Customer account is deleted succesffuly
	Customer view accont	Customer	-Actor is logged in -Server is on -View account page is provided to user	-Customer account is displayed successfully
Book order	Customer book order (add to cart)	Customer	-Actor is logged in -Server is on -Products page is provided to user	-Order is booked successfully
	Customer print booked order	Customer	-Actor is logged in -Server is on -Booked order page is provided to user	-Booked order is printed successfully
Logout	Logout	Administrator, customer	-Actor is logged in -Server is on	-Actor logged out successfully

Customer create account use-case describes the process by which customer can create a new account is as follows as *Table 3*. Customer login use-case describes the process by which Customer log into the respective account and this process is as same as *Table 2*. Customer edit account use-case describes the process by which user can edit account as *Table 3*. Customer delete account use-case delete the respective account of user as *Table 5* while customer view account use-case view the respective account as same as *Table 6*. Customer book order (add to cart) use-case describes the process

through user can add to cart desire products as briefed in *Table 9*. Customer print booked order use-case describes the process by which user can print booked order just as *Table 10*. Logout use-case describes the process by which admin/user logged out the respective account as *Table 11* procedure.

Table 9. *Use-case of customer book order (add to cart) of basic and alternate flow.*

Basic flow	Alternate flow
-Customer add to cart product and after checking out the order or making payment, customer requests the system for booking order. -System books the order and display order booked page.	-Error message will be displayed. If the fields for checking out order are not filled.

Table 10. *Use-case of customer print booked order of basic and alternate flow.*

Basic flow	Alternate flow
-Customer prints the order after booking and requests the system to print it. -System prints the booked order.	-Error message will be displayed. If the order is not booked.

Table 11. *Use-case of admin/customer logout of basic alternate flow.*

Basic flow	Alternate flow
-Actor logged out from the system. -Session that maintains the actor information will be removed.	-Database connection is not properly created.

Now, the UML operation contracts identify the changes in system when an appropriate operation is done. It identifies what each operation does. Therefore, all the operations explain with necessary details are present in *Table 12*.

Table 12. *UML operations contracts of admin and customer.*

Name	Responsibilities	Exceptions	Pre-conditions	Post condition
Admin or customer login	Admin or customer log into respectvive account on website login page	None	-Page is properly loaded -Connection is established to server	-A login instance was created -Instance is connected to database
Admin account management (add, edit, delete, view)	Desire account are managed	None	-Admin is logged in -Page is properly loaded -Connection is established to server	-Admin accounts were managed
Company details management (add, edit, delete, view)	Desire company details are managed	None	-Admin is logged in -Page is properly loaded -Connection is established to server	-Company details were managed
Company management (add, edit, delete, view)	Desire categories are managed	None	-Admin is logged in -Page is properly loaded -Connection is established to server	-Categories were managed
Products management (add, edit, delete, view)	Desire products are managed	None	-Admin is logged in -Page is properly loaded -Connection is establised to server	-Products were managed
Purchase management (add, products to stock)	Desire purchases are managed	None	-Admin is logged in -Page is properly loaded -Connection is established to server	-Purchases were managed
Report management (sale purchase, stock, profits & loss (generate & print)	Desire reports are managed	None	-Admin is logged in -Page is properly loaded -Connection is establised to server	-Reports were managed
Create customer account	Desire accounts are created	None	-Page is properly loaded -Connection is established to server	-Customer accounts were created

Customer account management (edit, delete, view)	Desire accounts are managed	None	-Customer is logged within respective account -Page is properly loaded -Connection is establised to server	-Customer accounts were managed
Customer purchases (add to cart)	Customer add to cart desire products and book order	None	-Page is properly loaded -Connection is established to server	-Customer order was booked
Print booked order	Customer print booked order	None	-Page is properly loaded -Connection is eatablised to server	-Customer order was printed

Conclusion

This study examined that how to convert manual shopping system into online shopping system and give better services to customer by using e-commerce web apps and also how to make web apps for e-commerce. Using this, different organizations will have the ability to manage their records with automate system. In results, the work will be performing fast using low resources and even the customers of that organization will get shopping services at door-step easily. By the progress of technology, these techniques will be useful in future where everything is going online. COVID-19 has had a major influence on international e-commerce. What was once a gentle growth slope has now become a sharp and steep incline, necessitating the introduction of new strategies to improve conversion rates? In this context, web usability has taken centre stage and is now commonly regarded as the most critical aspect to consider. Any interactive application's quality and performance is affected by this factor. Currently, there is a sizable usability of computer-based software is the topic of a body of knowledge.

Acknowledgement

Conflict of interest

The authors confirm that there is no conflict of interest involve with any parties in this research study.

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