

Design and Implementation of a Web-Based Electronic-Commerce System

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Abstract — The Internet opens up a new horizon for us and has a tremendous impact on our daily lives, including shopping. The Internet-based electronic commerce (e-commerce) has given the business and shopping concept a new dimension that makes buying and selling necessary goods and products more convenient and accessible. There is no doubt that e-commerce will play a prominent role in the eventual success of future businesses, and the efficient architecture of the e-commerce system will play a significant role in that success. In this paper, we present a design and implementation of a web-based e-commerce system called campus accessories that focuses on the four fundamental business issues of attracting, interacting, acting, and reacting. The system presented here focuses on the business-to-customer e-commerce system to provide a more efficient approach to handling online shopping. Because of this application, university students can make an easy approach to buying and selling necessary products.

Key words — e-commerce, Human well-being strategy, Online shopping, Web-based application.

I. INTRODUCTION

Information and communication technology has the potential to play a significant role in the development and improvement of strategies for distributing services and solutions in the business sectors, and the advancement in information and communication technology is considered the next wave of revolution following the agricultural and industrial revolutions [1]. Electronic commerce (e-commerce), which is a noteworthy application of the multipurpose use-ability of modern information and communication technology, refers to a wide range of online economic activities for products and services that significantly influence people's daily lives. It is frequently linked with online buying and selling or any transactions incorporating the transfer of ownership or privileges towards using items and/or services across the Internet or other computer networks.

E-commerce has created a new dimension and fascination in purchasing products and services in the current world through technology such as the Internet [2]. We even feel more interested in touching the item online to get a greater sense of its form, size, and value. Why venture out somewhere when all you have to do now is only choose the product, place an order with a payment method, select a shipping service, and then relax and wait for your purchase to be delivered straight to your doorstep. Moreover, the COVID-19 pandemic forced us to think newly and use the advantages of information and communication technology to maintain social distances, which is the key to preventing

infections. Different shopping is the major part of our daily lives and coming peoples in contact with each other. Therefore if we can shop distantly, then it will reduce the chance of COVID-19 infection by a huge amount, and e-commerce is showing us a solution here.

E-commerce has been widely adopted in developed countries in advances of information and communication technology. Moreover, in today's world, the e-commerce sector is very important across both developed and emerging nations. It has a significant impact both on the regional and global economies. According to recent study reports, e-commerce has a favorable impact on the real advancement of the country's economy, and this participation will be continued to grow [3]. There seems to be no dispute that the trend of technology advancement will raise an organization's overall sales and production. The growth of e-commerce is dependent on people's ability to use the services of information and communication technology.

The usage of e-commerce in low and medium-income countries is very limited, while some sectors are leading. The contribution of the e-commerce market to GDP is almost 2.5% in Bangladesh now. Population in Bangladesh is currently estimated to be around 164.6 million [4], according to the Bangladesh Bureau of Statistics, and the number of internet subscribers is around 90 million [5], according to the Bangladesh Telecommunications Regulatory Commission, and this number is increasing because of the noticeable improvements in information and communication sector. Moreover, because of the COVID-19 pandemic and widespread use of the Internet, the contribution of e-commerce is significantly increasing. As a result, the impact of e-commerce on Bangladesh's economy is unlikely to be overlooked. Bangladesh is massively expanding its competence in this area after witnessing and analyzing the efficiency of the e-commerce marketplace. Moreover, the huge advancement in the information and communication sector is showing us a new possibility.

Therefore, there is a lot of possibility and room for development to make e-commerce more convenient and easily accessible. In this study, we are interested in designing and implementing a web-based e-commerce system that mainly focuses on university campus accessories. We finally tested the e-commerce system, and customer satisfaction is high.

II. LITERATURE REVIEW

Daily human life has seen enormous changes due to advancements in information and communication technology. Hundreds of local and global networks, including

private, public, academic, business, and government networks, contribute to the creation of the Internet, and multipurpose uses it is a significant advancement in the modern world [6]. The Internet has a significant impact on the globe and people's daily lives, particularly on business, because it can serve billions of users worldwide. It has paved the way for e-commerce to flourish that is becoming more popular as a means of conducting business [7].

There are many different sorts of e-commerce, but the most prevalent are Business-to-Business (B2B), Business-to-Consumer (B2C), and Consumer-to-Consumer (C2C). The B2B deals business-to-business transactions in which merchandise is sold through a third-party intermediary [8]. According to Gupta et al. [9], this sector accounts for almost 80% of all e-commerce. A business deal between a manufacturer and a wholesaler, or a wholesaler and a retailer, is an example of B2B. Again, the business that is handled directly between the wholesaler and consumers via a website is the B2C model [10]. Organizations and companies exchange goods and services to customers over the Internet for personal use in the B2C model. Finally, the C2C is the most rapidly expanding sort of e-commerce. Businesses only provide a venue for advertisers to market their products, and customers can purchase them straight from the vendor [8]. Businesses facilitate the setting where consumers buy and sell goods and services directly to one another in the C2C model.

The survey found that young consumers are more comfortable and happy while completing online purchases [11], which also pleased the merchants by making the operation simple to complete. The Internet and e-commerce, as we all know, are completely dedicated to every developed nation. But, if an appropriate business goal can be found, we believe it can be realized and provide a significant benefit to poor countries. E-commerce, according to Hasan *et al.* [12], is a breakthrough and a turning point in online business strategies that can provide a significant contribution to the economy. According to the United States Census Bureau [13], the manufacturing industry is the greatest provider of e-commerce, accounting for 47.4% of total shipments, followed by vendors, accounting for 28.6% of total sales.

E-commerce is also becoming popular in Bangladesh with

improvement in information and communication sectors and contributing to national economics. Inspired by this direction, this paper shows the design and implementation of a B2C e-commerce system.

III. METHODOLOGY

The methodology includes analyzing the system requirements, designing the system architecture, implementing using appropriate development tools, and finally, integrating and testing. The details of each are given in the following subsections.

A. System Requirements

The most crucial aspect of obtaining a thorough picture of interactions among actors and the platform is to conduct a system requirements analysis. The top view of the system is shown in Fig. 1(a), and the customer, administrator, and employee are the three main actors. We analyzed the system's requirements from the customer, administrator, and employee perspectives of view. From the customer's perspective, the e-commerce system interfaces must be attractive and contain enough information, in addition to being easy-to-use, have a higher level of security in a convenient payment method, simple, speedy, and secure registrations and login processes. Furthermore, the system must be multi-platform, accessible via PC, laptop, smartphone, or tablet. Customers should be able to connect with the authority for any questions they may have, as well as track their orders. From the perspective of the administrator, the databases must be simple to handle and manage. They should be able to simply add new administrators and employees and keep the system up to date. Employees should be able to simply add new products, and modify product descriptions and prices.

B. System Architecture

The next phase is to design the system after the requirements have been examined and determined. Here, we highlighted only the complete interaction method between the customer and the e-commerce system. Fig. 1(b) depicts the activity diagram of the customer.

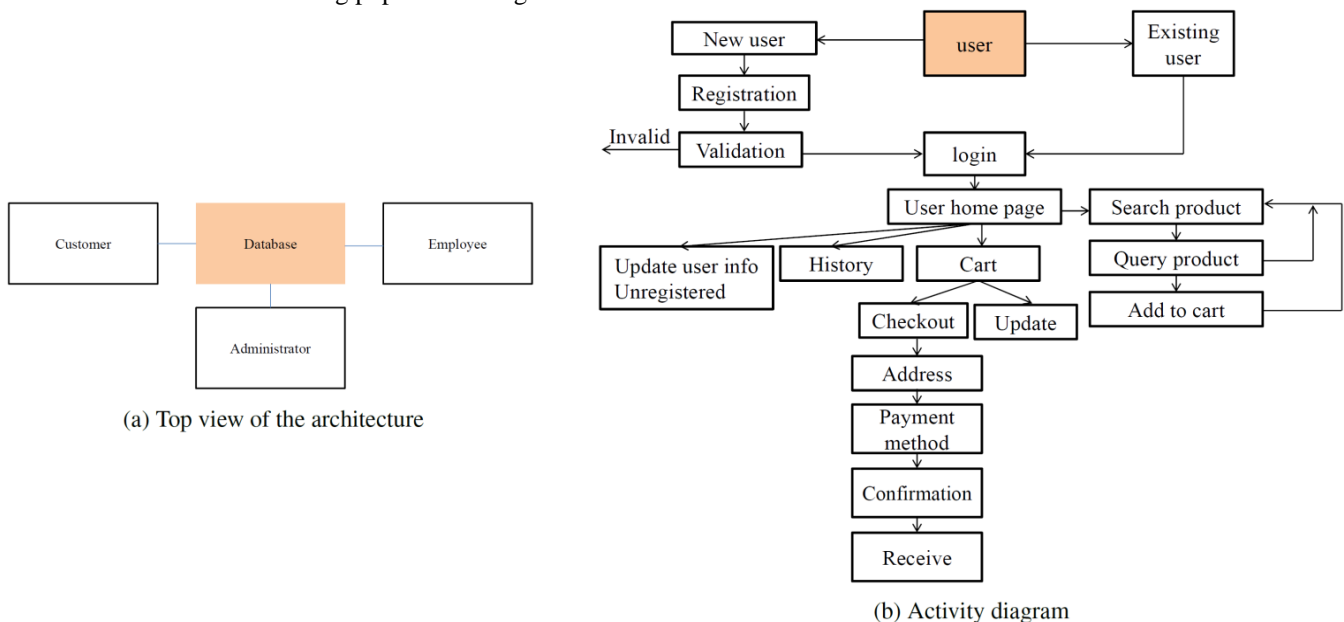


Fig. 1. Overview of the e-commerce system architecture and activity diagram.

C. Implementation

The implementation of the designed system needs to consider three technical parts, namely framework, database, and front-end development.

Framework: The selection of the appropriate framework is an important step that makes the implementation process accessible. There have many frameworks where Django, Angular JS, Laravel, Spring, Rails, and similar, are prominent frameworks. The Django is one of the most suitable ones, which carries many prominent features. It is a stable and portable high-level web framework based on Python, which has thriving and active community support, and after all, Python has many machine learning libraries such as sklearn, keras, etc, that make it easy to handle machine learning related tasks in the e-commerce systems. It also enables the rapid development of scalable, secure, and maintainable websites. Moreover, it is free, open-source, and supports different kinds of databases like MySQL, PostgreSQL, etc, with strong security integrated into the framework like SQL injection prevention, XFrame prevention, etc. We used Django, considering these factors.

Database: We used MySQL for database development which is fully compatible with Django. MySQL is an open-source relational database management system that is particularly well suited to quick development. It provides data security and enhances customer interactions. Moreover, the MySQL database with Xampp provides a good graphical row and column structure view. It is chosen for speedy development in addition to the strong transaction support to secure online transactions provided by MySQL. It is useful for testing the projects and modifications offline.

Front-end: Attractive visual appearances, easy navigation, and simple usability are significant aspects of the profitability of an e-commerce system. People are more likely to return to shop if it is visually appealing in addition to the good services. Users like to interact with photos that are high quality and real, but the speed with which the pages load is critical. The threshold for e-commerce website acceptability is said to be two seconds [14]. Branding is also important to all businesses. The design and placement of the brand's logo carry overall importance. We take all these factors into account when creating the website. Therefore, we used the Django framework compatible HTML and CSS for front-end development.

Finally, testing was carried out to ensure that the deployed e-commerce system met the design criteria and functioned effectively across a variety of devices.

IV. RESULTS AND DISCUSSION

Fig. 2 shows the screenshots of the developed e-commerce system that includes a few important parts: front page, products page, registration, login, and finally, contact methods. The front page is the initial page of a website, as seen in Fig. 2(a). To attract customers, we put as much information as possible that is displayed while loading time is at a minimum of 3-4 seconds at most. The campus accessories tab will direct the user to the main product page that contains the products list. Only the administrator has the right to add any product, update its price or delete any product. Product Page, as shown in Fig. 2(b), displays several major categories. In the details view, the products on this website are divided by categories and brands. Customers can have a closer look at any product by moving their mouse over the image in the product details section. If the customer wishes to buy a product, they have to add it to the shopping cart. They can add multiple products at a time. To complete the order, they need to checkout with registration and login using the required information, and complete the process by putting the delivery address and payment method.

Payment is a crucial component of e-commerce once you want to purchase products. Two payment methods are commonly used; the first one is cash on delivery, payment is accomplished after the goods, items, and services are delivered, and the second one is processed by a credit or debit card, which is accepted globally. In addition, mobile banking such as Rocket, BKash, SureCash, mCash, and similar is the most popular and convenient that is the most often utilized payment method in Bangladesh. Because of the high context culture, it is very important to develop trust among the people interested in a transaction, and the latter is regarded as a convenient payment platform for Bangladeshi people. Therefore, we selected two payment methods; card and mobile banking. After completing an order, there is a system where customers can track their order. In addition, customers can contact the authority in any necessity using a contact way, as shown in Fig. 2(d).

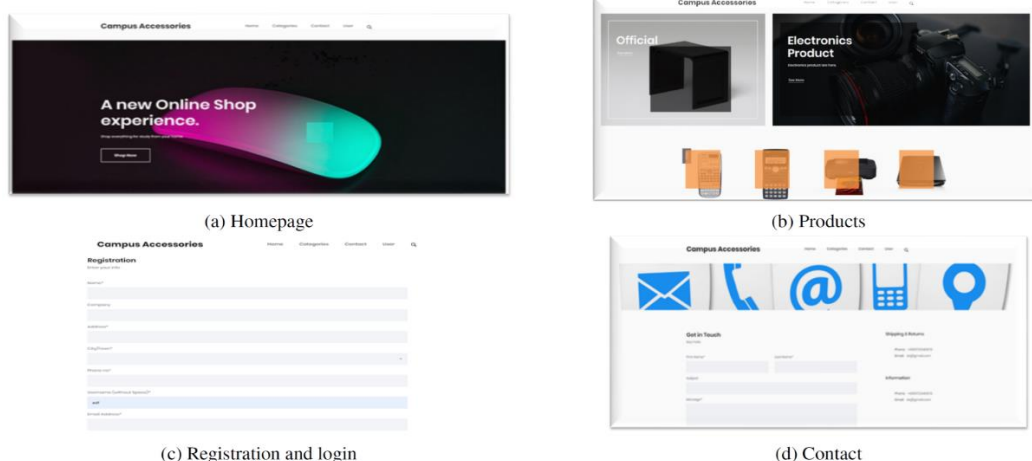


Fig. 2. Outcomes of the developed e-commerce system

V. CONCLUSION

E-Commerce has changed our lifestyles entirely in addition to saving money and time. With the help of e-commerce application development, one can speed up the pace of the online business. It is one of the most cost-effective ways to do business, as e-commerce expansion has reduced the cost of service and product advertisement. There are no time constraints when it comes to marketing the merchandise. Even at midnight, one can log in to the e-commerce system and buy things with a simple mouse click. An online store that is engaging, user-friendly, and targeted can create a lot of business. In this study, we develop an e-commerce system for Bangladeshi people focusing on university campus accessories. All of the facilities developed and tested here will make life easy, enabling online shopping and protecting us from COVID-19 infections. It will be expanded in the near future to many different sectors in order to increase effectiveness.

REFERENCES

- [1] Khan MS, Mahapatra SS, Sreekumar NA. Service quality evaluation in internet banking: an empirical study in India. *International Journal of Indian Culture and Business Management*, 2009 Jan;2(1):30-46.
- [2] Nanekaran YA. An introduction to electronic commerce. *International journal of scientific & technology research*, 2013 April;2(4):190-193.
- [3] Belkhamza Z, Wafa SA. The role of uncertainty avoidance on e-commerce acceptance across cultures. *International Business Research*, 2014 May 1;7(5):166.
- [4] BBS, <http://www.bbs.gov.bd/>, accessed on March 18, 2022.
- [5] BRTC, <http://www.btrc.gov.bd/>, accessed on March 18, 2022.
- [6] Castells M. The impact of the internet on society: a global perspective. *Change*. 2014 Sep 8;19:127-148.
- [7] Ngai EW, Wat FK. A literature review and classification of electronic commerce research. *Information & Management*, 2002 Mar 1;39(5):415-429.
- [8] Pandey D, Agarwal V. E-commerce transactions: An empirical study. *International Journal of Advanced Research in Computer Science and Software Engineering*, 2014 Mar;4(3).
- [9] Gupta A. E-commerce: Role of e-commerce in today's business. *International Journal of Computing and Corporate Research*, 2014 Jan;4(1).
- [10] Dan C. Electronic commerce: State-of-the-art. *American Journal of Intelligent Systems*, 2014;4(4):135-141.
- [11] Moon NN, Sultana S, Nur FN, Saifuzzaman M. A literature review of the trend of electronic commerce in Bangladesh perspective. *Global Journal of Management and Business Research*, 2017 Jul 25;17(3B).
- [12] Ohidujjaman, Hasan M. & Huda MN. E-commerce Challenges, Solutions and Effectiveness Perspective Bangladesh. *International Journal of Computer Applications*, 2013 May;70(2):9-17.
- [13] United States Census Bureau, <https://www.census.gov/>, accessed on March 10, 2022.
- [14] Yunus A, Masum M. Design and Development of an E-Commerce system in a rapid organized way. *International Journal of Science and Research*, 2020 March, 9(3)1368-1375.