Project Report on

A Web Based System for E-Commerce

Software Development Project-III

Course Code: CSE-300

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Submission Date:20 February, 2023

Acknowledgement

A project is a golden opportunity for a student to learn and self-development. We consider ourselves very lucky and honored to have so many wonderful people who lead us in the completion of this project.

We are also thankful to **Prof. Dr. Md. Sheikh Sujan Ali,** Head of the department, CSE for giving us the lab facilities to accomplish this project.

Our thanks and gratitude to our honorable supervisor, **Dr. Tushar Kanti Saha** who despite being extraordinarily busy with his duties, took time out to hear, guide, and keep us on the correct path. We do not know where we would have been without him.

Last but not least there were so many who shared valuable information that helped in the successful completion of this project.

Abstract

The web-based system for E-commerce is needed to assist small to medium-sized businesses to manage their inventory, sales, and store operations as well as provide an online platform for their business. The goal of this project is to develop a web-based e-commerce system for running a real-time online business. To meet this goal, we have developed the system - using PHP, JavaScript, MySQL, HTML5, CSS3, etc. Our system includes a complete suite of e-commerce solutions including an Admin panel, Employee panel, Product searching to product ordering, and keeping track of financial data and transactions of the business.

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1 Introduction

A very important and basic need of today's modern business world is the quick availability and processing of information using a computer. One can easily get the type of required information within a fraction of a second. The project that we have taken is also in this category which is used in our daily life whenever we want to purchase some items online so that we can easily get them at our home.

E-commerce (electronic commerce) (Kim, 2010) is the buying and selling of goods and services, or the transmitting of funds or data, over an electronic network, primarily the internet. These business transactions occur either as business-to-business (B2B), business-to-consumer (B2C), consumer-to-consumer or consumer-to-business. The terms e-commerce and e-business are often used interchangeably.

Our project provides such an e-commerce based solution for a single small to medium-scale business.

1.1 Motivation

E-commerce is a necessity for a modern business to thrive. Especially the large customer outreach on the web, ease of use, and excellent cost-to-benefit ratio makes it a must for a business. Web-based solutions provide a better platform for e-commerce as it provides better UI, faster response time, and better affordability for various sizes of business. Also, the majority of the customers have a habit of using web services for purchases when they come to shopping online to save time of shopping.

We wanted to take advantage of such facts and develop a system that would benefit a business to provide better service to their customers and lower operational costs for their accounts and sales.

1.2 Purpose of the Project

The purpose of the project is to build a web-based system that meets the user requirements (requirements of the business) while offering enough adaptability for future changes.

Moreover, our goal is to provide a platform to sell products online, keep track of the inventory as well as automate the accounting or bookkeeping process of the business & create features for the admin to control the content of the websites as dynamically as possible without any help of experts.

1.3 Scope of the Project

The scope of the project includes developing a web-based system for E-commerce that will be applicable to small to medium-sized businesses. That will aid in the process of running business operations like keeping track of transactions and basic accounting as well as provide an online presence through a website.

The features of this project include:

For customers:

- A customer view of the website to browse products catalog and filter products.
- Leave a review of products.
- Contact the shop authority.
- Place order online.

For business owners and employees:

- Admin panel for changing the content of the website dynamically
- Auto generation of financial reports
- Track inventory automatically.
- Confirm orders.
- Set up or approve employee accounts for access to limited admin features.

1.4 Outline

We discuss the requirements of the system in Chapter 2. We show the development methodology of the e-commerce system in Chapter 3. The process of development, UI of the system along with the tools required for its implementation is shown in Chapter 4. In the final chapter or Chapter 5, we describe its current limitations and possible future improvements.

2 Requirements Specifications of Our System

A requirement specification is a process of writing down the user and system requirements in a document. Ideally, system requirements should be clear, unambiguous, easy to understand, complete, and consistent. In practice, this is difficult to achieve as stakeholders interpret the requirements in different ways and there are often inherent conflicts and inconsistencies in the requirements. For a system, the functional and non-functional requirements should be described so that they are understandable by system users who don't have detailed technical knowledge. For better understanding, they should specify only the external behavior of the system. The requirement document should not include details of the system architecture or design. System requirements are the expanded versions of the user requirements that are used by software engineers as the starting point for the system design. They add detail and explain how the user requirements should be provided by the system. They may be used as part of the contract for the implementation of the system and should therefore be a complete and detailed specification of the whole system. (Audiopedia, 2017)

2.1 Functional Requirements

The functional requirements for a system describe what the system should do. These requirements depend on the type of software being developed, the expected users of the software, and the general approach taken by the organization when writing requirements. When expressed as user requirements, functional requirements are usually described in an abstract way that can be understood by system users. However, more specific functional system requirements describe the system functions, its inputs, and outputs, exceptions, etc., in detail.

Functional system requirements vary from general requirements covering what the system should do to very specific requirements reflecting local ways of working or an organization's existing systems. The functional requirements of the "Web Based system for E-commerce" are as follows:

Customer Modules:

- Customers can browse a product catalog
- Customers can select and place the order for the product

Admin/Business Owner Modules:

- The admin can register an account and verify employee accounts

- Admin can log in and logout
- Admin can recover his forgotten password
- Admin can update product database, see financial statements and reports and change certain settings.

2.2 Non-Functional Requirements

Non-functional requirements, as the name suggests, are requirements that are not directly concerned with the specific services delivered by the system to its users. They may relate to emergent system properties such as reliability, response time, and store occupancy. Alternatively, they may define constraints on the system implementation such as the capabilities of I/O devices or the data representations used in interfaces with other systems. Non-functional requirements are often more critical than individual functional requirements. Non-functional requirements arise through user needs, because of budget constraints, organizational policies, the need for interoperability with other software or hardware systems, or external factors such as safety regulations or privacy legislation.

The implementation of the requirements may be diffused throughout the system. There are two reasons for this:

1. Non-functional requirements may affect the overall architecture of a system rather than the individual components.
2. A single non-functional requirement, such as a security requirement, may generate several related functional requirements that define new system services that are required.

2.3 Types of Non-Functional Requirements

Non-functional requirements are three types.

2.3.1 Product Requirements

These requirements specify or constrain the behavior of the software. Examples include performance requirements on how fast the system must execute and how much memory it requires, reliability requirements that set out the acceptable failure rate, security requirements, and usability requirements.

Product requirements of the "Web-based E-commerce system" are:

- The website must be accessible from all popular browsers.
- The load time should be as low as possible.
- The website should contain details of all available products of the business.

2.3.2 Organizational Requirements

These requirements are broad system requirements derived from policies and procedures in the customer's and developer's organization. Examples include operational process requirements that define how the system will be used, development process requirements that specify the programming language, the development environment or process standards to be used, and environmental requirements that specify the operating environment of the system.

The organizational requirements of our system are:

Software Requirements:

Specification	Description
Platform	Web
Database	MySQL
Server	Apache

Hardware Requirements:

This system is an online-based web application. Therefore, a device with web browsing capability can access this site.

2.3.3 External Requirements

This broad heading covers all requirements that are derived from factors external to the system and its development process. These may include regulatory requirements that set out what must be done for the system to be approved for use by a regulator, such as a central

bank; legislative requirements that must be followed to ensure that the system operates within the law, and ethical requirements that ensure that the system will be acceptable to its users and the public.

For our system, external requirements include:

- Not break any laws of the nation.
- Ensure that customer data is handled with secrecy and consent.
- All required digital permissions are explained.
- All activities should follow all laws according to the “consumers' rights law”.
- Explain all policies including refund, purchase, money transaction, and liabilities in case of failure of any kind beforehand.

3 Methodology

In this chapter, we discuss software design and how to define a system model. We also discuss software and hardware tools that need for system development. Moreover, we discuss the reasons behind selecting the model.

Software design is the process by which an agent creates a specification of a software artifact, intended to accomplish goals, using a set of primitive components and subject to constraints. Software design may refer to either "all the activity involved in conceptualizing, framing, implementing, commissioning, and ultimately modifying complex systems" or "the activity following requirements specification and before programming".

3.1 Architectural Design

Architectural design is concerned with understanding how a system should be organized and designing the overall structure of that system. In the model of the software development process, architectural design is the first stage in the software design process. It is the critical link between design and requirements engineering, as it identifies the main structural components in a system and the relationships between them. The output of the architectural design process is an architectural model that describes how the system is organized as a set of communicating components. Architectural decomposition is usually necessary to structure and organize the specification. In practice, conceptual views are almost always developed during the design process and are used to support architectural decision-making. (Xiaohui Wang, 2010) They are a way of communicating the essence of a system to different stakeholders. During the design process, some of the other views may also be developed when different aspects of the system are discussed, but there is no need for a complete description from all perspectives.

3.1.1 Architectural Data Flow of the Application

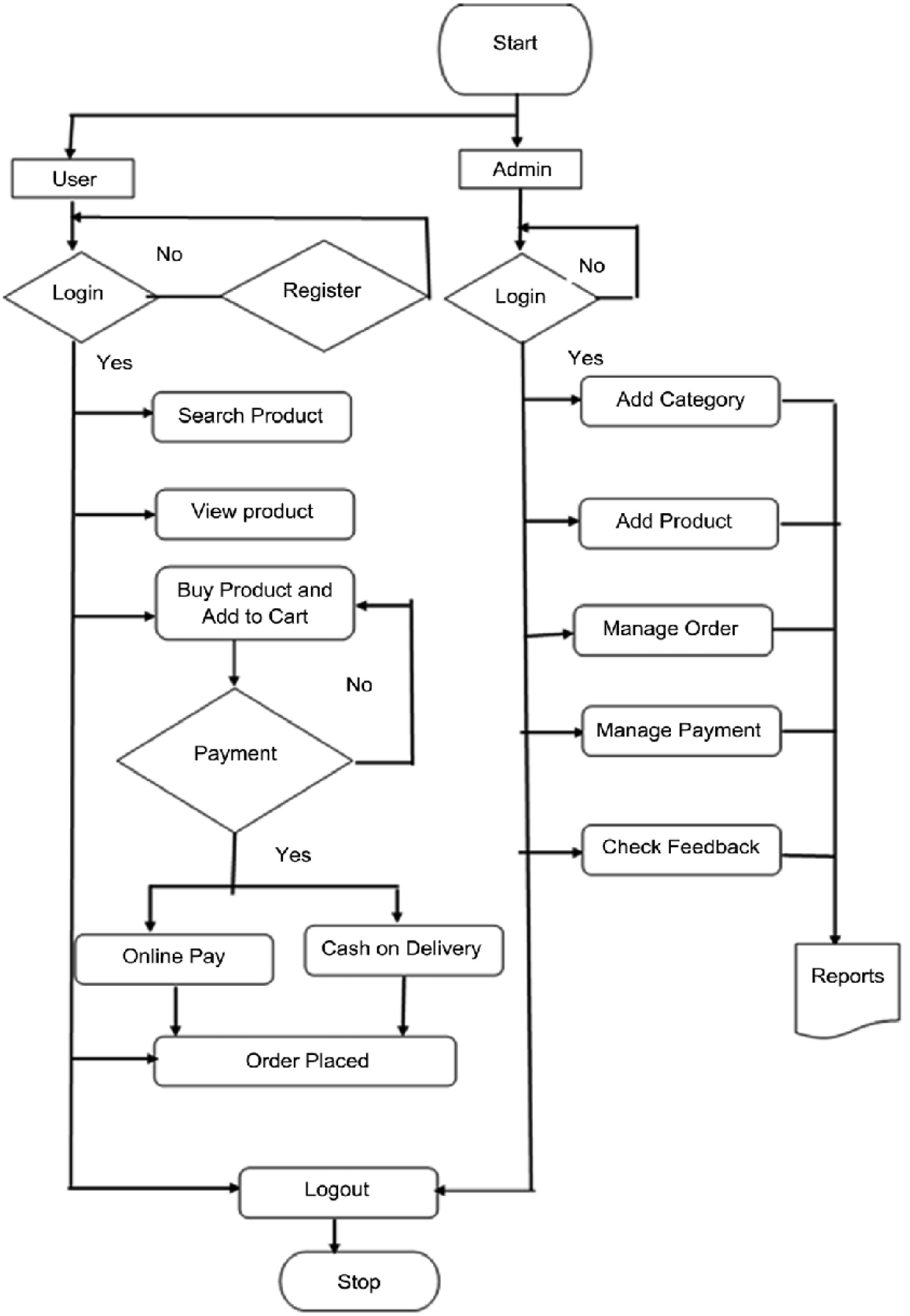


Figure 3.1: Data flow of our e-commerce system

The flowchart gives an overall idea of the system as shown in Fig.1. It also generalizes the basic functionalities of the system. As we can see in the flowchart, at step one we can login to the system as either a user or as an admin. Users after opening the website will see the user view. They will view and search for products, and add desired products to the cart. They can then either proceed to buy the product and place an order or update the cart again before ordering. After ordering they can simply logout.

In case user is logged in as admin they will be taken to the admin dashboard. The dashboard has multiple functionalities for controlling the content of the website and modifying and viewing the contents of the database such as adding a new product to inventory, seeing pending orders, customer details, generating invoices, etc. The admin can simply logout to exit the system.

3.2 Software Model

A system model is a conceptual model because system modeling describes and represents a system. A system comprises multiple views such as planning, requirement (analysis), design, implementation, deployment, structure, behavior, input data, and output data views. A system model is required to describe and represent all these multiple views.

There are various software development models or methodologies. They are as follows:

- Waterfall model
- V model
- Incremental model
- RAD model
- Agile model
- Iterative model
- Spiral model
- Prototype model

In this project, we have used the "incremental method" for the processing of the **"Web Based E-commerce system"**.

3.3 The Incremental Model

In the incremental model, the whole requirement is divided into various parts. Multiple development cycles take place here, making the life cycle a ―multi-waterfall‖ cycle. Cycles are divided up into smaller, more easily managed modules. Each module passes through the requirements, design, implementation, and testing phases. A working version of the software is produced during the first module, so we have working software early on during the software life cycle. Each subsequent release of the module adds functionalities to the previous release. The process continues till the complete system is achieved.

In the diagram below when we work incrementally, we are adding piece by piece but expect that each piece is fully finished. Addition of the pieces continues until it's complete.

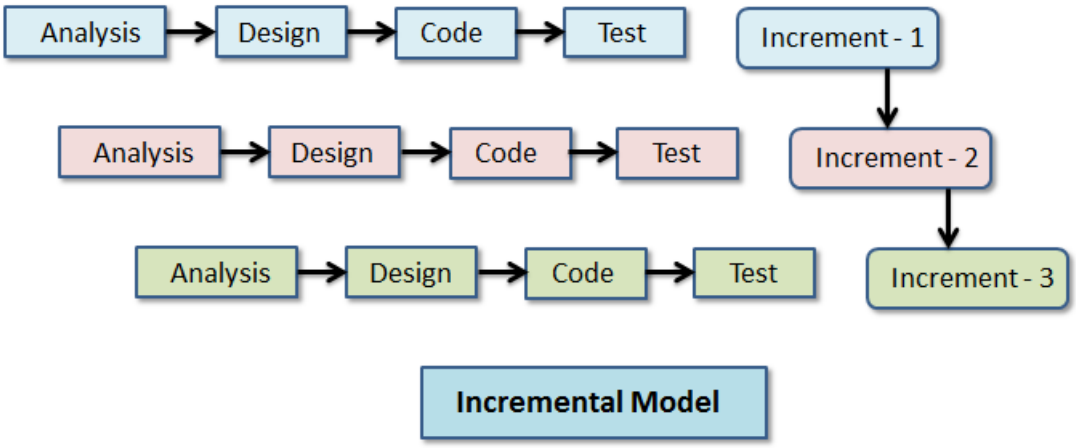


Figure 3.2:Incremental Model

3.4 Benefits of the Incremental Model

- Generates working software quickly and early during the software life cycle.
- More flexible and less costly to change scope and requirements.
- Easier to test and debug during a smaller iteration.
- Customers can respond to each build.
- Lowers initial delivery cost.
- Easier to manage risk because risky pieces are identified and handled during iteration

3.5 Selecting the Incremental Approach

It is necessary to determine whether the system to be built is suitable for incremental or not. This is decided depending on the application area, complexity, and projects characteristics. We choose it for the following reasons:

- The requirements of the complete system are clearly defined and understood.
- The incremental model improves the quality of software day by day.
- Major requirements must be defined. However, some details can evolve with time.
- There is a need to get a product to the market early.
- A recent technology is being used.
- Resources with the needed skill set are not available.
- There are some high-risk features and goals.

3.6 Software Development Tools

A software development tool is a computer program that software developers use to create, debug, maintain, or otherwise support other programs and applications. The term usually refers to relatively simple programs, which can be combined to accomplish a task, such as one might use multiple hand tools to fix a physical object. The ability to use a variety of tools productively is one hallmark of a skilled software engineer. The most basic tools are a source code editor and a compiler or interpreter, which are used ubiquitously and continuously. Other tools are used more or less depending on the language, development methodology, and individual engineer, and are often used for discrete tasks, like a debugger or profiler. Tools may be discrete programs, executed separately – often from the command line – or may be parts of a single large program, called an integrated development environment (IDE).

Therefore, to develop this system the required tools will be hardware, software, and programming language.

3.7 Hardware Support

- 64-bit Microsoft Windows 8/10
- Processor –Core-i7
- Hard Disk – Minimum 1 GB Space
- Memory – Minimum 8GB RAM

3.8 Software Support

- IDE – Visual Studio Code
- Database – MySQL
- XAMPP

3.9 Programming Language

As our system is a web-based application, we used PHP, HTML, CSS, JS to develop our system. We also used MySQL Database as our database & SQL for database manipulation.

4 Software Implementation

4.1 Development of the System

To achieve the deliverable of acceptance and meeting of objectives, the new system being built must be tested. The construction phase does two things: builds and tests a functional system that fulfills business or organizational design requirements and implements the interface between the new system and the existing production system. The project team must construct the database, web programs, user and system interfaces, and networks. (Ong, 2019) Developing a system includes programs and structured databases. The stages of development of our system are described below:

4.1.1 User Interface

The user interface is the communication between a user and the system. In our proposed system, there are two types of users: Customers and admins.

4.1.1.1 Customer View

<u>Home Page</u>: Opening the web address of the website opens the home page. Here one can choose how they want to use the app, either as a customer or as an admin.

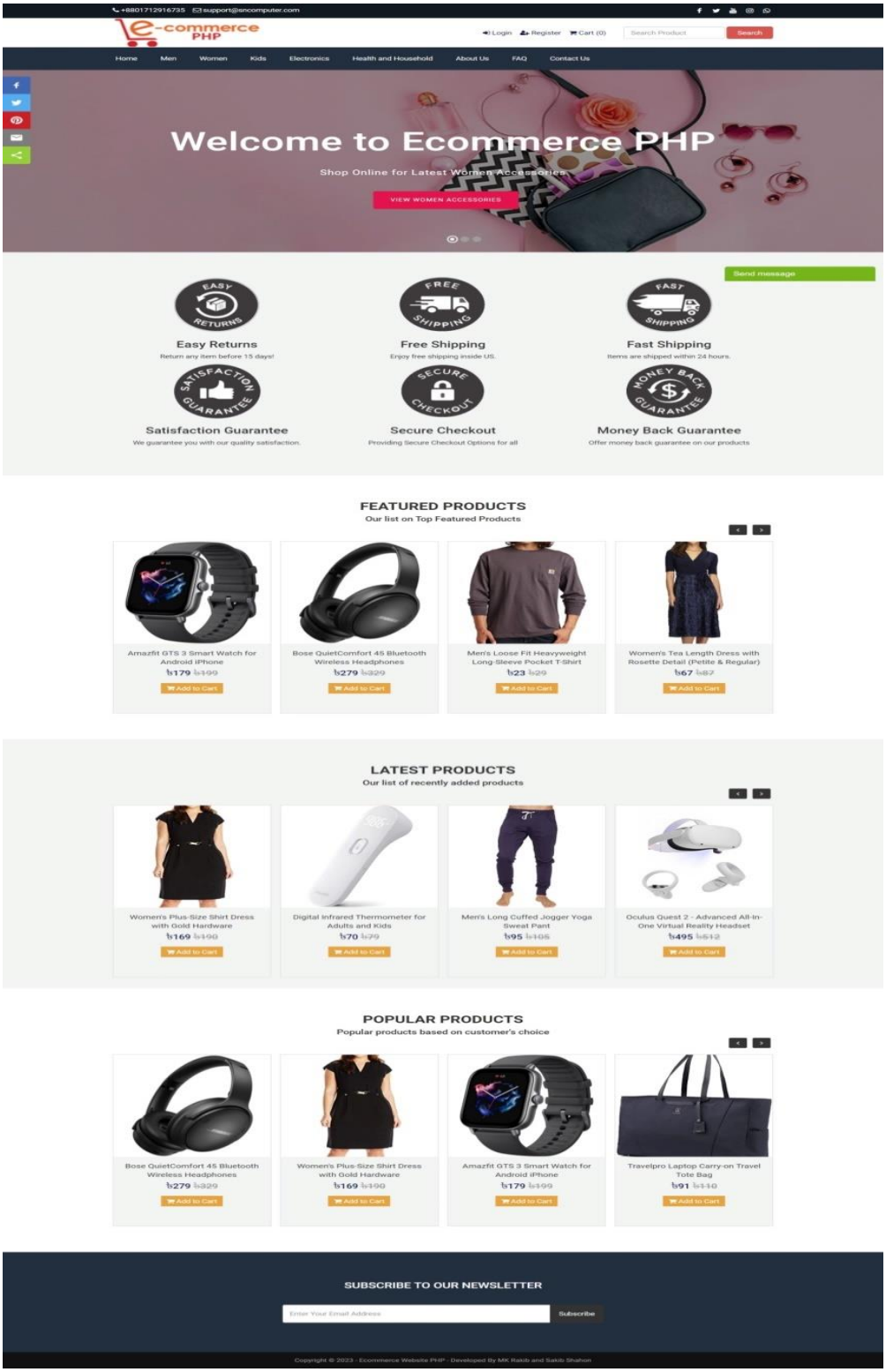


Figure 4.1: Homepage

Search product: The search bar at the top right side can filter products based on the name of the searched item.

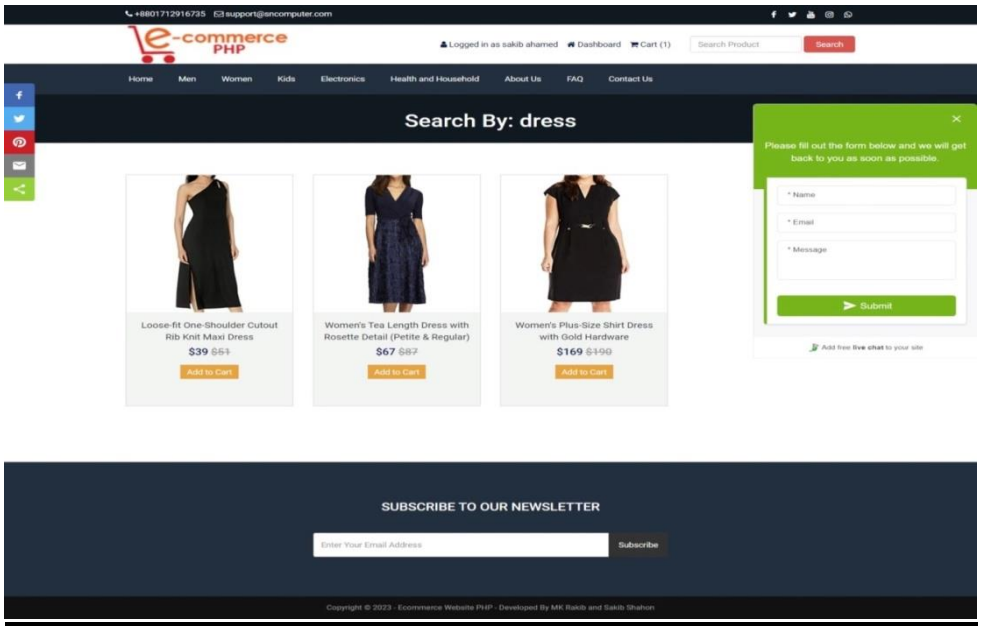


Figure 4.2: Search Filter

Filtering: Divided into three layers, can filter products according to different categories.

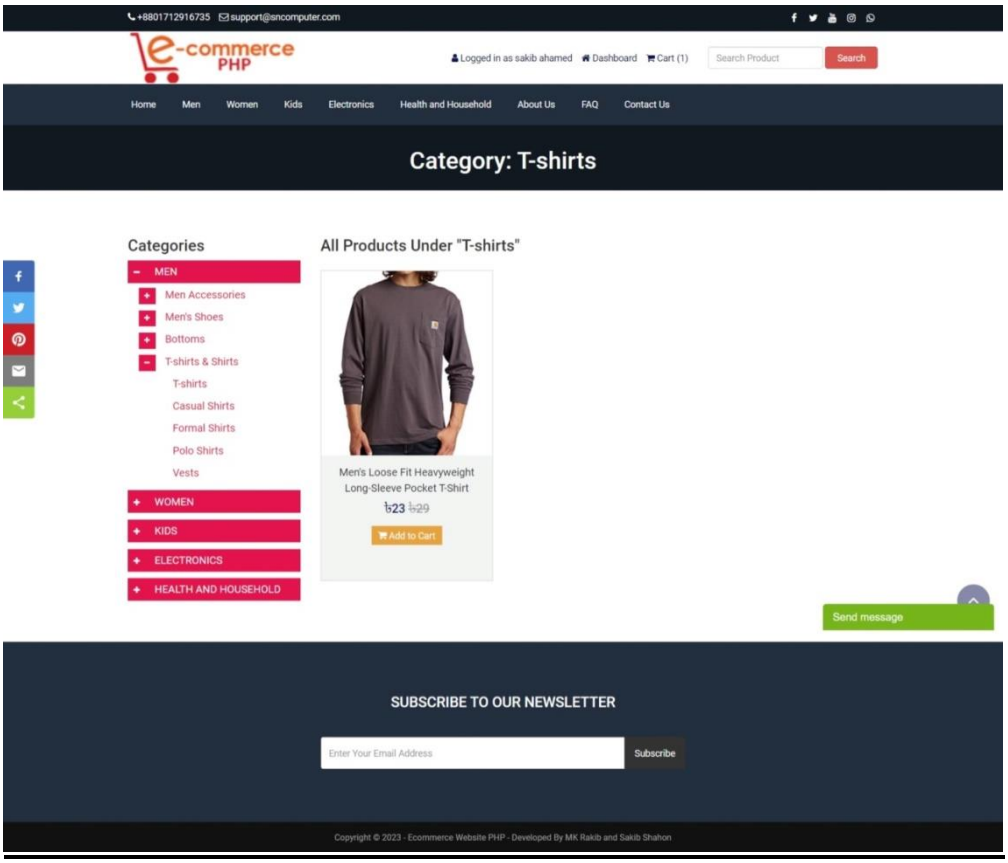


Figure 4.3: Category filter

Product Details: Product details like name, rating, price, color, size, quantity with description, features, reviews and much more.

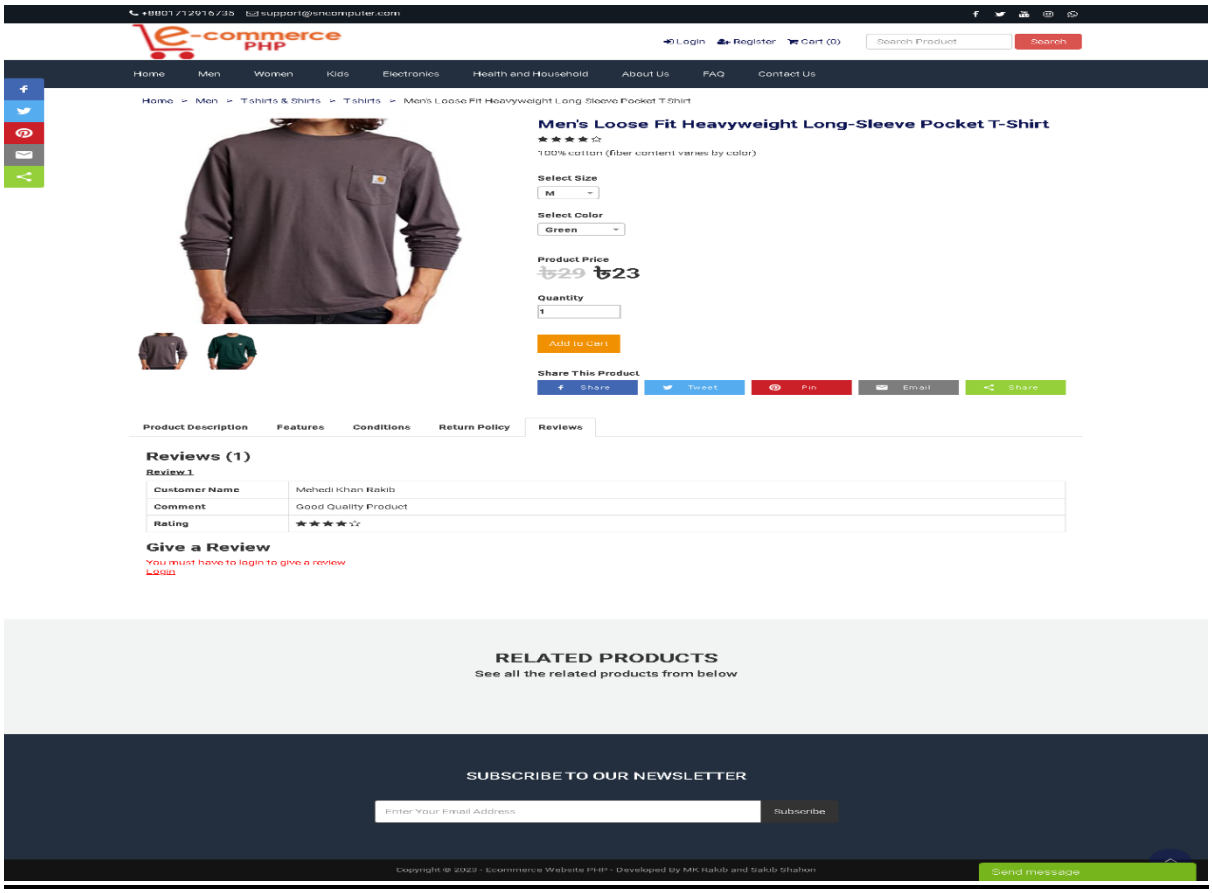


Figure 4.4: Product Details

Cart: Temporarily stores the data of selected products and calculates the current price and total price of items.

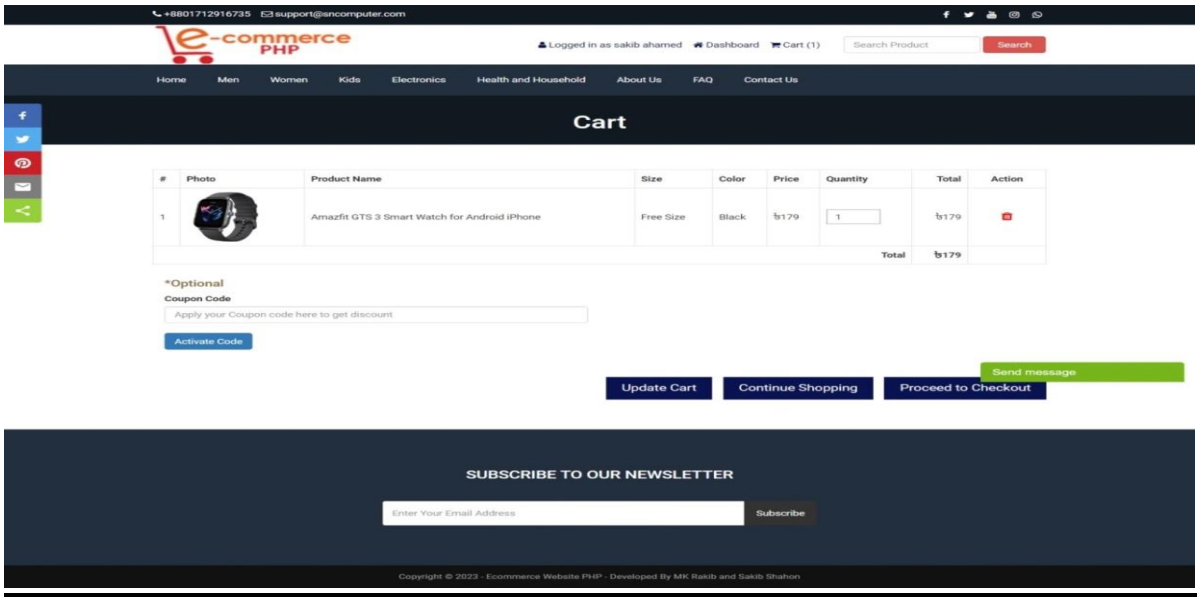


Figure 4.5: Cart

Customer login: The webpage for logging in as a customer using an email address and password also has a password recovery feature.

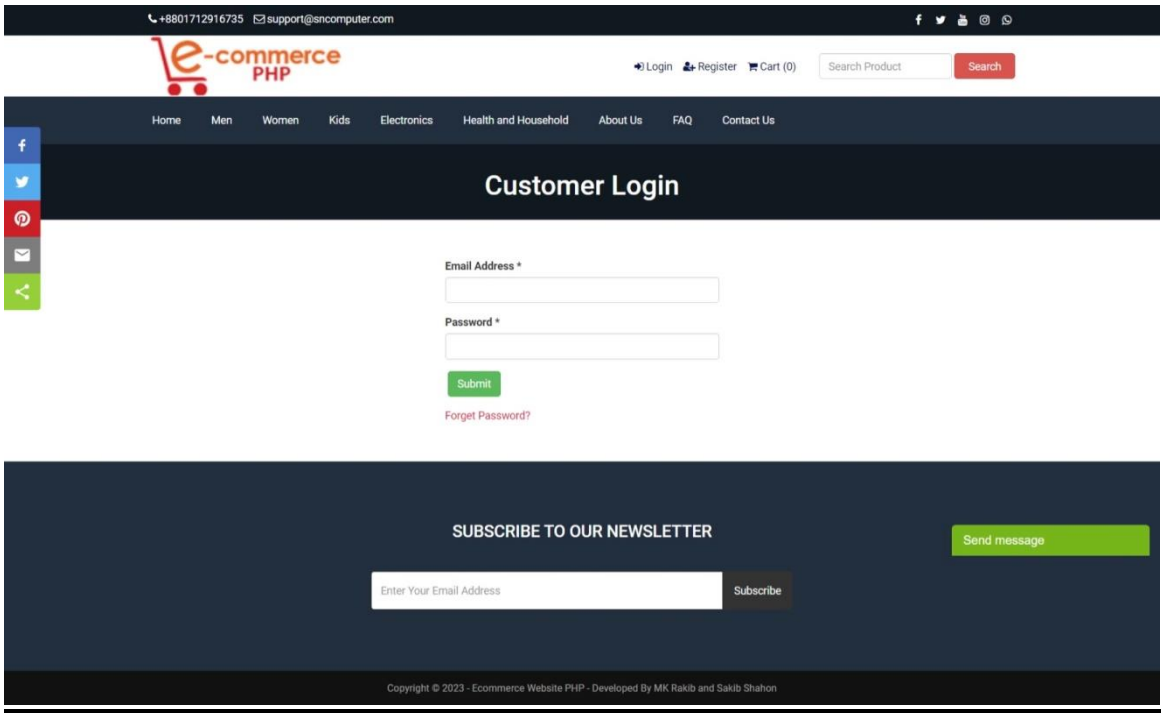


Figure 4.6: Customer login page

Customer profile: Page for updating details of the customer. Collects personalized data from customers. These data are also used for billing.

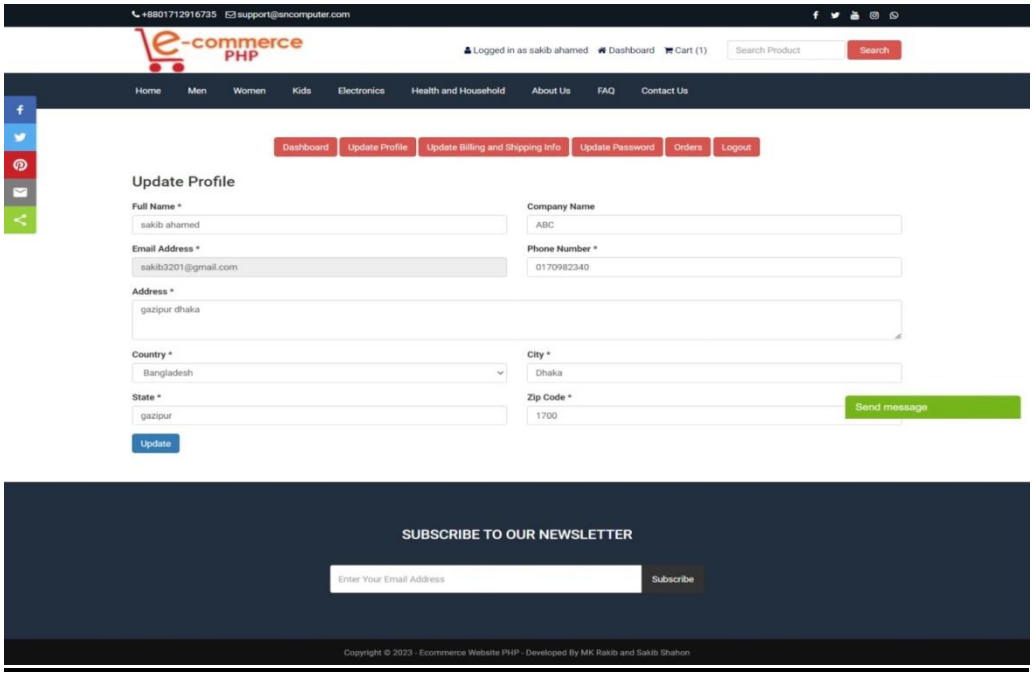


Figure 4.7: Customer Profile Update

Customer billing info: Used for updating the billing information of the customer.

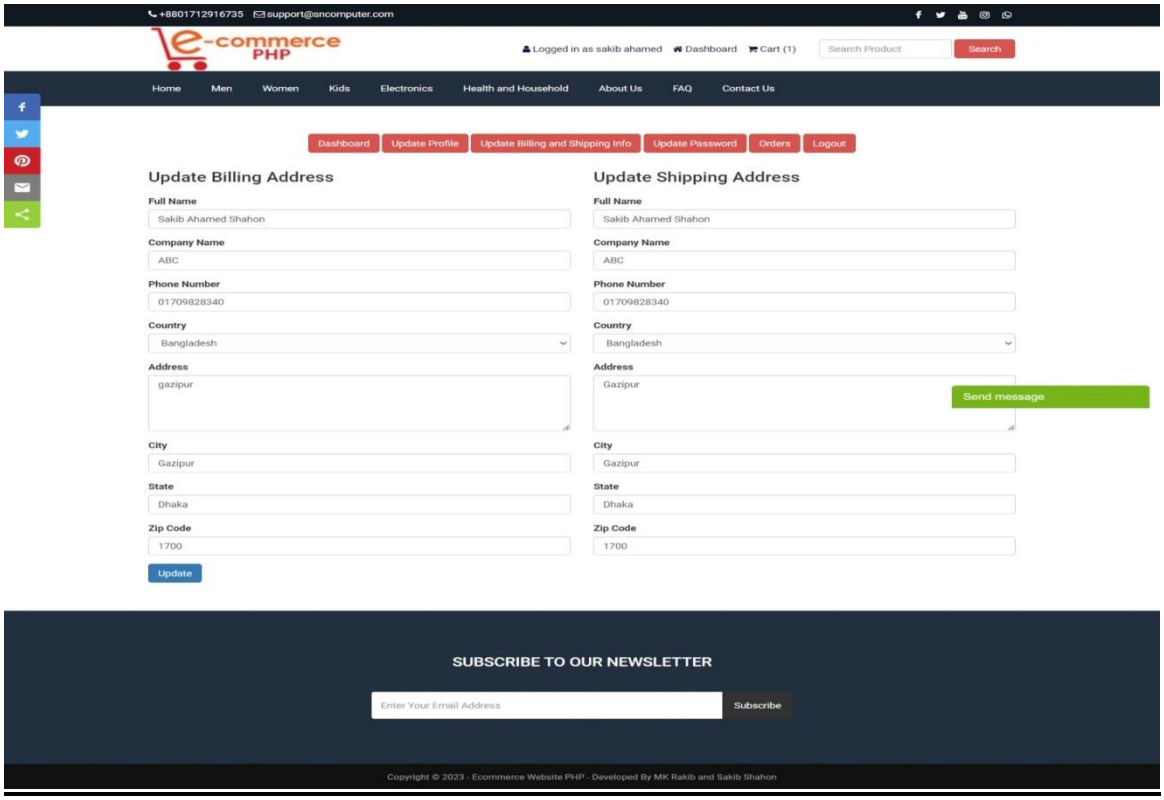


Figure 4.8: Billing & shipping address update

Order checkout: Displays this page for final confirmation of order. Shows a summary of order allows selecting payment method and shows billing and shipping details.

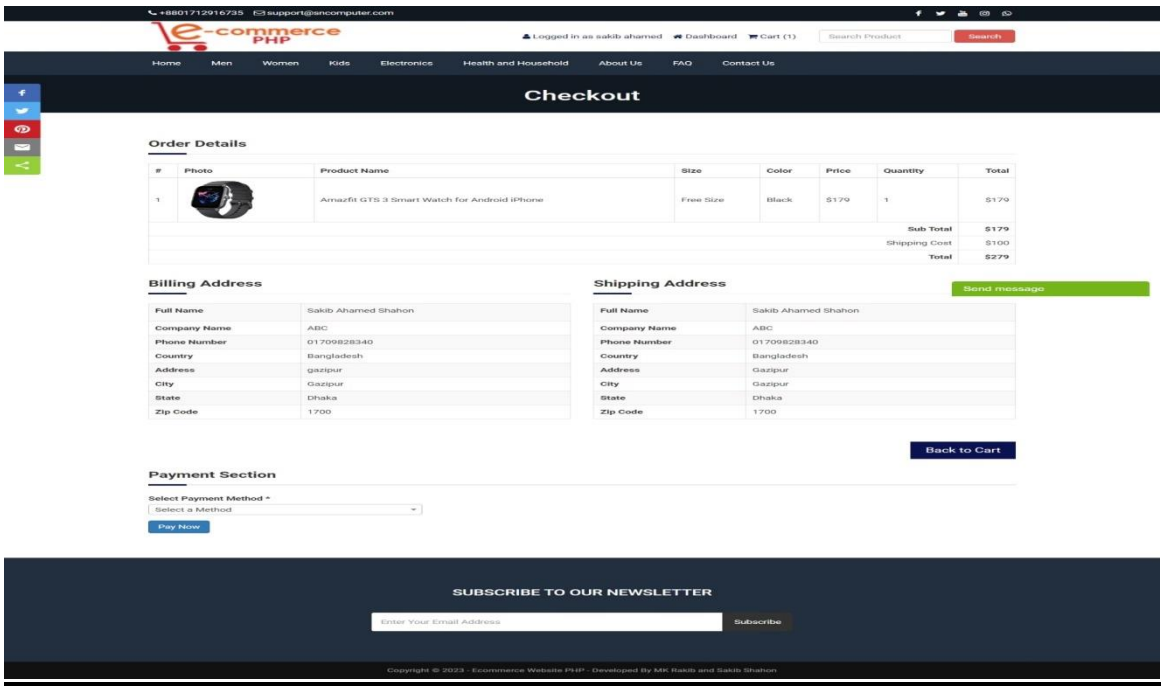


Figure 4.9: Order checkout

Customer order history: This shows the summarized order history of the customer.

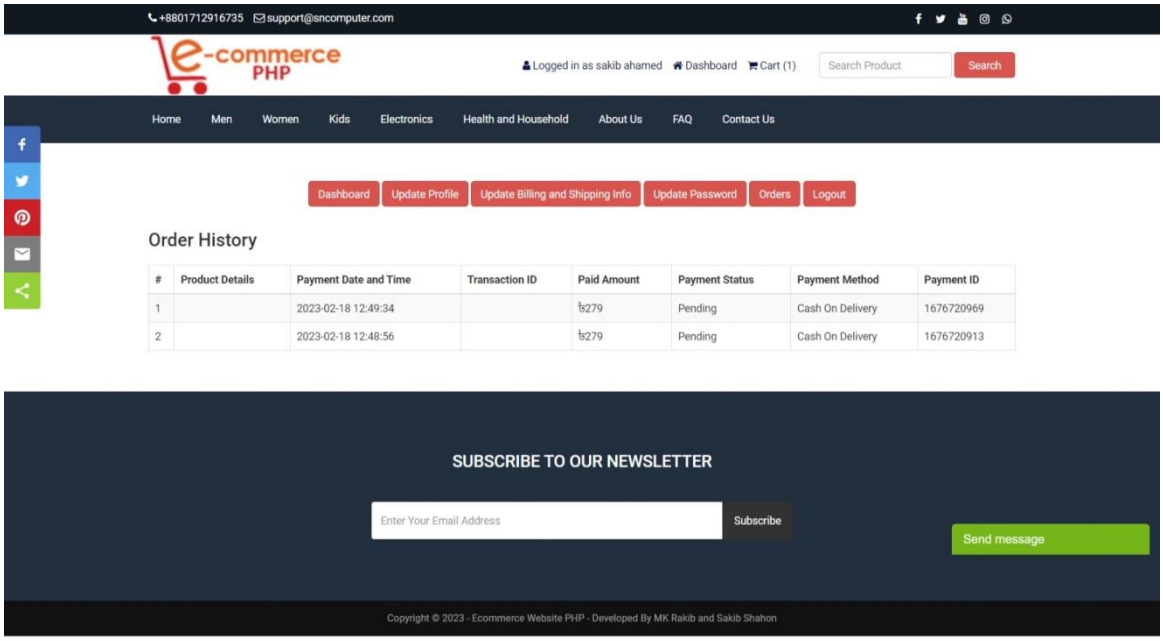


Figure 4.10: Customer Order History

4.1.1.2 Admin View

<u>Admin Panel Login</u>: Page for logging in as admin.

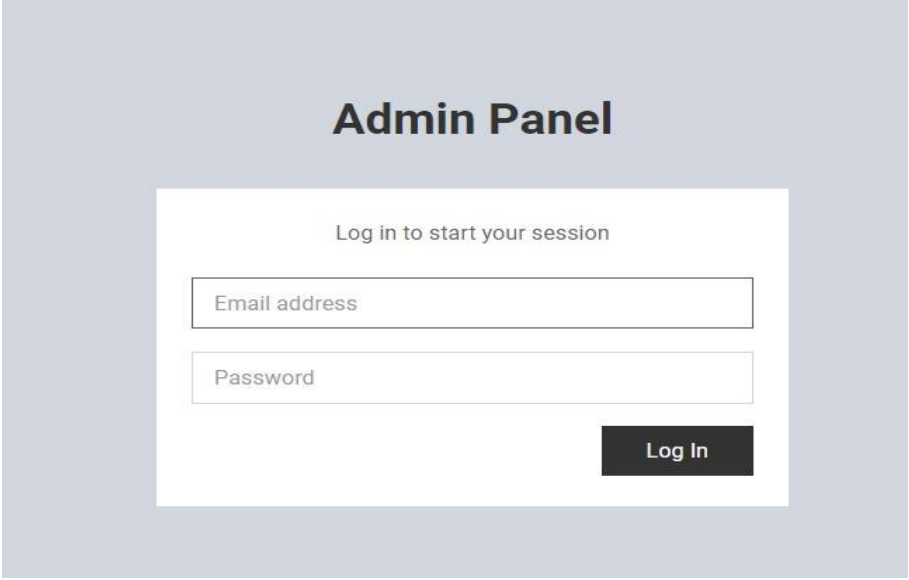


Figure 4.11: Admin login panel

<u>Admin Dashboard</u>: After logging in as admin shows the dashboard. The dashboard contains summary data of the website and access to all admin features.

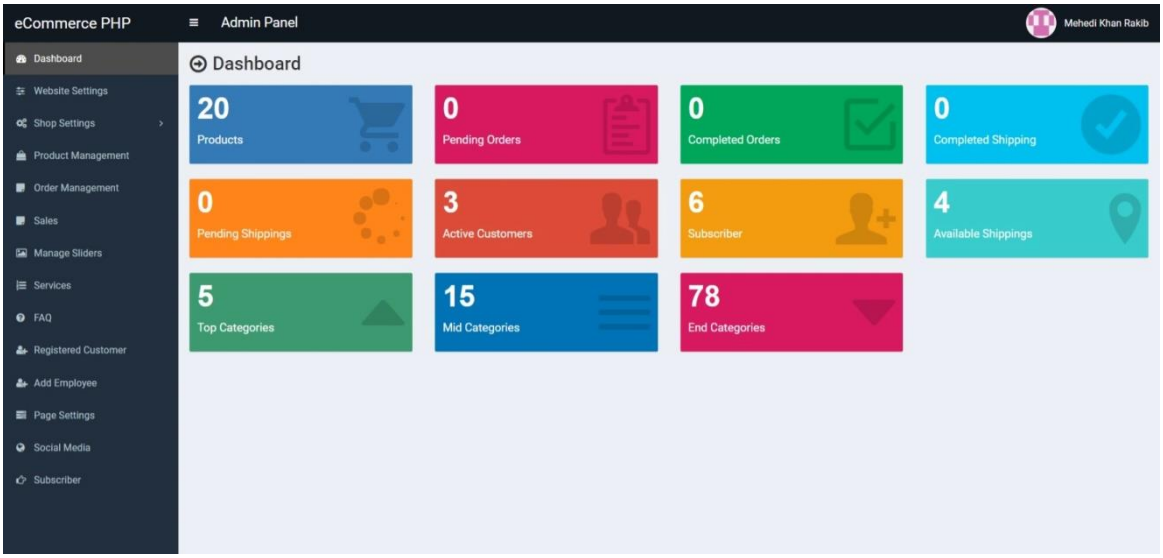


Figure 4.12: Admin dashboard

Page setting: Allows to dynamically change the contents of the homepage and other key pages of the system by the admin.

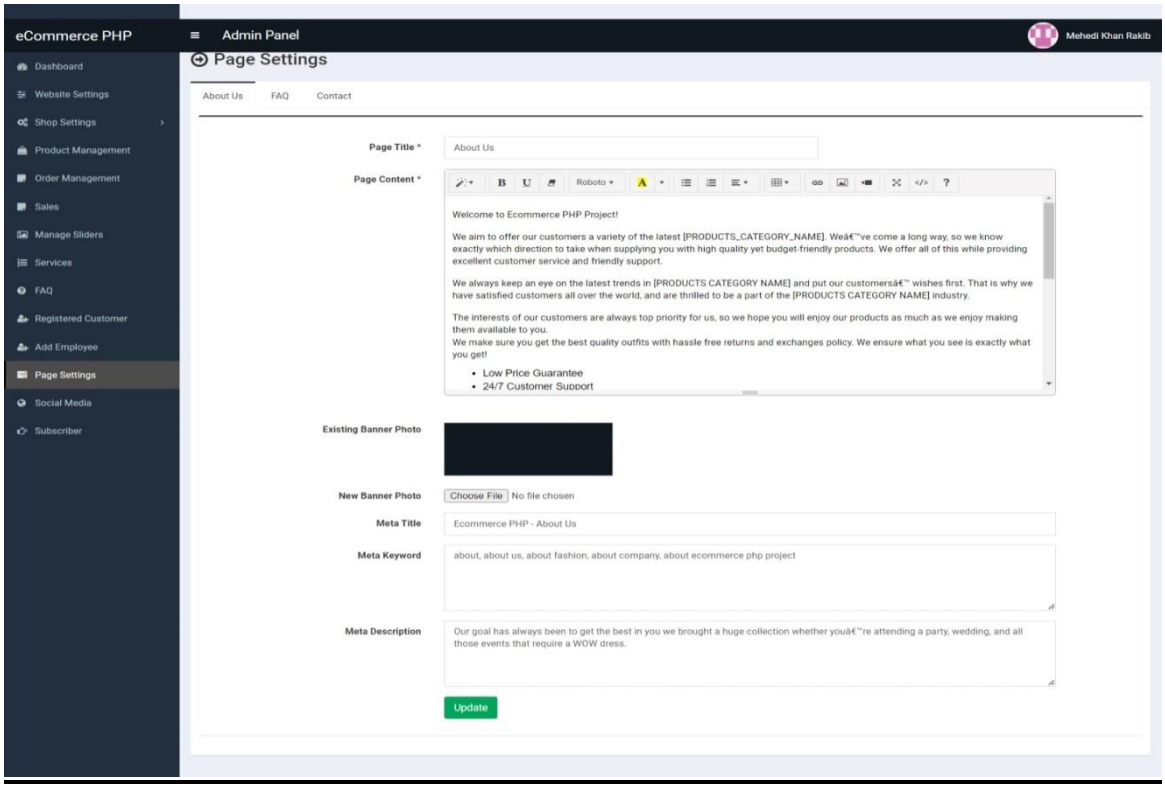


Figure 4.13: Page setting

Employee registration page: Gather data for setting up an employee account.

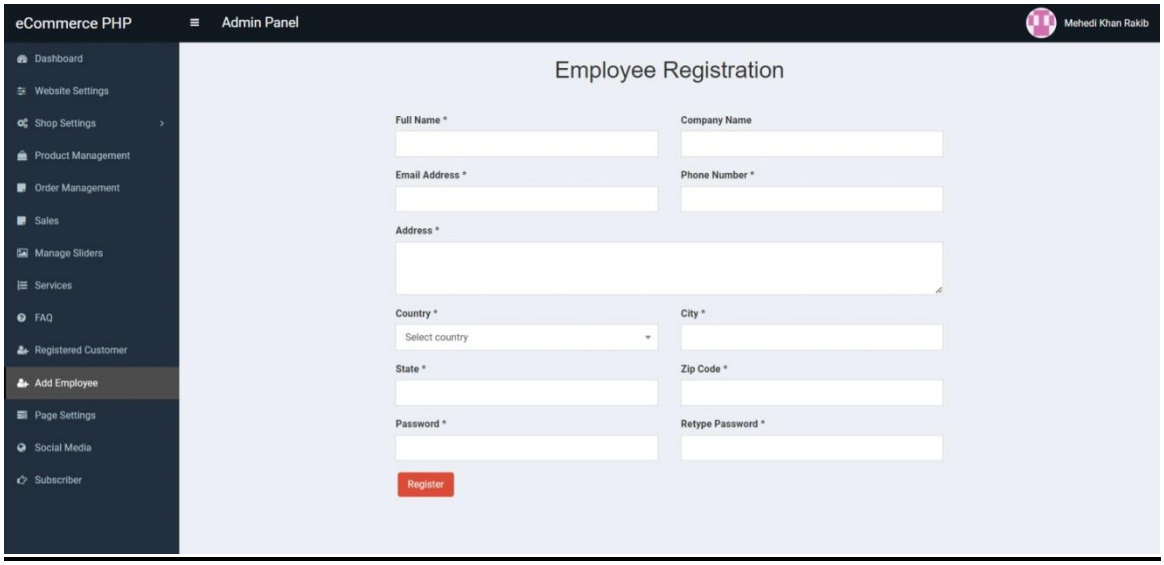


Figure 4.14: Employee account registration

Slider management: This page is specifically used for controlling the content of slider.

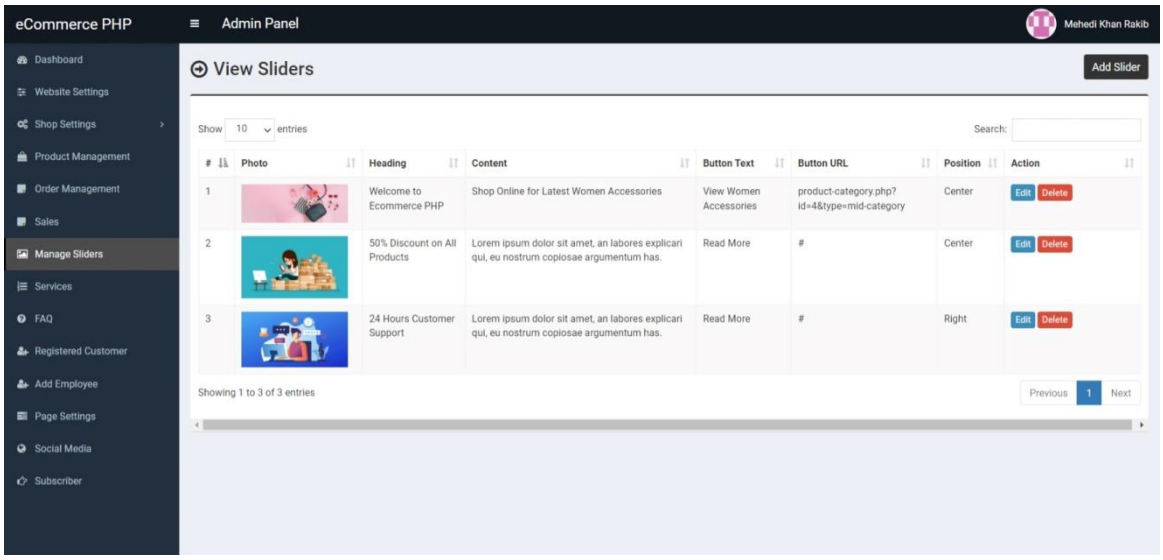


Figure 4.15: Slider Management

Customer management: Displays current list of registered customers and allows changing the status of customers.

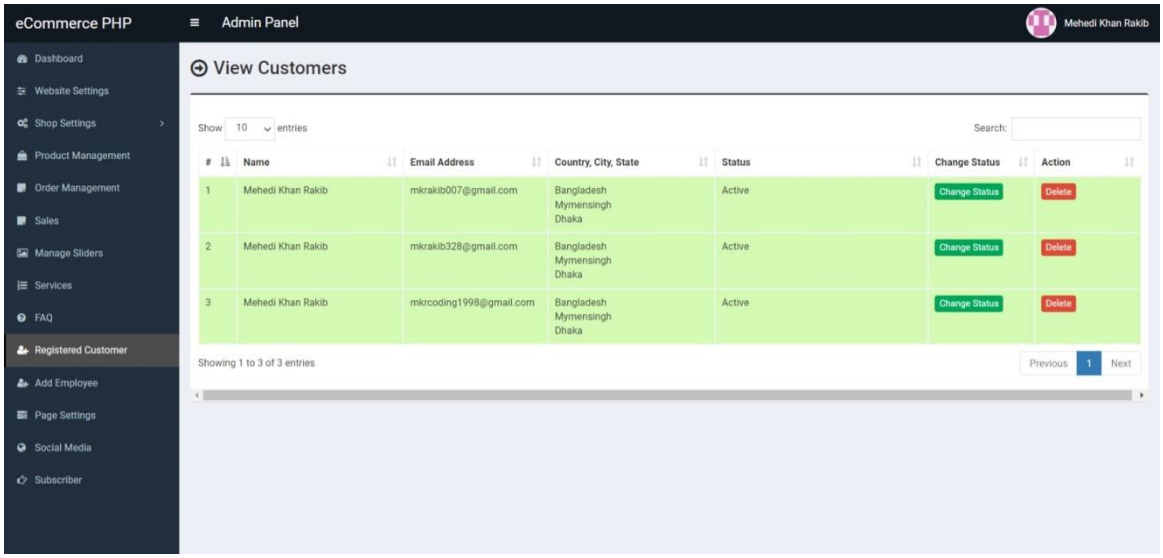


Figure 4.16: Customer Management page

Change shipping cost: Sets up custom shipping cost according to location as well as products.

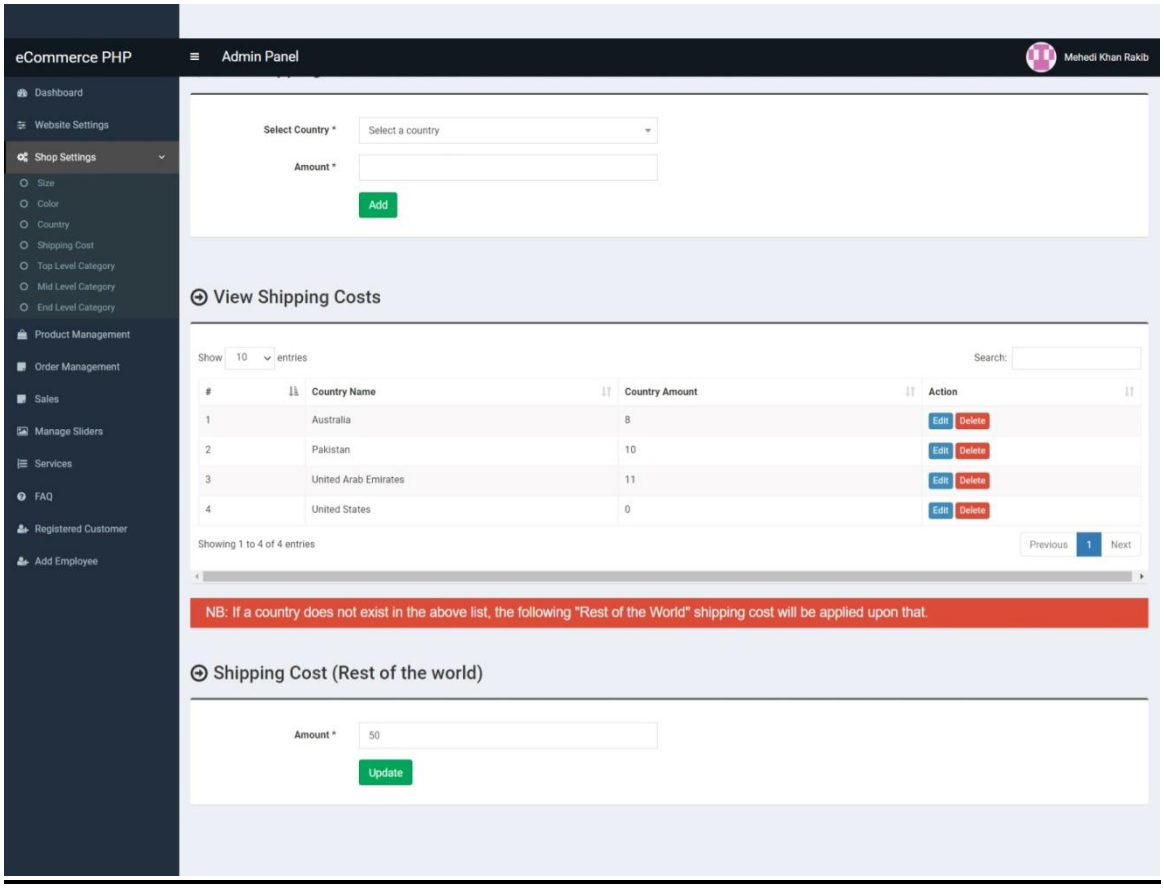


Figure 4.17: Shipping cost setup page

Product management: Shows details of products and allows adding new products to the database as well as generate discount coupons.

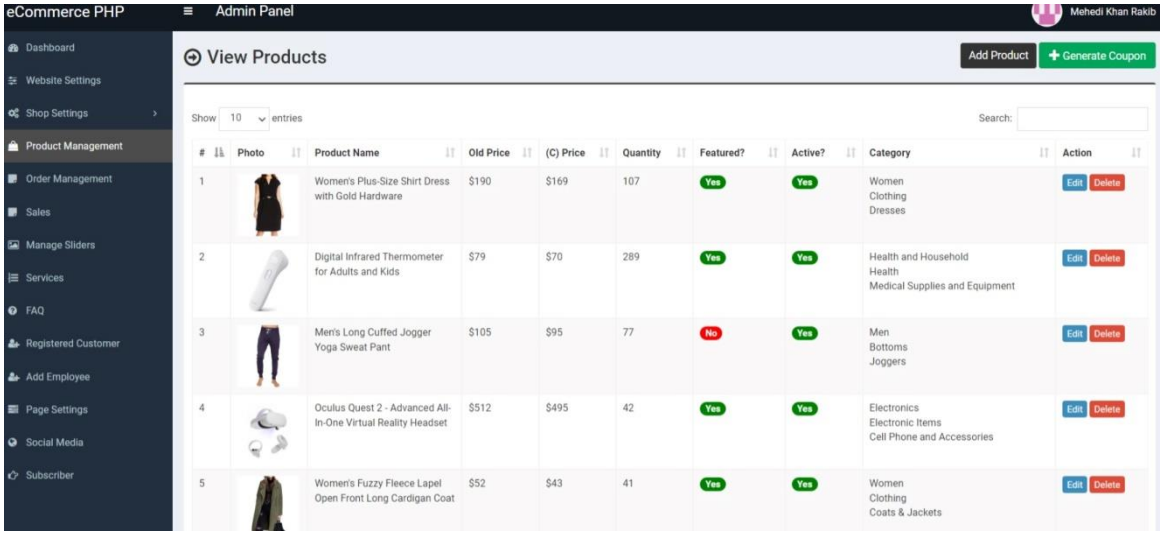


Figure 4.18: Product management page

Add product: Used for adding a new product with all of its possible details.

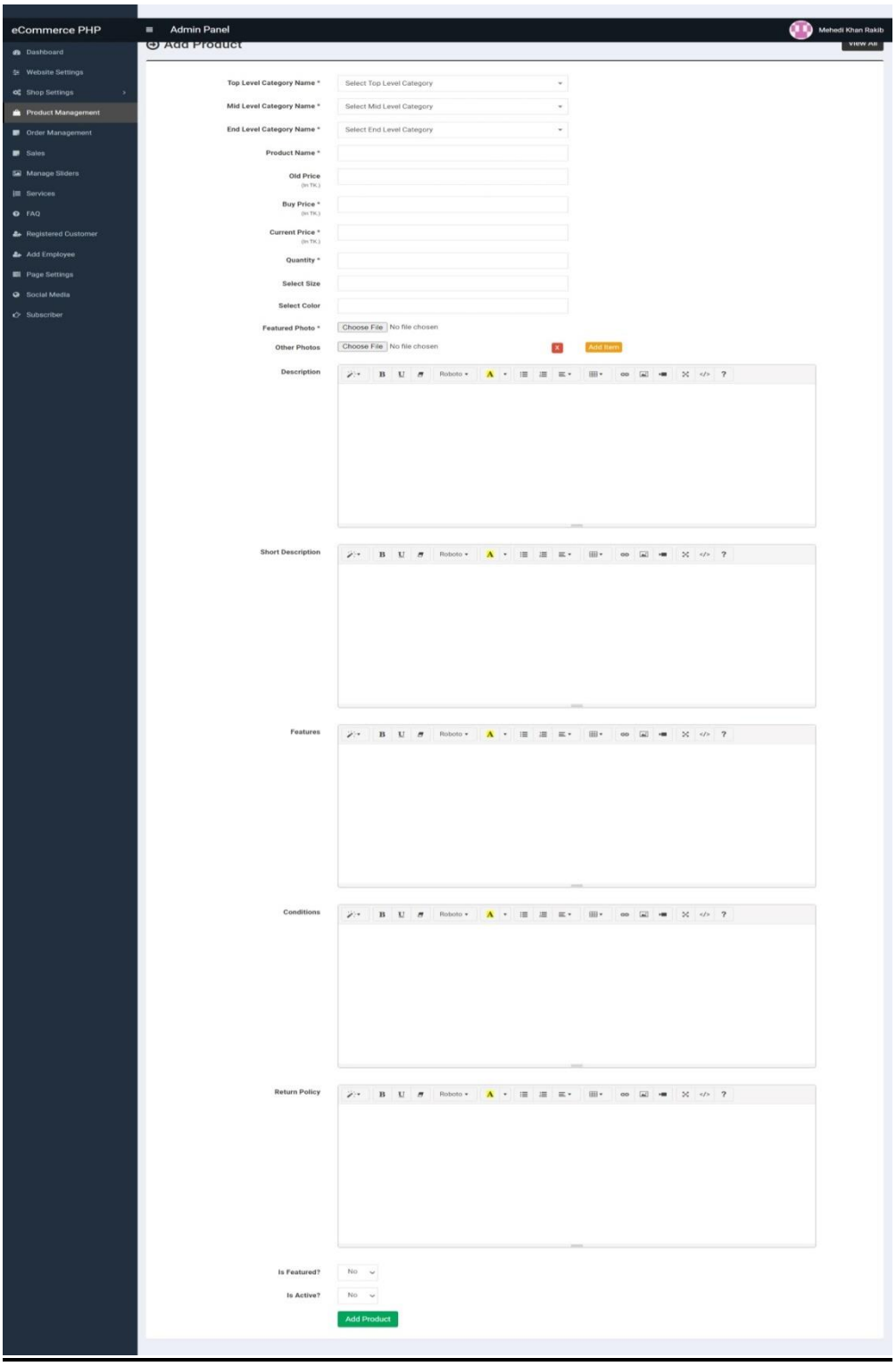


Figure 4.19: Add new product

Edit product: Used for editing an existing product with all of its possible details.

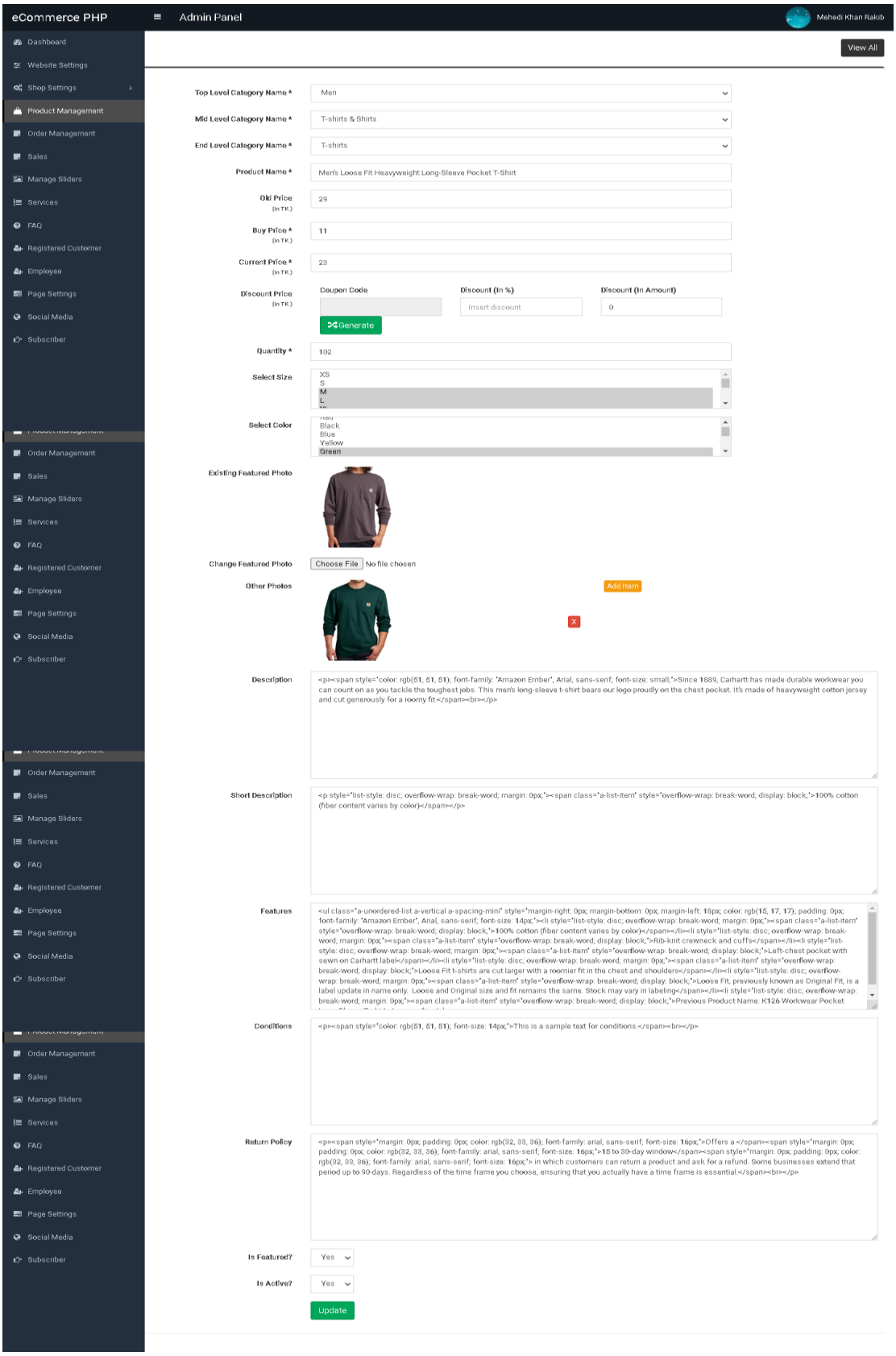


Figure 4.20: Edit existing product

Generate Coupon for Discount:

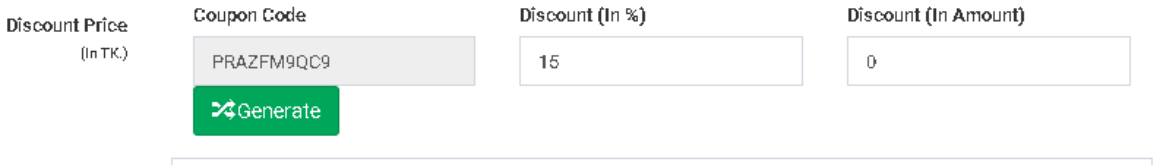


Figure 4.21: Generating coupon code

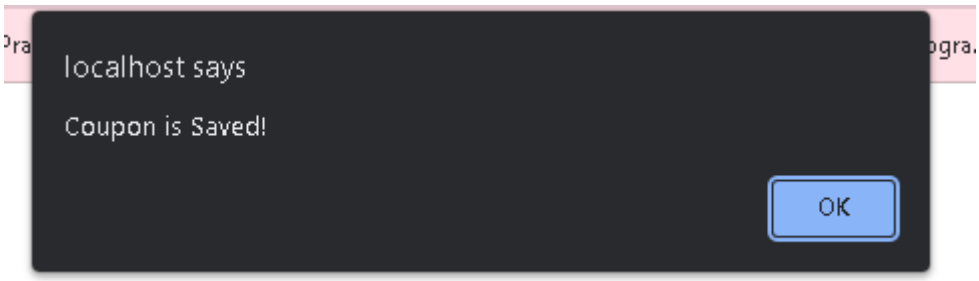


Figure 4.22: Coupon saved to database

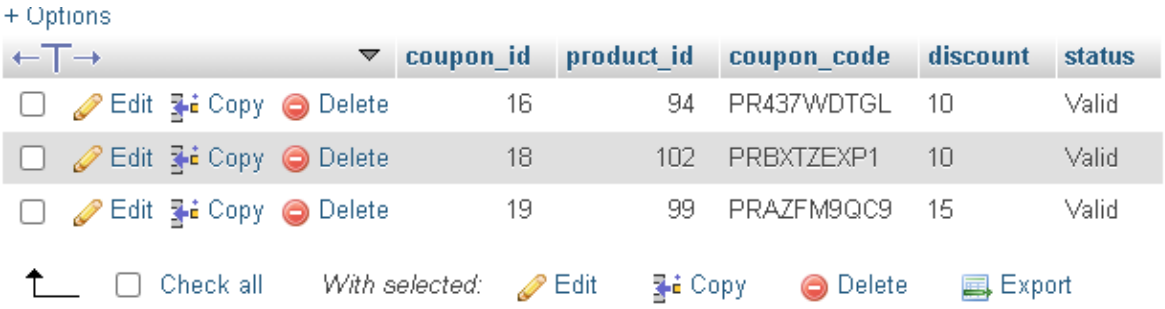


Figure 4.23: Database view

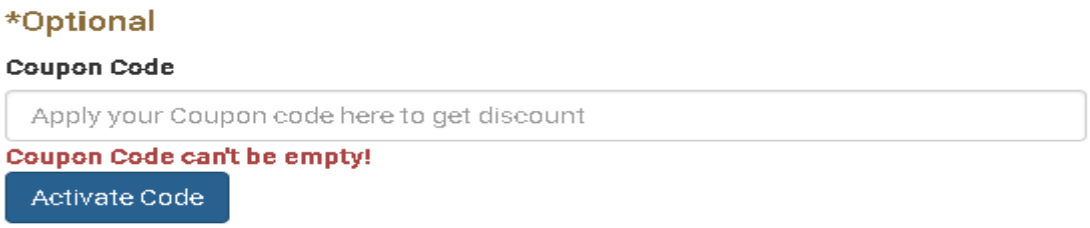


Figure 4.24: Pressing button without typing any code

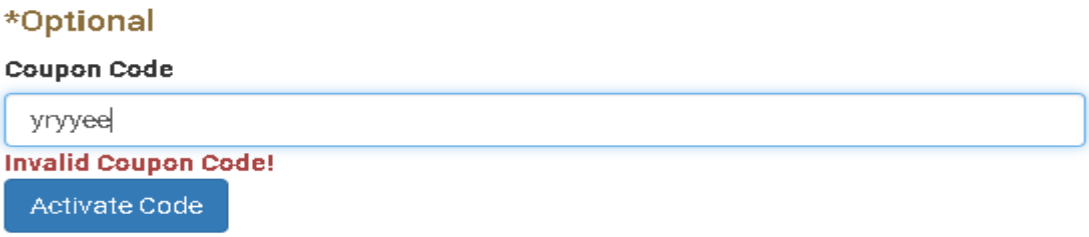


Figure 4.25: Pressing button with wrong code

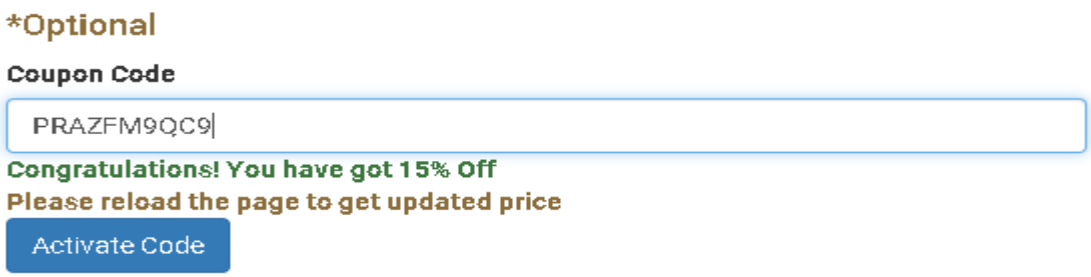


Figure 4.26: Pressing button with right code

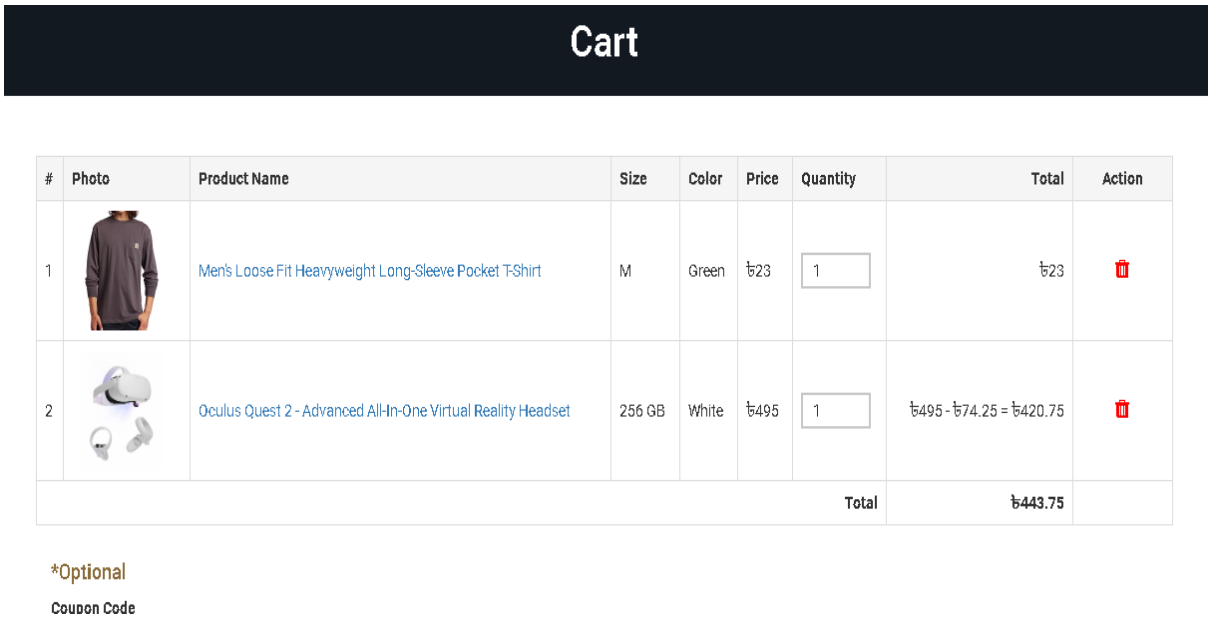


Figure 4.27: Successfully updated price

Order Management:

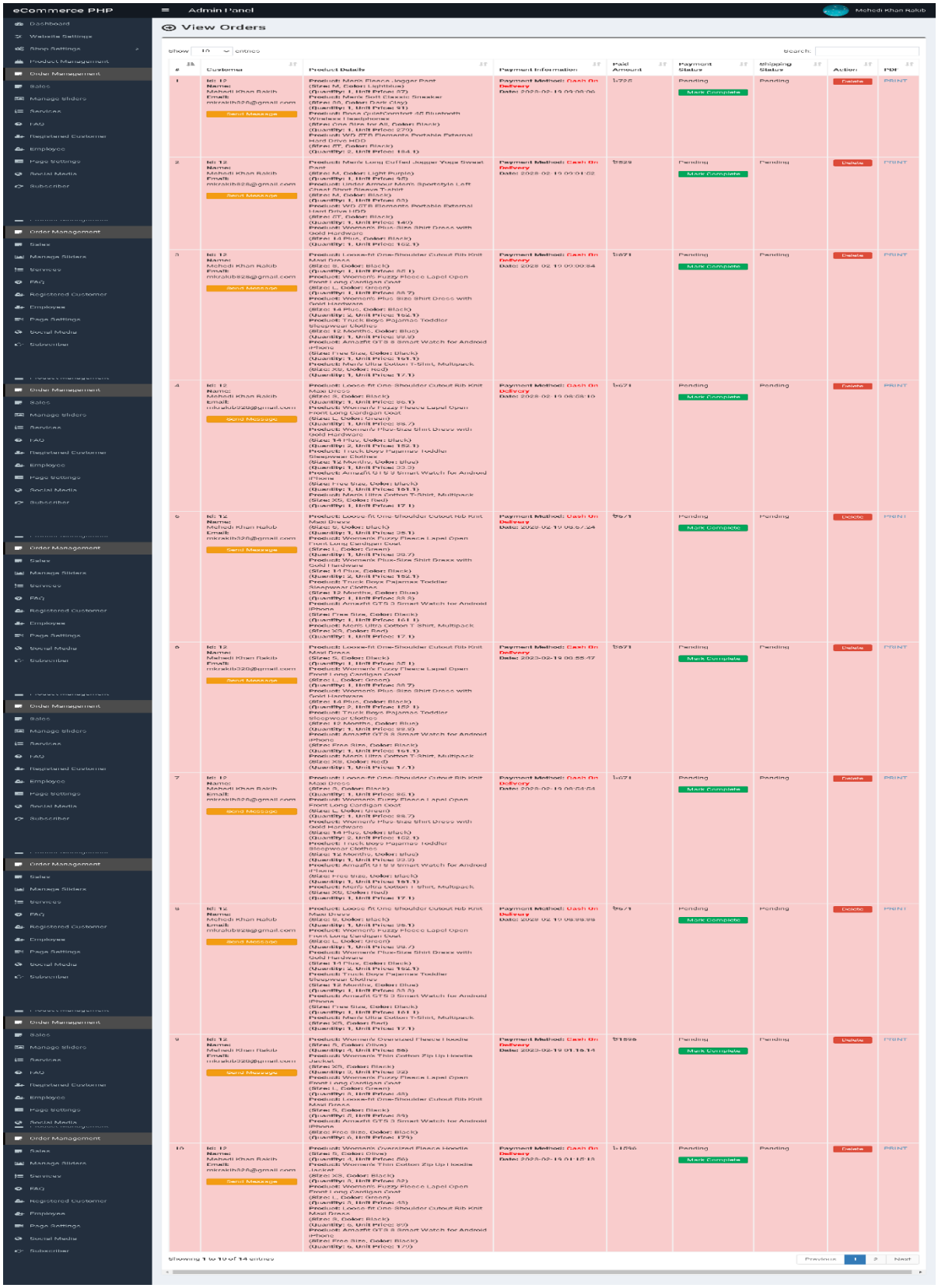


Figure 4.28: Order history

Sales Management:

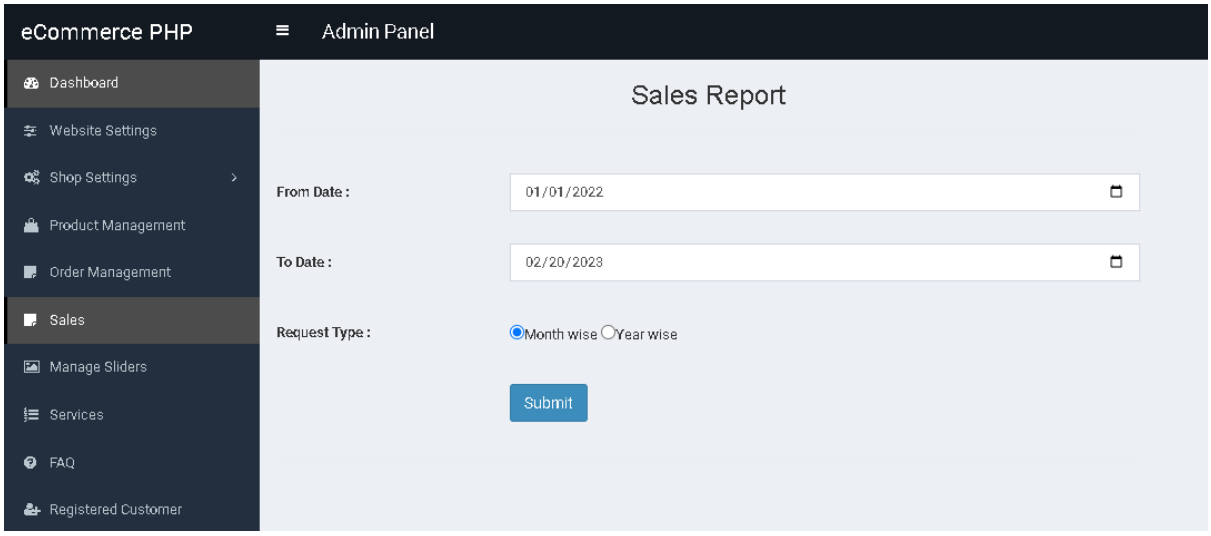
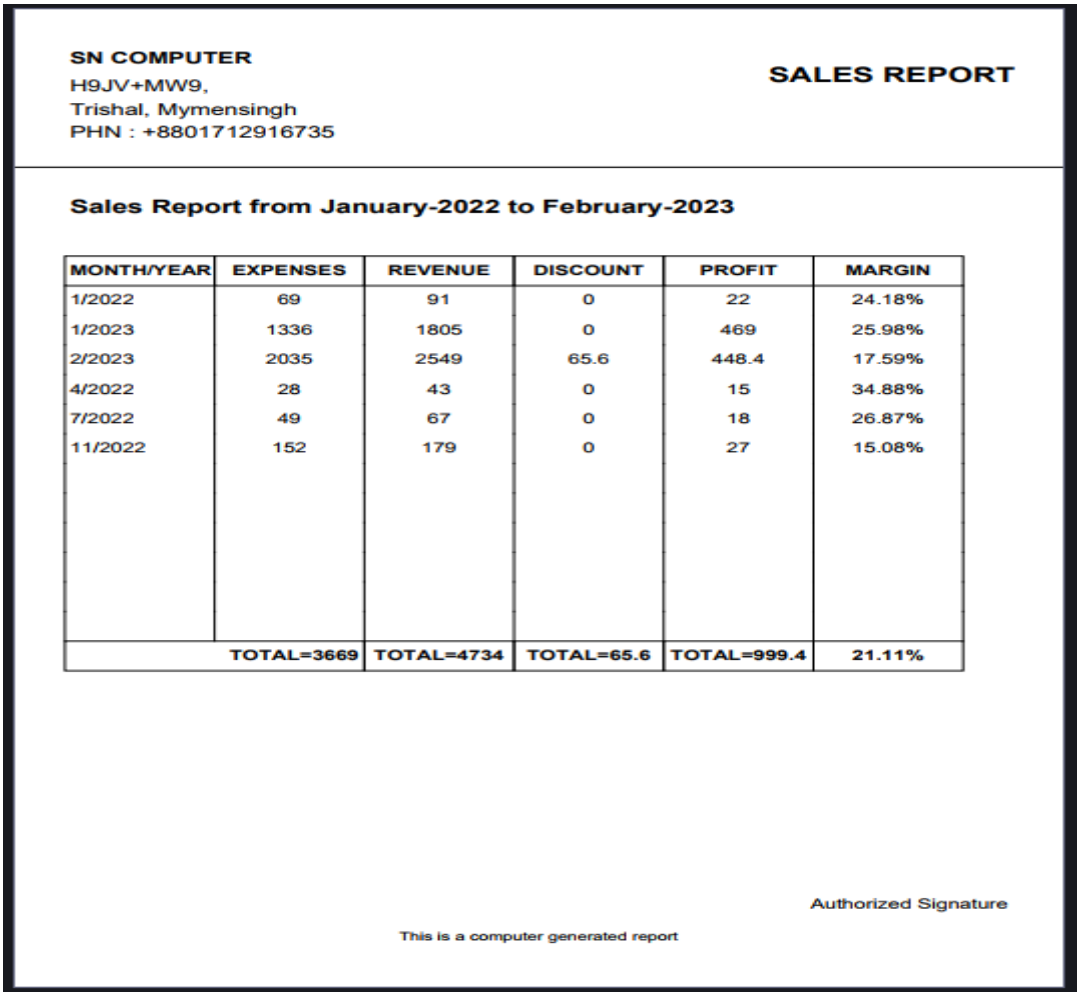


Figure 4.29: Sale history

Month wise Sale PDF:



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SALES REPORT

Sales Report from January-2022 to February-2023

MONTH/YEAR	EXPENSES	REVENUE	DISCOUNT	PROFIT	MARGIN
1/2022	69	91	0	22	24.18%
1/2023	1336	1805	0	469	25.98%
2/2023	2035	2549	65.6	448.4	17.59%
4/2022	28	43	0	15	34.88%
7/2022	49	67	0	18	26.87%
11/2022	152	179	0	27	15.08%
	TOTAL=3669	TOTAL=4734	TOTAL=65.6	TOTAL=999.4	21.11%

Authorized Signature

This is a computer generated report

Figure 4.30: Monthly Sale history

Yearly Sale PDF:

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SALES REPORT

Sales Report from 2022 to 2023

MONTH/YEAR	EXPENSES	REVENUE	DISCOUNT	PROFIT	MARGIN
2022	298	380	0	82	21.58%
2023	3371	4354	65.6	917.4	21.07%
	TOTAL=3669	TOTAL=4734	TOTAL=65.6	TOTAL=999.4	21.11%

Authorized Signature

This is a computer generated report

Figure 4.31: Yearly Sale history

5 Conclusion

In this report, we have shown the procedure of developing the software "Web-based e-commerce system" which is user-friendly and practical enough to run an online shop. The software has a few limitations. But it has the potential to become something of greater use as more features get implemented. We will try to overcome the limitations in the future and further improve this application.

5.1 Limitations

The limitations of this system are as follows:

- Doesn't have any offline capability.
- Automatic SEO is not included.
- The system isn't scalable across servers.
- It can only support a single business or vendor.

5.2 Future Scope

As we have said earlier that there are some limitations to this project. The primary aim would be to resolve these limitations shortly. In addition to this, there will be some major modifications e.g.

- The system will have built-in SEO facilities.
- The system will be cloud compatible or fully scalable with traffic.
- There will be multi-vendor support.

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