Developing an E-Plastic Management System

A project report Submitted in Partial Fulfillment of the Requirements for the Degree of Bachelor of Science in Computer Science of State University of Bangladesh

Submitted by

Sarmily Biswas
ID: UG02-47-18-045

Sadia Anha Tanny
ID: UG02-49-18-004

Tarin Ahmed Shara
ID: UG02-50-19-020

Supervised By

Muntasir Hasan Kanchan

Assistant Professor, Department of CSE

Co-Supervised By

D. Stalin Alex

Professor, Department of CSE

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

STATE UNIVERSITY OF BANGLADESH

April 2023

Course Code: CSE-0400 Course Title: Project

Project Title: Developing an E-Plastic Management System

Students ID's: UG02-47-18-045, UG02-49-18-004 and UG02-50-19-020

<table>
<tr><th colspan="3">Knowledge Profile, Engineering Problems and Engineering Activities</th><th>Remarks</th></tr>
<tr><td rowspan="4">Knowledge Profile</td><td>☑ K1 (Natural Sciences)</td><td>☑ K5 (Engineering Design)</td><td rowspan="4">K1 = Page 02
K4 = Page 17
K5 = Page 18
K7 = Page 14, 15, 16,18
K8 = page 06, 07</td></tr>
<tr><td>☐ K2 (Mathematics)</td><td>☐ K6 (Engineering Practice)</td></tr>
<tr><td>☑ K3 (Engineering Fundamentals)</td><td>☑ K7 (Comprehension)</td></tr>
<tr><td>☑ K4 (Specialist Knowledge)</td><td>☑ K8 (Research Literature)</td></tr>
<tr><td rowspan="4">Complex Engineering Problems</td><td>☑ P1 (Depth of knowledge)</td><td>☐ P5 (Extent of applicable codes)</td><td rowspan="4">P1 = Page 02
P3 = page 4
P6 = Page 21</td></tr>
<tr><td>☐ P2 Range of conflicting requirements)</td><td rowspan="2">☑ P6 (Extent of stakeholder involvement and conflicting requirements)</td></tr>
<tr><td>☑ P3 (Depth of analysis)</td></tr>
<tr><td>☐ P4 (Familiarity of issues)</td><td>☐ P7 (Interdependence)</td></tr>
<tr><td rowspan="3">Complex Engineering Activities</td><td>☐ A1 (Range of resources)</td><td rowspan="2">☑ A4 (Consequences to society and the environment)</td><td rowspan="3">A3 = Page 35
A4 Page 61</td></tr>
<tr><td>☐ A2 (Level of interactions)</td></tr>
<tr><td>☑ A3 (Innovation)</td><td>☐ A5 (Range of resources)</td></tr>
</table>

DECLARATION

We, hereby, declare that the work presented in this project is the outcome of the investigation performed by us under the supervision of Muntasir Hasan Kanchan, Assistant Professor Department of CSE, Department of Computer Science and Engineering, State University of Bangladesh. We also declare that no part of this Thesis or thereof has been or is being submitted elsewhere for the award of any degree or Diploma.

Signed by

Sarmily Biswas
UG02-47-18-045

Sadia Anha Tanny
UG-02-49-18-004

Tarin Ahmed Shara
UG02-50-19-020

STATE UNIVERSITY OF BANGLADESH
join the trendsetter

CERTIFICATE OF APPROVAL

The foregoing Thesis is hereby accepted as a credible study of an engineering subject carried out and presented in a manner satisfactory to warrant its acceptance as a prerequisite to the degree for which it has been submitted. It is understood that by this approval the undersigned does not necessarily endorse or approve any statement made, opinion expressed, or conclusion drawn therein, but approves the thesis only for the purpose for which it is submitted.

Board of Examiners

Md. Masud Tarek
Associate Professor and Head Of Department
Dept. of Computer Science & Engineering
State University of Bangladesh

ACKNOWLEDGEMENT

First of all, we would like to thank the almighty God. Today we are successful in completing our work with such ease because God gave us the ability, chance, and cooperating supervisor. We would like to take the opportunity to express our gratitude to Md. Masud Tarek Associate Professor and Head of Department, our respected supervisor Muntasir Hasan Kanchan, Assistant Professor.

Although they were always loaded with several other activities, they gave us more than enough time for this work. The door to their office was always open whenever we ran into a trouble spot or had a question about our research or writing. They not only gave us time but also proper guidance and valuable advice whenever we faced some difficulties. Their comments and guidance helped us in preparing our thesis report.

We would like to thank our respected teachers and friends who inspired us in every step and helped us in a number of ways by providing various resources and moral support.

Finally, we must express our very profound gratitude to our parents for providing us with unfailing support and continuous encouragement throughout the years of study and throughout the process of researching and writing the thesis. This accomplishment would not have been possible without them.

Abstract

Nowadays, plastics are increasingly being used in our daily life activities. We can't think of something without technology. In every sector, from the kitchen to medicine we can find information and technology. Plastics are one of the most abundant materials found across the globe. So, we were thinking to create a socio-technical model for taking plastic waste management from informal to formal economy. Plastic is one such material which poses a big threat to the environment. A huge amount of plastic is produced and dumped into the environment which does not readily degrade naturally. Over the years, disposal of plastic waste has been one of the serious concerns of the environment as there is no proper collection system for the disposal of plastic waste. So we create a project where people can sell plastic waste in a proper way. In this system anyone can sell plastics by creating an account. Buyers can also buy plastics by creating their accounts. These are the major findings of an investigation into an e-plastic system. This system is very user friendly and it is very helpful in order to overcome the wastage issues of the plastics. The buyers can able to view the list of plastic categories based on their shapes they can choose any of it. It is a step by step process form user informing about the waste product in the site and it will be given to big companies, industries etc. E-plastic has various advantages as well as disadvantages. A framework for selling and buying plastic products online system. In this report, we will discuss the use of interactive features of e-plastic which will show the benefits of using an e-plastic management system.

Table of Contents

LIST OF FIGURES

Chapter 1:

Introduction

1. Introduction

In the present era, the generation of E-waste plastic has increased to five times more than the population growth rate. Waste plastic is an emerging environmental issue of recent global concern. China has formulated policies such as bans and restrictions on plastics to promote the management of plastics [1]. Waste home appliances are the main source. So, Recycling of plastics from e-waste (e-plastic) is of great significance for improving the efficiency of plastic resource utilization and reducing the cumulative environmental impact. Plastics have been reported as one of the major pollutants among various pollutants that are disposed of in the environment. They play a pivotal part in human life as they are cost-effective and are versatile. The plastics recycling is a very important not only because of the high waste landfills costs, but also the possibility of the recovery of energy from plastics and the fact that recycled products are cheaper than virginal products. This project is devoted to the subject of recycling. Currently, there are inadequate studies on the resource utilization of e-waste plastics. In terms of e-waste recycling policies, developed countries mainly adopt the extended producer responsibility (ERP) system, which extends the responsibility of producers to the full life cycle of products, especially recycling, resource utilization and detoxification disposal [1]. [K1].

1.1 Problem Statement

The primary goal of e-plastic system is that the environment can be kept free of pollution while saving valuable time at home. The handling of municipal plastic wastes has always been a big problem to the society. These plastic wastes lead to steep increase

in various types of pollution. The disposal of municipal plastic waste has become more difficult process than its production. Many researches across the globe have proven that these plastic wastes can be used in specific proportion along with bitumen in the laying of roads. In this diagram we show the problems associated with this e-plastic project.

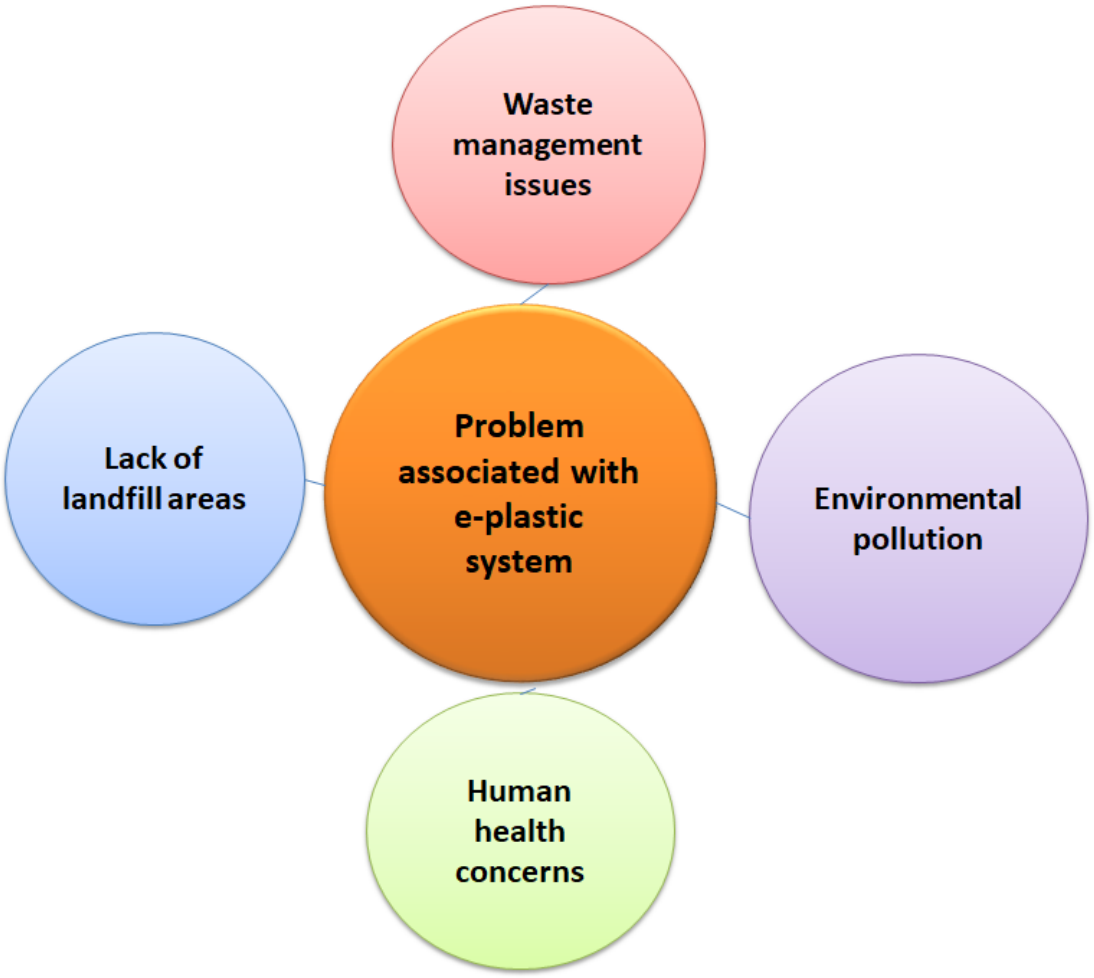


Figure: 1.1.1 MVC Problem statement diagram

Our e-plastic paradigm on the four main components of the process: the admin, the employee, the seller and the buyer. While completing this project we faced some problems.

- First of all we faced some problem while creating the database table.
- On the other hand, there was a problem while adding the online payment statement.

1.2 Project Objective

- The main objective of e-Plastic is to save valuable time at home and dispose of waste while maintaining the balance of the environment and keeping stable the economic driving force of the country.
- Determine if e-plastic management system is successful for People.
- The request for recycling placed by the sellers and buyers should be fulfilled by the admin.
- Identify the advantages and disadvantages of e-plastic management system.
- Help to understand the importance of e-plastic management system to the people. [P3]

1.3 Expected Outcome

Many e-plastic systems have already been created by researcher throughout the world. In this essay, we create an online e-plastic platform for reduced the abandoned waste. Recycling of plastics from e-waste (e-plastic) is of great significance for improving the efficiency of plastic resource utilization and reducing the cumulative environmental impact [3]. People's daily life is now very busy. We see that due to busy schedule, many people do not take out the plastic waste of their homes and throw it in the dustbin as a result of which they accumulate as a pile at home. On the other hand, plastic waste is harmful to the environment. So through this project we want people to be able to remove their household waste through a beautiful process at home. On the other hand, the environment will not be polluted again. We want everyone to use this process, maintain a pleasant environment and increase the economic driving force of the country. The improvements of e-plastics as well as future development can be influenced by the creation of models for this project.

Chapter 2:

Literature Review and Background Study

2. Literature Review and Background Study

After doing extensive research, we discovered that there are a big number of materials available of creating an e-plastic platform. Most plastic waste from previous research was refined into small particles to obtain a suitable size [4]. In European countries 39.7% of all plastics is used in the sector of packaging. Then, in terms of size, the sectors of using plastics are the construction and industry of construction (19.8%), the industry of automotive (10.1%), the electrical and electronic industry (6.2%), the household appliances sector (4.1%), the agricultural sector (3.4%), and for example: household appliances and products, furniture, medical devices (21.7%) [5].In recent years, the amount of plastic waste recycled has increased, with simultaneous decrease in the amount of waste going to landfills and the maintaining the level of waste destined for energy recovery. For example, in 2020, nearly 10.2 million tons of waste of plastic was recycled and stored [5].Focuses on the recycling companies' experience in China from 2012 to 2017.The average recycling rate was 33.3% and the recycling amount in 2017 was 558 kt [6]. This study also showed that e-plastic gives a conscious environment of the country. [K8]

2.1 Related Works

1. The European Union, striving to improve the level of plastic waste recovery, introduces new regulations, including a tax on plastic, and the Plastics Directive. Its aim is to reduce the pollution of the oceans, seas and soil with plastic waste as much as possible. Consumables made of plastic, such as plates, cutlery, food containers and polystyrene cups, are gradually withdrawn from the market. Producers of drinks in cartons were forbidden to attach plastic straws to them [5].

2. Plastics have been reported as one of the major pollutants among various pollutants that are disposed of in the environment. They play a pivotal part in human life as they are cost-effective and are versatile. Plastics are known to have a mixture of many chemical components and are used for various domestic applications. Despite various useful applications, plastics take a long time to degrade. The burning of plastics releases chemicals such as phosgene and dioxides that are considered a hazard to the ecosystem. Micro plastic-polluted foods and the presence of meager amounts of phthalates in toys lead to serious health consequences such as congenital diseases and malignant cancers. The dioxins released from the plastic polymers are lethally persistent organic pollutants which cause tumor and neurological damage in humans. Inadequate waste management practices have led to significant plastic pollution of water bodies. Plastics tend to settle on beaches, which decreases esthetic and recreation

values. In this article, we have discussed ways for resource recovery from plastic wastes and the possible effects of plastics on the environment and available safety regulations for the use of plastics. This article also discusses scientific literature about the remediation of plastics using various methods, which can help to promote further improvement of the existing system by competent authorities and researchers. [7]

3. Plastic waste is increasing rapidly due to urbanization and globalization. In recent decades, plastic usage increased, and the upward trend is expected to continue. Only 9% of the 7 billion tonnes of plastic produced were recycled in India until 2022. India generates 1.5 million tonnes of plastic waste (PW) every year and ranks among top ten plastic producer countries. Large amount of waste plastics could harm environment and human health. The current manuscript provides a comprehensive approach for mechanical and chemical recycling methods. The technical facets of mechanical recycling relating to collection, sorting, grading, and general management to create plastic products with additional value have been elaborated in this study. Another sustainable methods aligned with the chemical recycling using pyrolysis, gasification, hydrocracking, IH2 (Integrated Hydro pyrolysis 2), and KDV (Katalytische Drucklose Verolung) techniques have also been highlighted with the critical process parameters for the sustainable conversion of plastic waste to valuable products. The review also adheres to less carbon-intensive plastic degrading strategies that take a biomimetic approach using the microorganism based biodegradation. The informative aspects covering the limitations and effectiveness of all PW technologies and its applications towards plastic waste management (PWM) are also emphasized. The existing practices in PW policy guidelines along with its economic and ecological aspects have also been discussed. [8]

2.2 Advantages of E-Plastic

Web-based e-plastic system is an effective method for protects the environment. At a time multiple situations have benefited from the use of e-plastic. Here, there are some advantages of e-plastic management system:

1. It Prioritizes Environmental Protection:

E-plastic system prioritizes environmental protection. It includes proper handling, processing, and managing of e-waste. Because by using this system the plastic is being recycled by stopping the environmental pollution.

This Photo by Unknown Author is licensed under awarenessdays.com

Figure: 2.2.1 Plastic collections for recycling

2. Creates Jobs

E-waste recycling is creating new jobs for people. Because the system is a source of employment for many unemployed youths. The system will be continued the activities of admin and employee. The more important thing is that, by doing so, it has created a secondary market. Where recycled materials are the primary commodity. The Environmental Protection Agency released findings that show the magnitude of economic benefits that come from e-waste recycling. In a year, the US's recycling activities provided 757,000 jobs, $6.7 billion in tax revenues, and $36.6 billion in wages. Of course, e-waste is only a part of that, but as the fastest-growing waste stream, it is likely to become increasingly significant as we become more reliant on digital devices.

This Photo by Unknown Author is licensed under thepaclub.com

Figure: 2.2.2 Plastic collections by employees

3. Saves time and Reduces environment pollution

The busy lives of people, e-plastics systems can recycle plastic waste at home, thereby saving valuable time. On the other hand, you can benefit through financial income.

4. Increases Affordability

Using recycled components obtained from e-plastic are cheaper than ones obtained from mining activities. This way, manufacturing costs can be reduced.

2.3 Disadvantages of E-Plastic Management System

Plastic recycling is an alternative but has some drawbacks. Some recycling technologies are highly sensitive to purity. Zheng and Suh [9] stated that replacing fossil-based energy with renewables can reduce the environmental footprint of plastic significantly especially GHGs. Plastics have characteristics that are important for applications related to the management of COVID-19. However, prior to this crisis, public perception and government regulations have sought to minimize plastic use. It is important to note that many of their environmental impacts (e.g., micro plastics pollution) are not inherent properties of the materials but are consequences of behavioral patterns of consumers (e.g., improper disposal).

Chapter 3:

Design

3.1 Entity Relationship Diagram (Full)

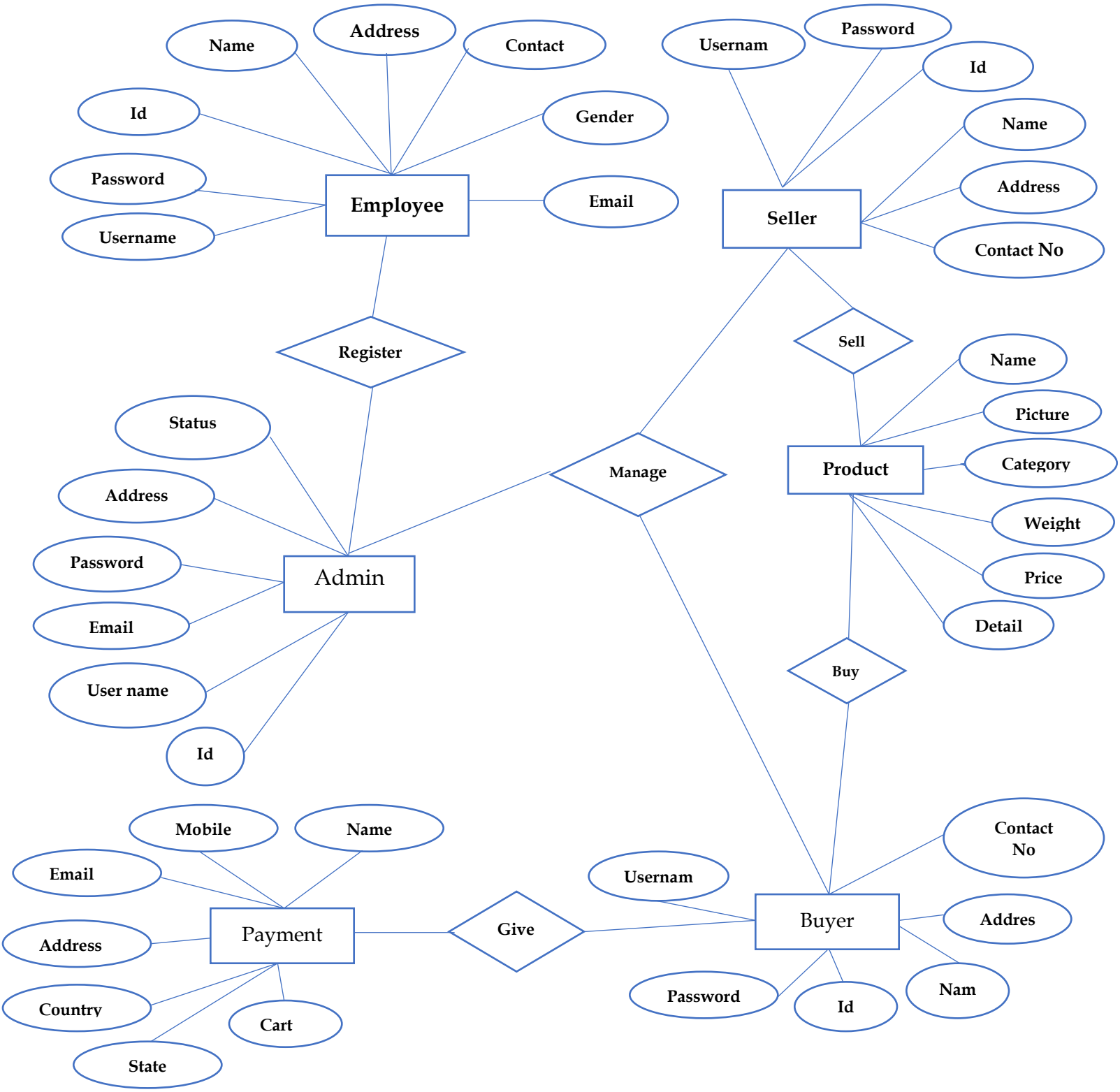


Figure: 3.1.1 ER diagram

Chapter 4:

Methodology and Model Implementation

4. Methodology and Model Implementation

Currently in Bangladesh, recycling of disposed plastic products is mainly being handled by the informal sector. Plastic is collected, segregated, dismantled and recycled in the informal sector based in Dhaka's urban slums [10].With this project recycle up the plastic waste, the economy of the country will be active. The process is completed through the work of admin, employee, seller and buyer. Admin accesses the entire system. Employee, seller, buyer they can only access the work of their under and nothing else. When the seller gives the request, the employee will go for the plastic collection and clear the payment by collecting the plastic. After that, the plastics that are in stock will be added. Looking at the website, the buyer will give a request to purchase plastic; the admin will accept/cancel it. If the request is accepted, the employee will go to deliver and collect the payment. Thus the whole process is completed. The main part of this project is that the design of the system is implemented through PHP with Laravel framework. Database will designed by using MySQL. On the other hand full project developed by using also HTML, CSS, JavaScript, Bootstrap.

4.1 Adopted Applications and Programming Languages

A method of notation for creating computer programs is known as a programming language. The majority of formal programming languages are text-based; however, they can also be graphical. They are a sort of programming language. The two parts of syntax (form) and semantics (meaning), which are often described by a formal language, make up the definition of a programming language. Some languages like the C programming language have a specification document that serves as its definition, but other languages, like Perl, have a dominant implementation that serves as their reference. Both exist in certain languages, with the base language being defined by a standard and extensions being drawn from the most popular implementation. The branch of computer science known as "programming language theory" focuses on the creation, use, analysis, characterization, and categorization of programming languages.

4.1.1 Programming Languages

We have to utilize a server-side programming language since we constructed a server based website. Any number of programming languages may be used to create server side code; common server-side web languages include PHP, Python, Ruby, C#, and JavaScript (NodeJS). To create the system, we used PHP, HTML, CSS, MySQL, bootstrap, JavaScript, and laravel. PHP (Hypertext Preprocessor): PHP is a simple yet powerful language designed for creating HTML content [11]. On php journey to becoming the most popular web development platform on earth [12]. In 1994,an incredibly forward-thinking man named Rasmus Lerdorf developed a set of tools that used a parsing engine to interpret a few macros here and there [13]. [K7]

That is particularly appropriate for web development. With the help of the computer language PHP, site designers may generate dynamic content that communicates with databases. Web development works nicely with PHP. [K7]

• HTML: The standard markup language for texts intended to be viewed in a web browser is called Hyper Text Markup Language, or HTML [9]

.HTML, was originally introduced as HTML 2.0 in 1995, HTML 3.2in 1996, HTML 4 in1997 and HTML 4.01 in 1999. The most extensively used version during the 2000s.Web pages consist of two parts, one for the data whose file name should finish in .html which stands for Hyper Test Markup Language and another for the styles whose file name should finish in.CSS which stands for Cascading Style Sheets [10]. [K7]

• CSS (Cascading Style Sheets): Cascading Style Sheets (CSS) is the standard language for styling structured documents, such as HTML [14]. Using Cascading Sheets (CSS), we can apply styles to our web pages to make them look exactly how we want. This works because CSS is connected to the Document Object Model (DOM).With CSS we can quickly and easily restyle any element[15]. Along with HTML and JavaScript, CSS is a key component of the World Wide Web including layout, colors, and fonts [K7]

• JavaScript: JavaScript Object is a popular format for data serialization [16]. JavaScript programming language has been in existence for many years already and is one of the most widely known, if not, the most used front-end programming language in web development [17]. JavaScript is the language that provided a dynamic web site which actively communicates with users. JavaScript is used in today's web applications as a client script language and on the server side [18]. [K7]

• Bootstrap: A free and open-source CSS framework called Bootstrap is designed for front-end web development that prioritizes mobile responsiveness. It includes design templates for typography, forms, buttons, navigation, and other interface elements that are based on HTML, CSS, and JavaScript. An HTML, CSS, and JS package called Bootstrap focus on making the creation various essential web pages easier (as opposed to web applications). The main goal of adding it to a web project is to apply the color, size, font, and layout options of Bootstrap to that project. Therefore, the main determinant is whether the responsible developers like such options. All HTML components have basic style declarations once Bootstrap is introduced to a project [19]. Likewise bootstrap methods in statistics seem to accomplish the impossible [20]. [K7]

4.1.2 Framework

A software frame work known as a web framework (WF) or web application framework (WAF) is made to facilitate the creation of online applications, including web services, web resources, and web APIs. Online frameworks offer a standardized

method for creating and deploying web applications on the Internet. Web frameworks attempt to reduce the administrative burden associated with routine web development tasks. For instance, a lot of web frameworks include libraries for session management, templating frameworks, and database access, and they frequently encourage code reuse [21]. Although they frequently focus on the creation of dynamic websites, they also apply to static websites. [k7]

• **Static Website:** Static website generators have seen a significant increase in popularity in recent years, offering many advantages over their dynamic counterparts. Static website generators are tools used to generate a website made up only of HTML, CSS, and JavaScript. Static websites, unlike dynamic sites, do not use databases or server-side scripting languages, and the website appears to the user as it exists on the web server.[22]. [K7] A static analysis need not be approximate. A perfectly precise static analysis considers every possible execution of a program, maintaining, for each execution, the program's full state (or, rather, all possible states) [23].

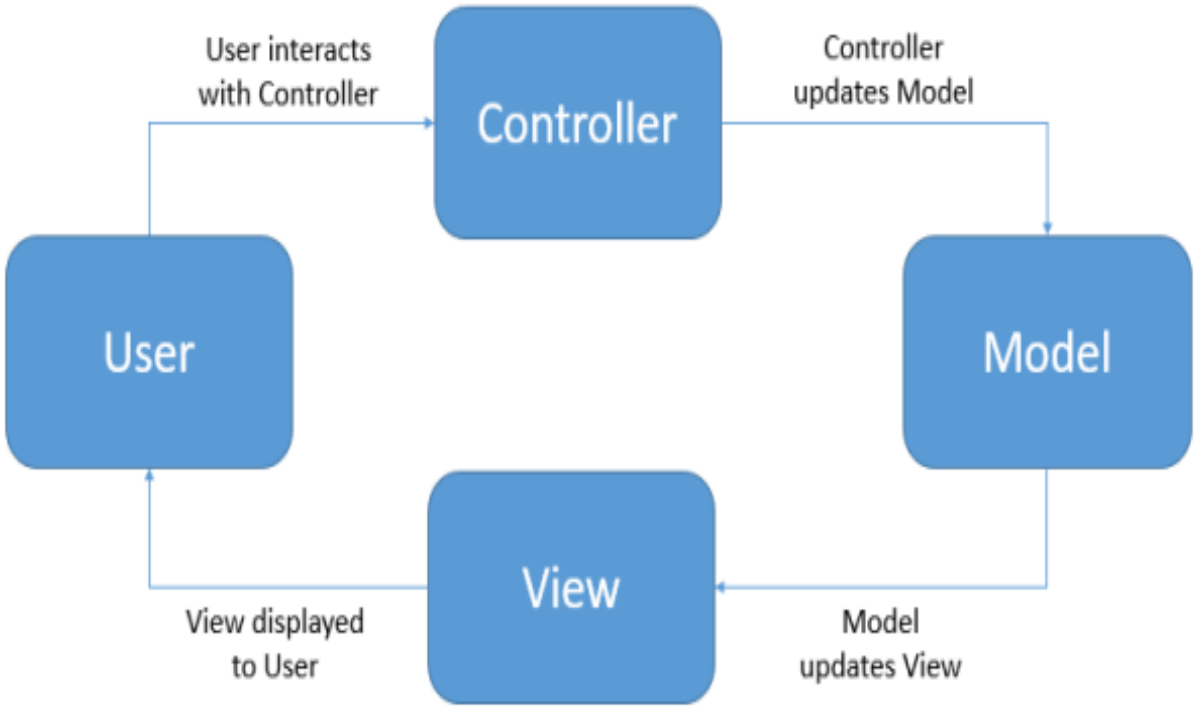
• **Dynamic Website:** Dynamic web sites may provide and display material dynamically, or on the-fly, based on user behavior or user-generated content since they are built utilizing server-side language and technology. A backend Content Management System (CMS)or database, which is connected to your website pages, is where all of your data and content are structured when you have a dynamic web site. How and when this content is shown on a page is determined by how it is organized and integrated into your site's design [19]. [k7]

In this system, a dynamic website is created using the Laravel framework:

• **Laravel:** A web application framework with expressive and beautiful syntax is called Laravel. Open source application based on the PHP framework with the MVC model or also commonly called the Model View Controller which is used to build a dynamic website using PHP code [24].

We use Laravel version 9 for our project. [K7]

MVC architecture of Laravel:



This Photo by Unknown Author is licensed under davidlim2007.wordpress.com

Figure: 4.1.2.1 MVC framework diagram

M: "M" stands for "model." A class that works with a database is called a model. For instance, if we have users in an application, we will also have a user's table and a user's model that interacts with a database to query the user's table. The example leads us to the conclusion that the model will have a table for that particular model [25]. [K4]

V: V is an acronym for view. A class that interacts with HTML is called a view. The view or representation is everything that we can see on the program in the browser [25]. [K4]

C: The letter C stands for the controller. A controller serves as a liaison between the model and the view. The class that pulls data from the model and transmits it to the view class is known as a controller [25]. [K4]

4.1.3 Database

A database management system often oversees a database (DBMS). DBMS designed specifically for managing semi structured information [26]. A DBMS is a powerful tool for creating and maintaining a large amount of data efficiently and allowing to persist over long periods of time safely. Database today's are essential to every business. They are used to maintain internal records, to present data to customers and clients on the World-Wide-Web and to support many other commercial processes. The first commercial database management systems appeared in the late 1960's [27].

- MySQL: The relational database management system MySQL is free and open-source. Its name is a combination of the words "My" and "SQL," which stand for Structured Query Language and are the names of cofounder Michael Widenius's daughter. Tables are used to hold the data in a MySQL database. A table is made up of columns and rows and contains a group of linked data. A database is a repository for structured data storage. The term "relational" refers to the dataset's data organization as tables. Every table has some connections. We used a local host database in our project [28].[K7]

4.1.4 Application

A computer software package known as an application, sometimes known as an application program or application software, performs a particular task either directly for the end user or, in certain situations, for another application. Applications might consist of a single program or a collection of applications. The program is a collection of procedures that allows the user to utilize the application. Applications run on computers using the operating system (OS) and other auxiliary software applications [29]. An application programming interface is used by an application to connect with other technologies and request services from them (API).

We used-

Visual Studio Code: Microsoft created the source-code editor Visual Studio Code, generally known as VS Code, for Windows, Linux, and mac OS using the Electron Framework. Debugging support, syntax highlighting, intelligent code completion, snippets, code refactoring, and integrated Git are among the features [29]. [K3]

XAMPP: The Apache HTTP Server, Maria DB database, and interpreters for scripts written in the PHP and Perl programming languages are the core components of XAMPP, a free and open-source cross-platform web server solution stack bundle created by Apache Friends [30]. [K3]

Git Bash: For Microsoft Windows systems, Git Bash is a program that offers an emulation layer for the Git command line interface. The abbreviation BASH stands for Bourne Again Shell. An operating system may be accessed by written commands using a shell, or a terminal program [31]. [k3]

Chapter 5:

Problem Analysis and Design

5. Problem Analysis and Design

The life time e-plastic system's new prototype has been conceived and created. The designer gains a good awareness of the "differences" between the desired outcomes. Several systemic designs approaches stress a more comprehensive [32]. The entire development team collaborates from the beginning to quickly construct modules rather than building the instruction in stages. One of the main challenges in trying to complete e-plastic program has been managing the number of creating database table successfully and added the payment system, status. That might affect the program's success. Regardless of whether this is an independent or another research project, the framework may be used to construct for current work in to the economics of e-plastic. One can use a straight method designed to understand the more complex circumstances surrounding online e-plastic to set. This system serves as the framework for an ever-evolving online earning program that can help unemployment. Due to the amounts of e-waste generated and the amount of both harmful and useful materials in them, e-waste is a growing problem. "STEP (Solving the E-waste Problem)" program estimates that by 2018, the planet will generate 35% more e-waste, or 75 million tons. China, as a leading producer, generates about 11.8 million tons of e-waste, led by the United States at about 10.8 million tons [33]. A recent report by India's Associated Chambers of Commerce revealed that India's e-waste reserves are rising at a compounded annual growth rate of around 30 percent and are expected to generate 18 Lakh metric tons (MT) of ewaste by 2016 from current levels of 12.5 Lakh MT per year. In India, Mumbai ranks number 95,988 in e-waste production, led by Delhi-NCR (66998), Bangalore (57,000), Chennai (48,000), Kolkata (36,000), Ahmedabad (26,000), Hyderabad (25,000) and Pune [34]. Reducing waste generation is accomplished through the use of different materials or through the use of more skilled workers in the construction phase, or both through the adjustment approach to production-process. Three methods will achieve this method, including Superior Working and Continuance Steps, Modification of Material and Modification of Process Equipment. A Significant waste reduction is accomplished by improving route apparatus operation and continuation by following standard procedures that subsequently optimize the use of raw materials by preventing losses from leaks and spills. The employee training strategy plays a critical role in any waste reduction system in plant processes, use of facilities, safety guidelines, monitoring plans and control of waste materials [35].

5.1 Factors of the System

Nowadays, having a strong online presence is just as crucial as having a good offline presence, and often even more so. If someone doesn't like the website of your business, that's like a consumer strolling into your store, saying "yuck!" and then leaving with the

intention of never coming back. We identify our system factors by taking into consideration Usability, Speed, Aesthetics, Content, Contact Information, and Website Maintenance.

- User friendly Website.
- Responsive interface.
- Resources available for it
- Recycling ensures sustainable use of resources.
- Through this E-Plastic we can categorize and display products of plastic.
- Give the date, day and time for plastic collection accurately.
- Employee support from top management.
- Adopt new methods and approaches. [p1]

5.2 Scope of the System

Website needs are outlined in the website scope so that you know what to include. It also aids in determining what you will leave out of the project. In addition to helping your business satisfy the demands of your users and the aims of your website, avoiding scope creep also makes it easier to remain on budget and launch your website on schedule.

- The project's goal is to clearly illustrate the system flashpoint.
- Anyone can register and login into the system.
- The user can view the course.
- We can make the Recycled products to feature on other online shopping portals so that more buyers can purchase it.
- This can become a standard mechanism for collection of plastic.
- The system can include public education and awareness campaigns to inform and educate the public on the importance of proper plastic waste management and the benefits of the system. [P6]

5.3 Database Design

At first we have to create a database. From the ER Diagram we have the idea of the table and field name of the database. And now we have finalized the data type, default value. We have applied into database. And based on this we will maintain the databases of the system. This system's database has 13 tables primarily. They are given bellow:

- users
- admins
- employees
- sellers
- buyers

- employee_assign_requests
- employee_assign_orders
- products
- product_categories
- product_purchases
- roles
- sell_requests
- orders

Enterprise data management systems may be designed, developed, implemented, and maintained with the help of a group of techniques known as database design. A well-designed database is cost-effective in terms of disk capacity, enhances data consistency, and is simple to manage. The database designer determines what information needs to be saved and how the data items should be related [36]. Producing logical and physical architectural models of the suggested database system is the primary goal of database design in DBMS. The logical model focuses on the needed data and the data to be kept without regard to physical factors [37]. It is not concerned with where or how the physical storage of the data will take place. We use MySQL for our system here is the database table figure of our project. [K5]

users		
Field Name	**Data Type**	**Comments**
id	bigint(20)	PRIMERY KEY
role_id	int(10)	FOREIGN KEY (role.id)
name	VARCHAR(255)	
email	VARCHAR(255)	
phone	VARCHAR(255)	NULL
email_verified_at	timestamp	NULL
password	VARCHAR (255)	
two_factor_secret	text	
two_factor_recovery_codes	text	
two_factor_confirmed_at	timestamp	
address	VARCHAR (255)	NULL
image	VARCHAR (255)	NULL
gender	VARCHAR (255)	NULL
remember_token	VARCHAR (100)	
current_team_id	bigint(20)	PRIMERY KEY

Figure: 5.3.1 users database table

admin		
Field Name	**Data Type**	**Comments**
id	bigint(20)	PRIMERY KEY
user_id	int(10)	FOREIGN KEY (user.id)
name	VARCHAR(255)	
email	VARCHAR(255)	
phone	VARCHAR(255)	NULL
password	VARCHAR (255)	
address	VARCHAR (255)	NULL
gender	VARCHAR (255)	NULL
created_at	timestamp	
updated_at	timestamp	

Figure: 5.3.2 admins database table

employees		
Field Name	**Data Type**	**Comments**
id	bigint(20)	PRIMERY KEY
user_id	int(10)	FOREIGN KEY (user.id)
name	VARCHAR(255)	
email	VARCHAR(255)	
phone	VARCHAR(255)	NULL
password	VARCHAR (255)	
address	VARCHAR (255)	NULL
gender	VARCHAR (255)	NULL
created_at	timestamp	
updated_at	timestamp	

Figure: 5.3.3 employees database table

sellers		
Field Name	**Data Type**	**Comments**
id	bigint(20)	PRIMERY KEY
user_id	int(10)	FOREIGN KEY (user.id)
name	VARCHAR(255)	
email	VARCHAR(255)	
phone	VARCHAR(255)	NULL
password	VARCHAR (255)	
address	VARCHAR (255)	NULL
gender	VARCHAR (255)	NULL
created_at	timestamp	
updated_at	timestamp	

Figure: 5.3.4 sellers database table

buyers		
Field Name	**Data Type**	**Comments**
id	bigint(20)	PRIMERY KEY
user_id	int(10)	FOREIGN KEY (user.id)
name	VARCHAR(255)	
email	VARCHAR(255)	
phone	VARCHAR(255)	NULL
password	VARCHAR (255)	
address	VARCHAR (255)	NULL
gender	VARCHAR (255)	NULL
created_at	timestamp	
updated_at	timestamp	

Figure: 5.3.5 buyers database table

Sell_requests		
Field Name	**Data Type**	**Comments**
id	bigint(20)	PRIMERY KEY
seller_id	VARCHAR(255)	FOREIGN KEY (seller.id)
address	VARCHAR(255)	NULL
product_name	VARCHAR(255)	NULL
product_category_id	VARCHAR(255)	FOREIGN KEY (productcategory.id)
product_ weight	VARCHAR(255)	NULL
product_price	VARCHAR(255)	NULL
total_price	VARCHAR(255)	NULL
image	VARCHAR(255)	NULL
status	VARCHAR(255)	
reject_reason	VARCHAR(255)	NULL

Figure: 5.3.6 sell request database table

Employee_assign_requests		
Field Name	**Data Type**	**Comments**
id	bigint(20)	PRIMERY KEY
employee_id	int(11)	FOREIGN KEY (employee.id)
sell_request_id	int(11)	
status	VARCHAR (255)	
created_at	timestamp	NULL
updated_at	timestamp	NULL

Figure: 5.3.7 employee assign requests database table

Employee_assign_orders		
Field Name	**Data Type**	**Comments**
id	bigint(20)	PRIMERY KEY
employee_id	int(11)	FOREIGN KEY (employee.id)
sell_request_id	int(11)	
status	VARCHAR (255)	
created_at	timestamp	NULL
updated_at	timestamp	NULL

Figure: 5.3.8 employee assign orders database table

roles		
Field Name	**Data Type**	**Comments**
id	bigint(20)	PRIMERY KEY
name	VARCHAR (255)	
slug	VARCHAR (255)	
created_at	timestamp	NULL
updated_at	timestamp	NULL

Figure: 5.3.9 roles database table

products		
Field Name	**Data Type**	**Comments**
id	bigint(20)	PRIMERY KEY
product_name	VARCHAR(255)	
product_description	VARCHAR(255)	NULL
product_category_id	VARCHAR(255)	FOREIGN KEY (product category.id)
product_ weight	VARCHAR(255)	
product_price	VARCHAR(255)	
buying_price	VARCHAR(255)	
selling_price	VARCHAR(255)	
image	VARCHAR(255)	NULL
status	VARCHAR(255)	
sale_status	VARCHAR(255)	NULL
created_at	timestamp	NULL
updated_at	timestamp	NULL

Figure: 5.3.10 products database table

Product_categories		
Field Name	**Data Type**	**Comments**
id	bigint(20)	PRIMERY KEY
name	VARCHAR(255)	
price_per_unit	int(11)	NULL
status	int(11)	
created_at	timestamp	NULL
updated_at	timestamp	NULL

Figure: 5.3.11 product categories database table

Product_purchases		
Field Name	**Data Type**	**Comments**
id	bigint(20)	PRIMERY KEY
user_id	VARCHAR(255)	FOREIGN KEY (user.id)
Product_name	VARCHAR(255)	
product_description	VARCHAR(255)	NULL
product_category_id	VARCHAR(255)	
product_weight	VARCHAR(255)	
product_price	VARCHAR(255)	
buying_price	VARCHAR(255)	
selling_price	VARCHAR(255)	
image	VARCHAR(255)	NULL
status	VARCHAR(255)	
status	VARCHAR(255)	

Figure: 5.3.12 product purchases database table

orders		
Field Name	**Data Type**	**Comments**
id	bigint(20)	PRIMERY KEY
order_id	VARCHAR(255)	PRIMERY KEY
transaction_id	VARCHAR(255)	PRIMERY KEY
currency	VARCHAR(255)	NULL
user_id	VARCHAR(255)	FOREIGN KEY (user.id)
name	VARCHAR(255)	
phone	VARCHAR(255)	
email	VARCHAR(255)	
address	VARCHAR(255)	NULL
product_id	VARCHAR(255)	FOREIGN KEY (product.id)
product_category_id	VARCHAR(255)	FOREIGN KEY (productcategory.id)
product_ weight	VARCHAR(255)	
product_price	VARCHAR(255)	
total_price	VARCHAR(255)	
image	VARCHAR(255)	
status	VARCHAR(255)	

[P6]

Figure: 5.3.13 orders database table

Chapter 6:

Evaluation of the System

6. Evaluation of the System

The Plastic pollution is a pervasive and growing problem. To estimate the effectiveness of interventions to reduce plastic pollution, we modeled stocks and flows of municipal solid waste and four sources of micro plastics through the global plastic system for five scenarios between 2016 and 2040. Implementing all feasible interventions reduced plastic pollution by 40% from 2016 rates and 78% relative to "business as usual" in 2040. Even with immediate and concerted action, 710 million metric tons of plastic waste cumulatively entered aquatic and terrestrial ecosystems. To avoid a massive build-up of plastic in the environment, coordinated global action is urgently needed to reduce plastic consumption; increase rates of reuse, waste collection, and recycling; expand safe disposal systems; and accelerate innovation in the plastic value chain [38]. While recycling has been recognised as the preferred plastic waste management solution, little is known about the detailed characteristics of plastic waste and how these may affect its recycling. In this study hard plastic, plastic film and PVC waste collected at Danish recycling centers were sampled and characterized according to product applications, legislative requirements (quality), expected product life time, polymer types and presence of potential impurities such as cultured plastics, non-plastic materials and multi- polymer products [39]. Plastic debris is an environmentally persistent and complex contaminant of increasing concern. Understanding the sources, abundance and composition of micro plastics present in the environment is a huge challenge due to the fact that hundreds of millions of tonnes of plastic material is manufactured for societal use annually, some of which is released to the environment [40].

Home page of the system:

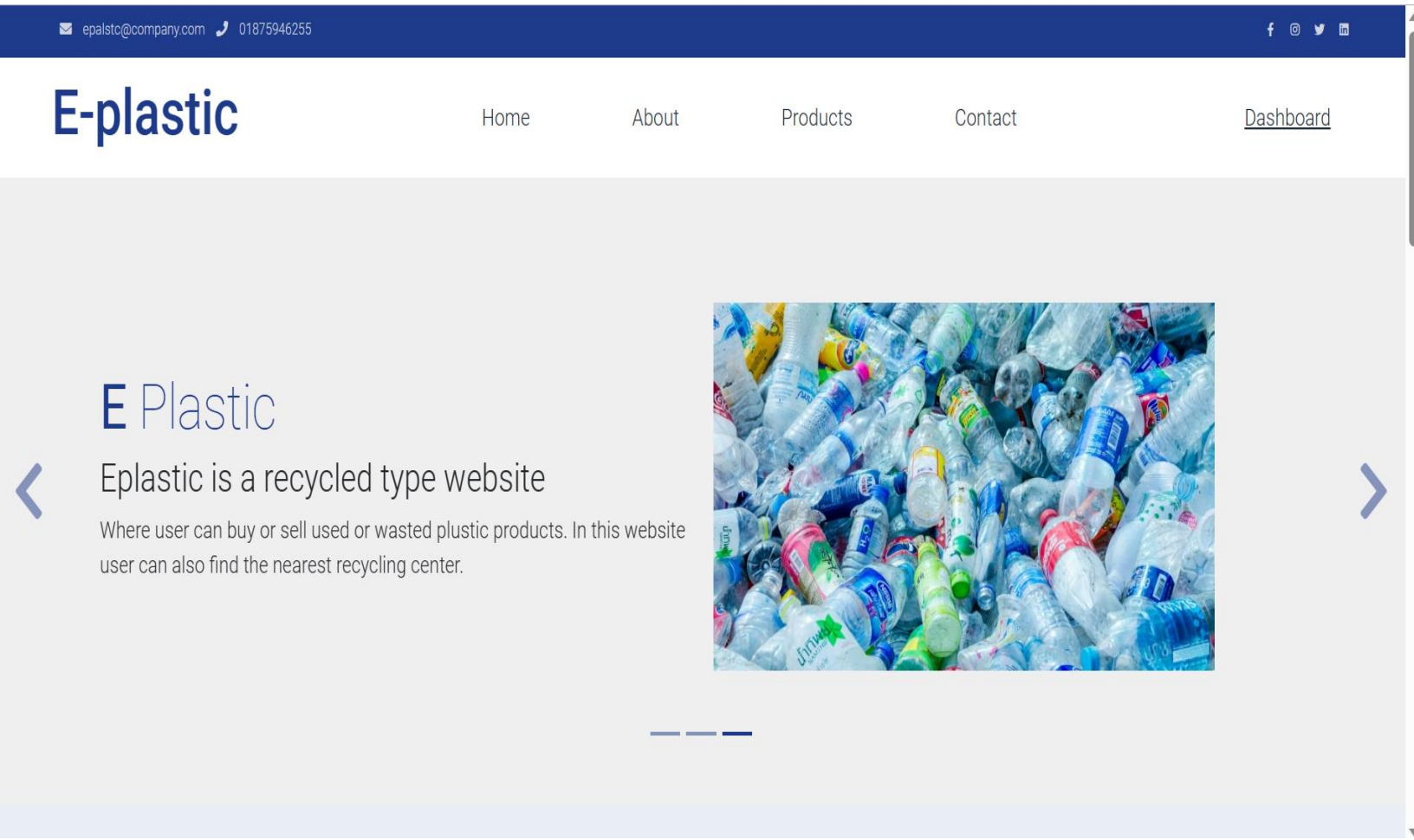


Figure: 6.1 Screenshot of the home page

Products View Page:

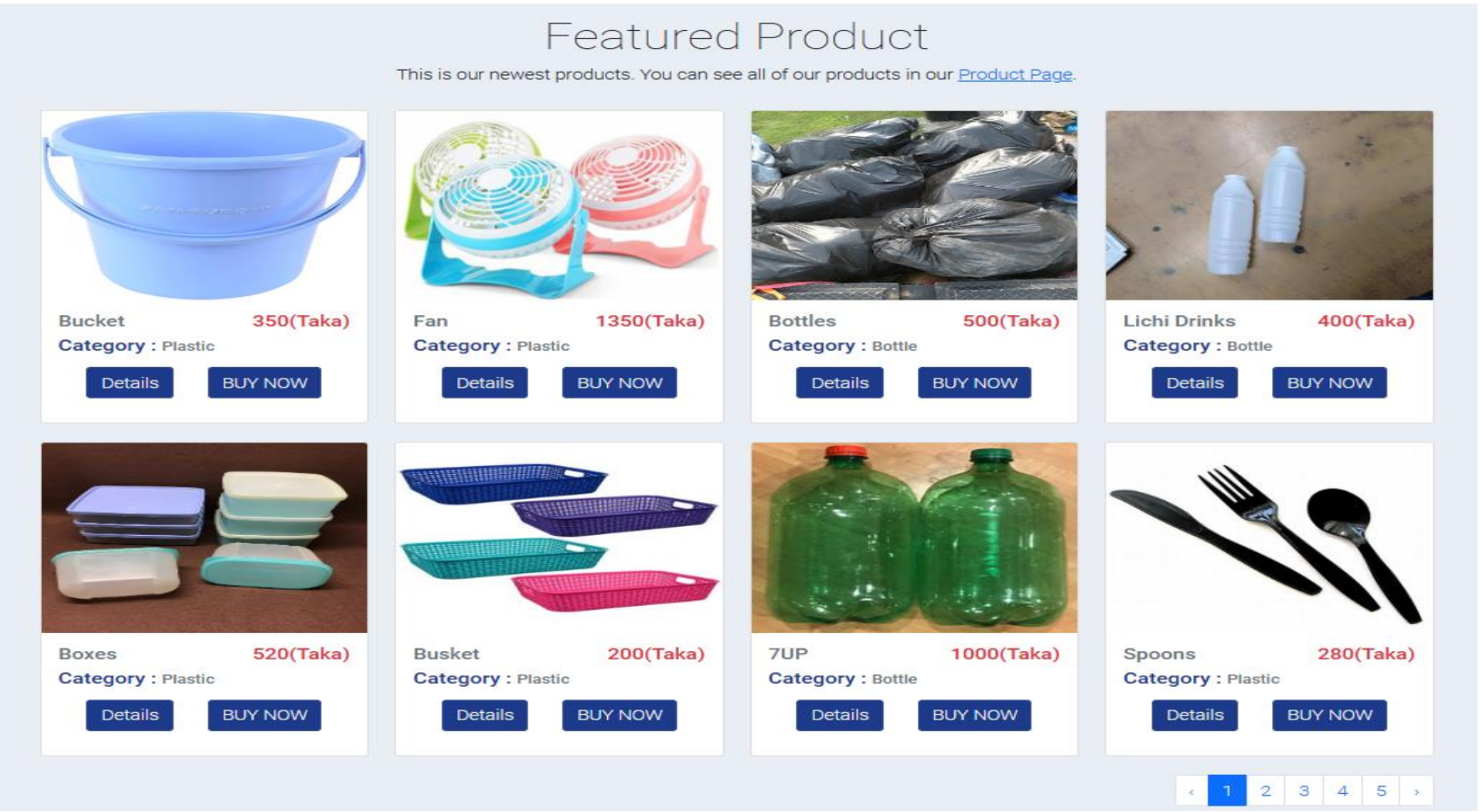


Figure: 6.2 products view page

6.1 Features of the System

E-Plastic Management System can be used in our daily life cycle, business, factory, restaurants, etc. It is a step by step process form user informing about the waste product in the site and the admin will reply for it when it will be taken, and the plastics will be taken properly and it will be recycled and it will be given to big companies, industries etc. from that companies or industries we will get money for that recycled process. By using this E-Plastic Management System we can reduce water scarcity, increase business profits, increase environmental wealth etc [41]. Natural resources are rapidly deteriorating due to factors such as rapid population growth, technological developments, and changes in consumption habits, with increasing harm from electronic wastes (e-waste). E-plastics alone make up to 21% of the e-waste collected globally, and their management or recycling is a growing concern as they pose

detrimental effects on the environment and public health. Construction industry is continuously adopting e-plastic waste for use as aggregate or fiber in concrete. Several studies have been conducted to test the applicability and properties of the resultant concrete when e-plastic is used as a partial substitute material for both coarse and fine aggregate in concrete of various grades [42]. [A3]

6.1.1 Types of Users

User Types categorize users and may assign responsibilities that provide them access to secure portions of the website. In searches and reporting tools like the User Data Report, users may be retrieved using User Type. Users can be categorized by User Types according to their membership status, location, industry sector, area of interest, or any other factor that is important to the organization [43]. The "member" role, which gives access to the site's Members' Areas, is often conveyed through User Types assigned through membership. There are four sorts of users on a typical e-plastic website. One is an admin and the others are employees, sellers and buyers. High-level administrative access roles are frequently linked to User Types so that they may be selectively given to particular people. The general user types are unique to your company. Frequently, they are no privileged types that are primarily used for categorization [44]. They might be used to simulate membership-based classifications within the organization, such as those based on geography, nonmember liaisons, or other categories of nonmembers. Access to administrative areas like the Kavi Members Admin Area, Reports Area, and Super Admin Area is granted to certain User Types [43]. Access to organizational data is made possible by the instruments in these areas. These categories are selectively assigned to employees or other users by administrators as needed. You must possess an Admin Person Type or a higher-level User Type in order to grant an Admin User Type to another user. The Super Admin User Type may only be given to another user by a Super Admin. Highly privileged user types have access to administrative or editing roles that provide them use of Edit tools or Admin Tools, which are used to control the pages and content of websites [45].

1 Admin: The role having the most access to your website is admin. Administrators have access to every item in the Admin Toolbar and may add content to any page. This implies that administrators have access to options that affect the entire site, including your website's style and appearance. A website administrator makes sure that a website is running well and that the impression that a business or organization wishes to project is maintained. Work on the technical aspects of websites, such as problem-solving, setting up web hosts, ensuring users have access, and programming servers, may be included in this. However, website administrators may also assist with features of a website that are visible to users, such as its design, usability, and usage of media. This frequently entails creating web pages for a website, selecting text fonts and colors, and formatting supplementary material, such as photographs, audio files, and videos, so that they appear properly [46].

We shall describe the admins' works using a diagram-

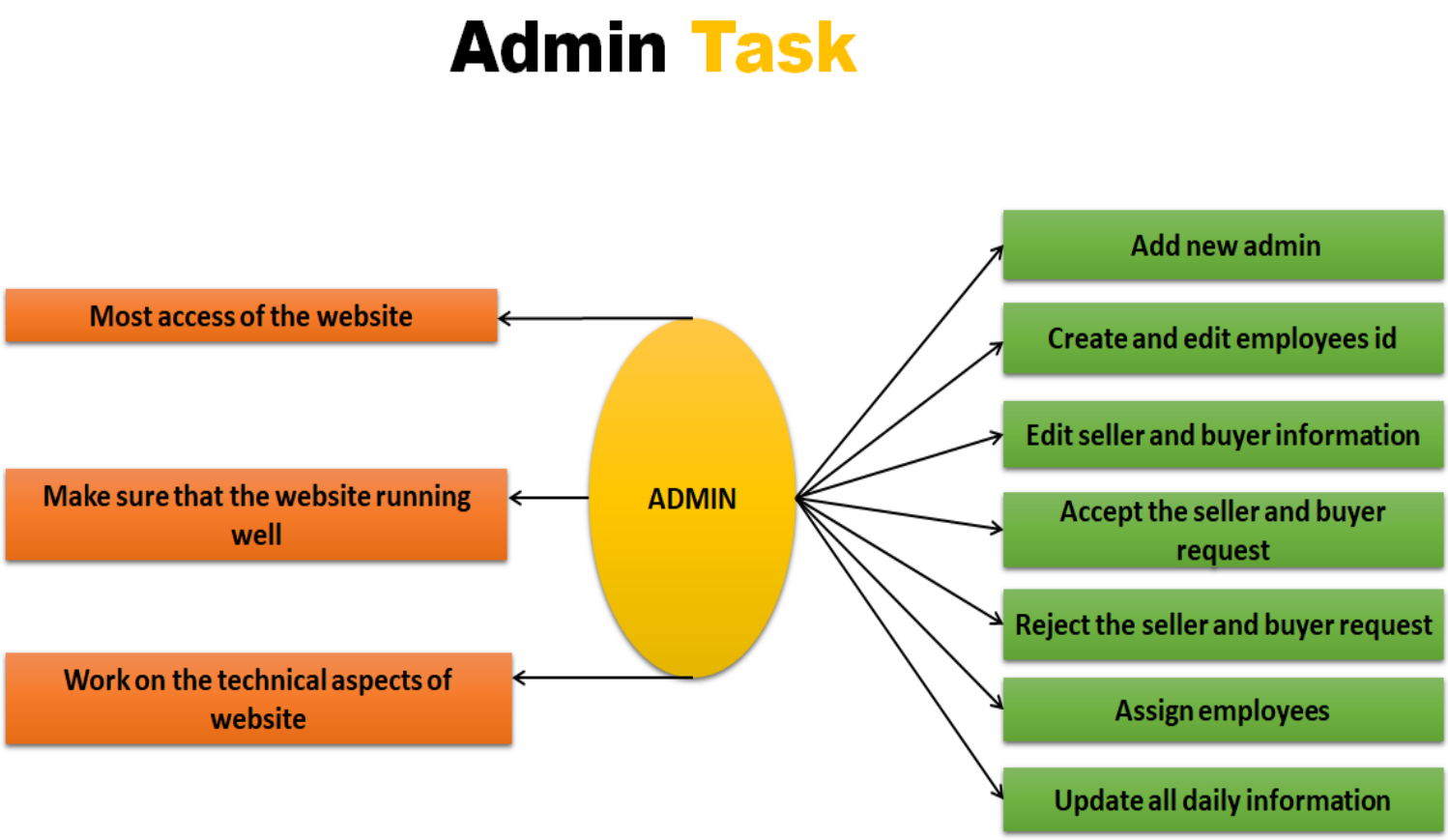


Figure: 6.1.1.1 Admins task diagram

Each website has a unique super administrator account with the username “admin” which is a privileged account with the ability to add, delete, and update other website administrators. The super admin account has the same level of access and permissions as the other administrators. To illustrate the functions of the administrators, a diagram will be provided. Admin has all access to change password, manage user employee, buyer and seller. Summary report for seller and buyer completed order and pending orders. The admin can also assign employee, reject or accept buyer or seller order request. Also update all the daily information.

Admin profile view:

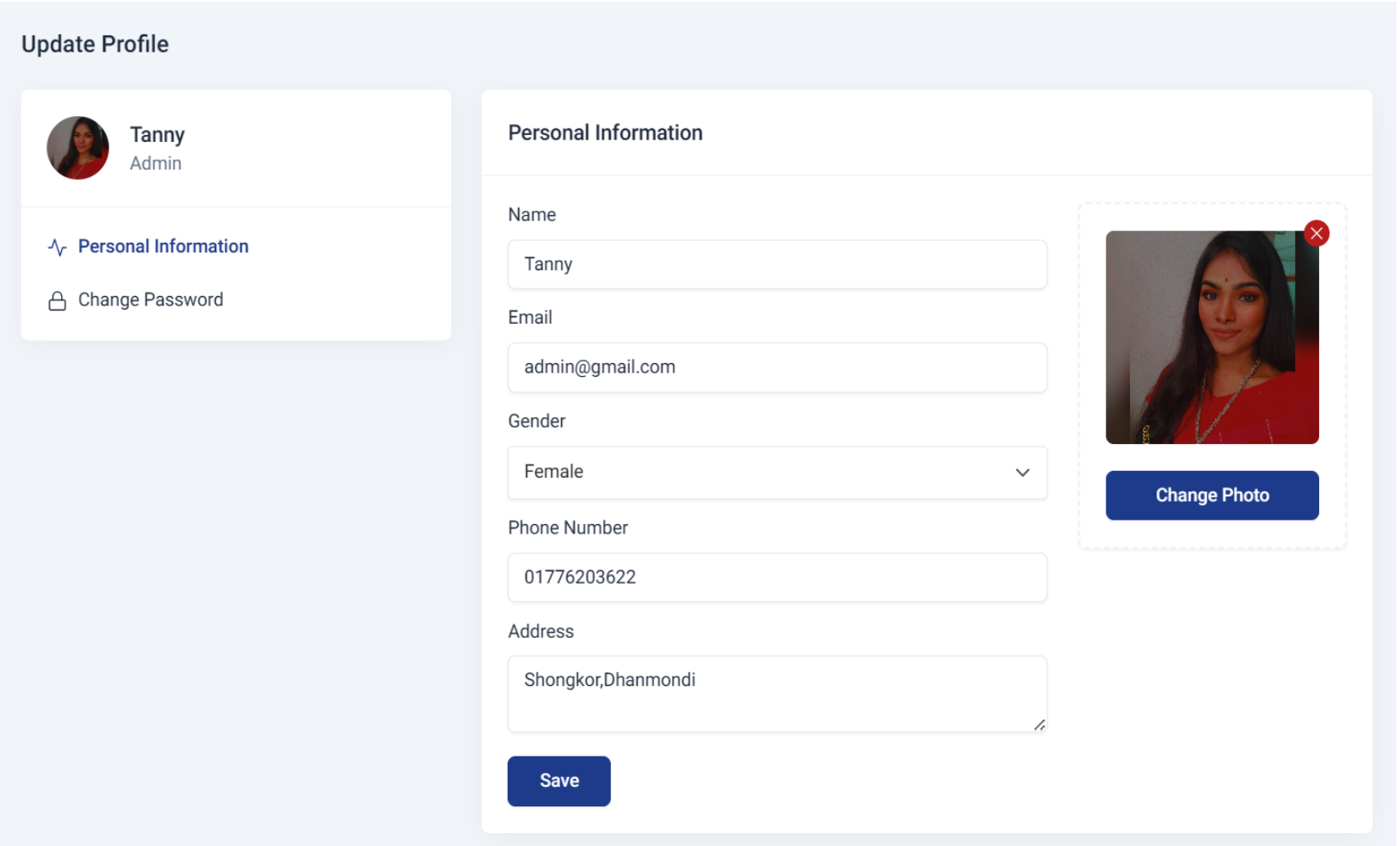


Figure: 6.1.1.2 Admin interface diagram

Dashboard of the system:

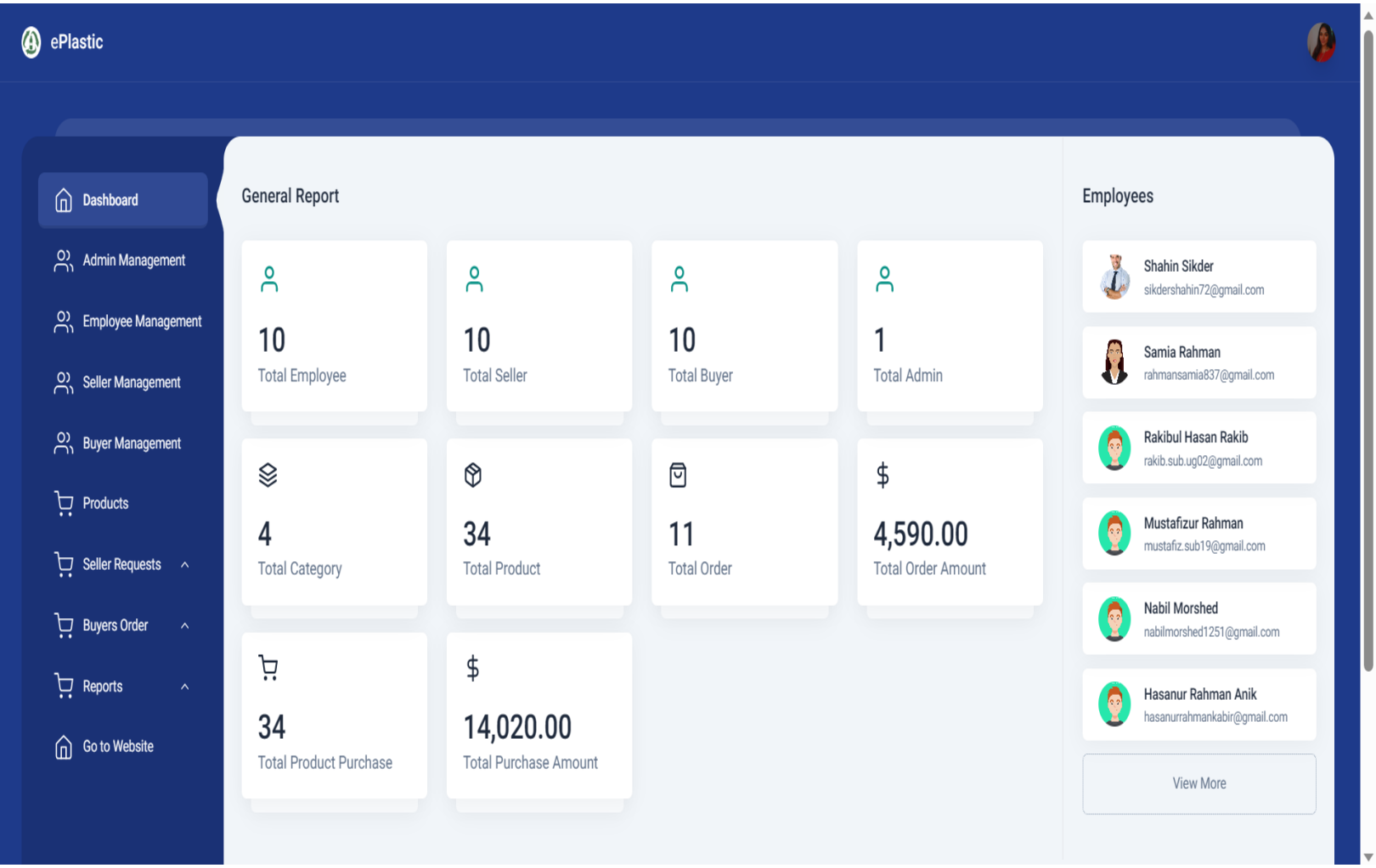


Figure: 6.1.1.3 Screenshot of the dashboard page

In this dashboard we can see the admin and total number of employees, sellers and buyers. We can also see the total category of products, total number of products, total orders, total amount of orders, total product purchase and purchase amount.

2. Seller: The system allows anyone to become a registered user by providing accurate information during the registration process. Once registered, users can log in and explore the website, view their profile, and edit their information. Users can also browse through available product and purchase them to gain access to all the products. The entire plastic products are available to all users, but purchasing the item is necessary to access the complete set of product category. Payment can be made using the designated method, and after a successful payment, the user's product purchase request will be reviewed by the administration. Upon approval, seller can access and sell the product.

Through a diagram, we will see the admin and seller relationship-

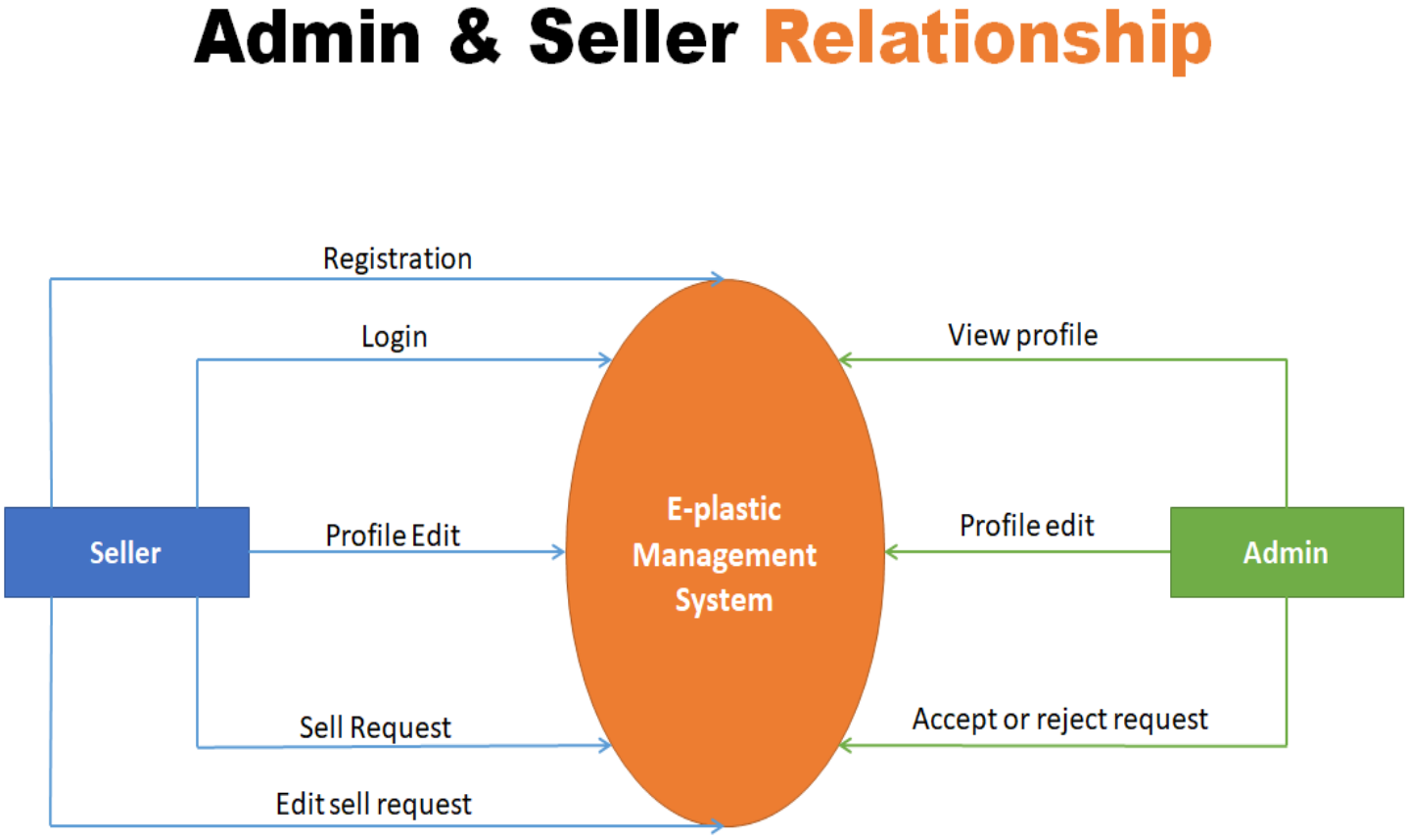


Figure: 6.1.1.4 admin and seller relationship diagram

Seller profile view:

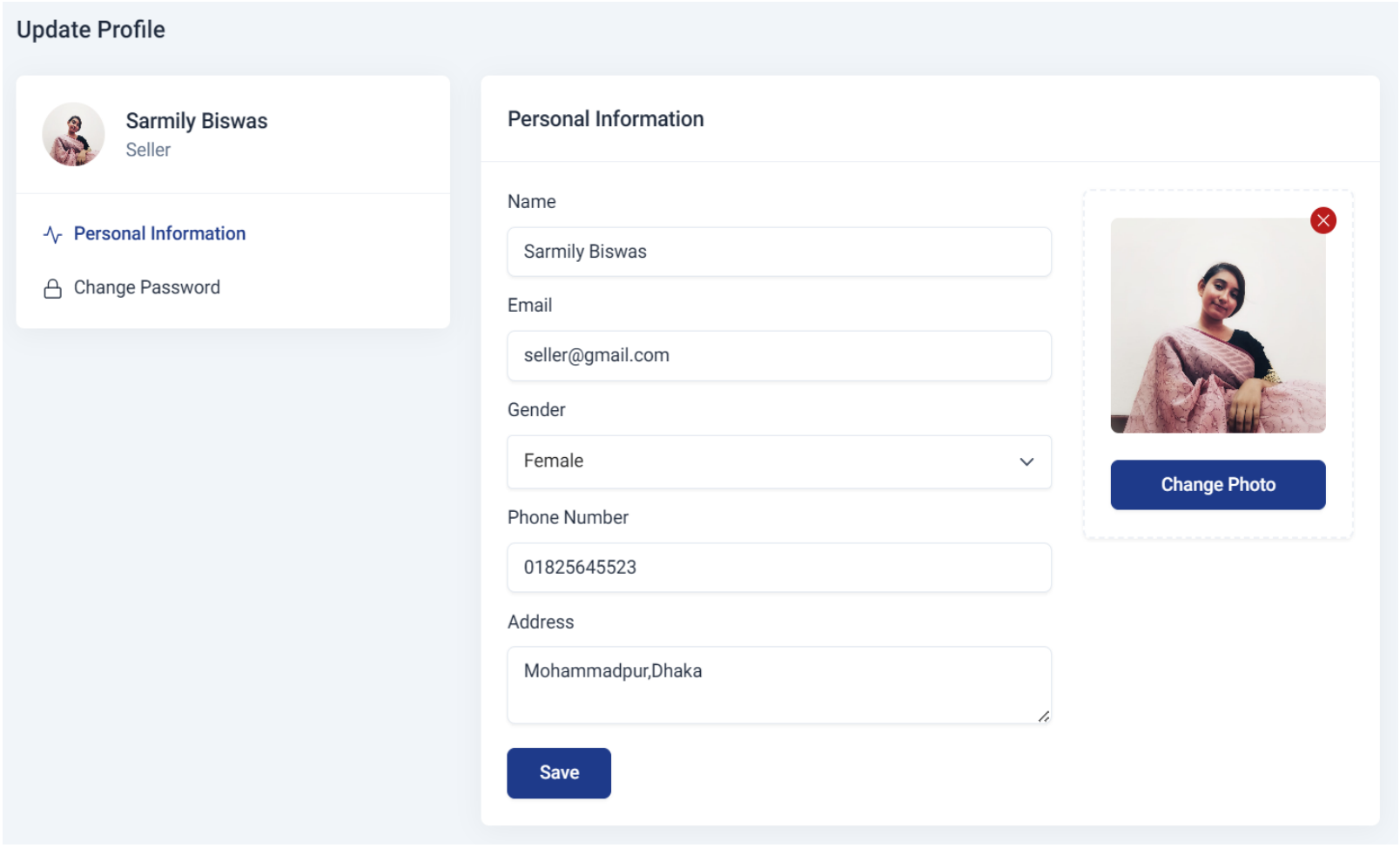


Figure: 6.1.1.5 seller interface

3. Buyer: A buyer in an e-plastic context is someone who uses an online platform to purchase products or services. When a buyer visits an e-commerce website, they typically browse through various product listings, which may be organized by category, price, or other criteria. Buyers can read product descriptions, view images and videos, and check customer reviews and ratings to help them make an informed purchasing decision. Once a buyer decides to make a purchase, they can add the desired product to their cart and proceed to the checkout page. At the checkout page, the buyer provides their shipping address, payment details, and any additional information required to complete the purchase. The buyer may have the option to choose from various shipping and delivery options, such as expedited shipping or in-store pickup. After the purchase is completed, the buyer typically receives a confirmation email with details of the purchase, including the order number, shipping details, and expected delivery date. The buyer may also have access to order tracking information, allowing them to monitor the progress of their delivery. Buyers play a critical role in the success of the business. Providing a positive buying experience,

including clear product information, easy checkout, and reliable shipping and delivery, can help to build customer loyalty and drive repeat business.

Through a diagram, we will see the admin and buyer relationship-

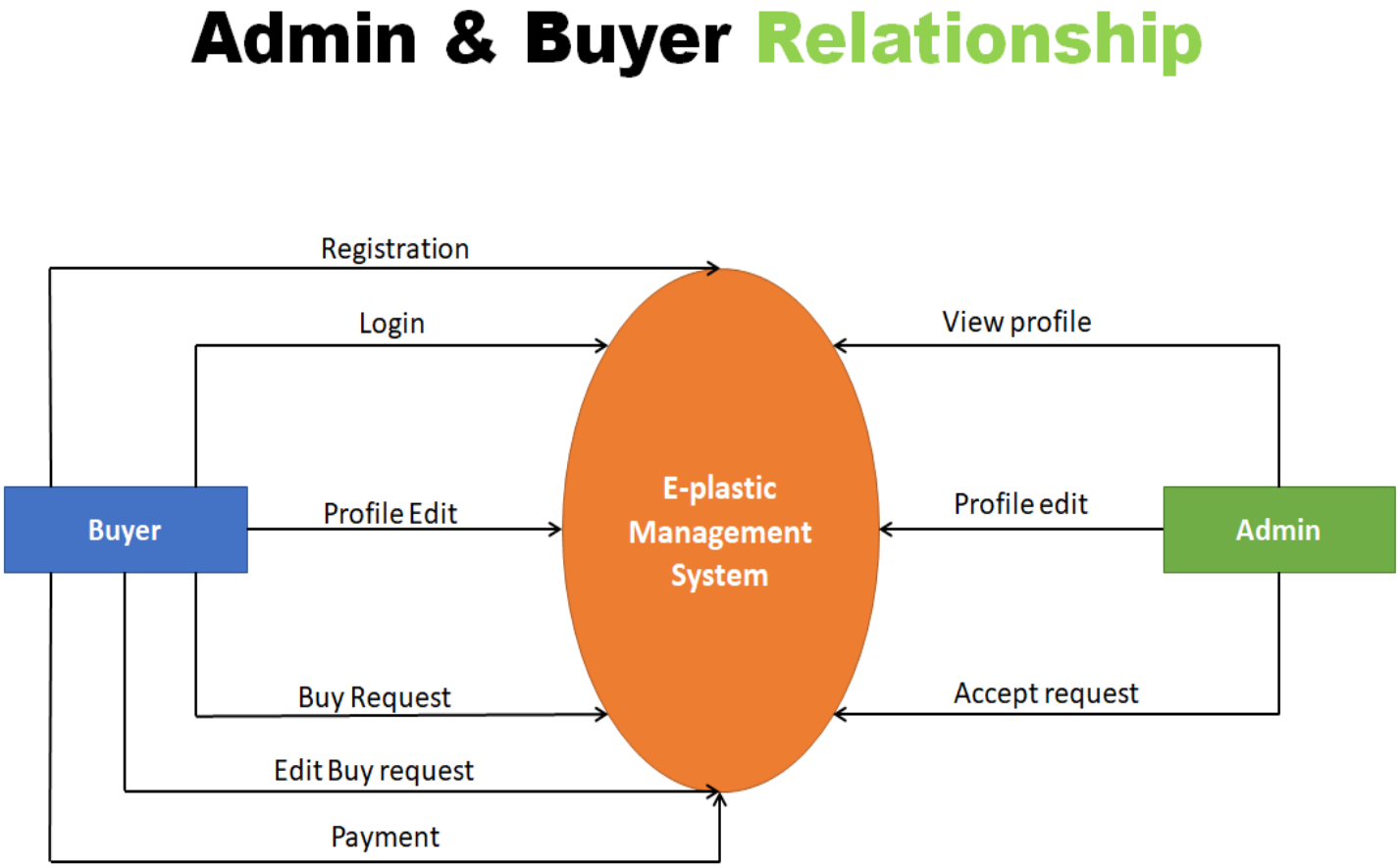


Figure: 6.1.1.6 admin and buyer relationship diagram

Buyer's profile view:

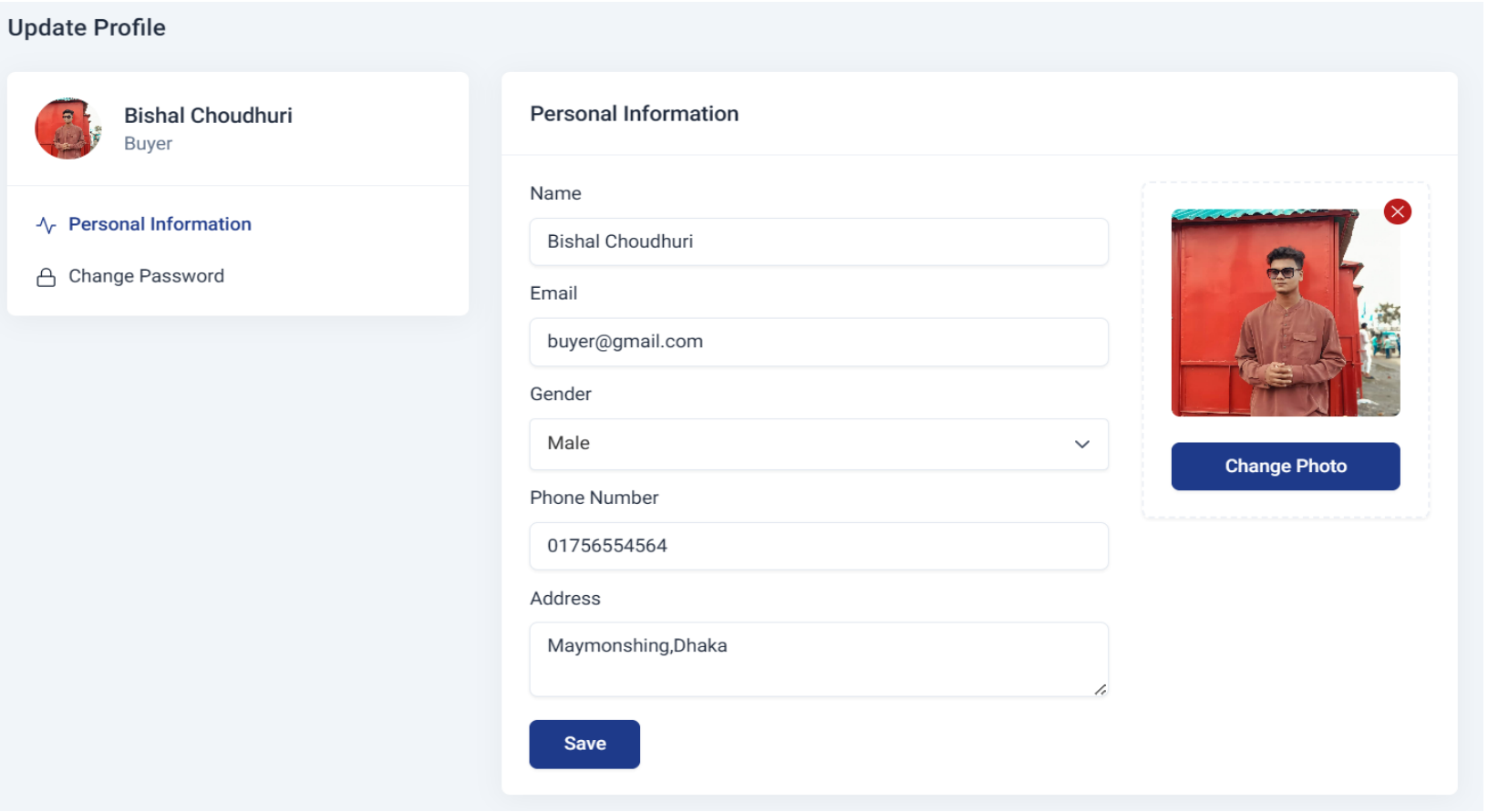


Figure: 6.1.1.7 buyer interface

3. Employee: Employee roles within an e-plastic management system can vary greatly depending on the size and scope of the operation. Generally, there are several key positions that are essential to the successful functioning. First and foremost, there is typically a team responsible for website design and development. These professionals work to create an attractive and user-friendly interface that encourages customers to explore the site and make purchases. This team may also be responsible for ensuring the site is optimized for search engines and integrating various third-party tools and plugins to enhance functionality. These employees are responsible for picked the order and delivered the order and also edit their own account only. Admin assigned the employee to the list which employees do this. Admin assigned employee request and employee orders.

Through a diagram, we will see the admin and employee relationship-

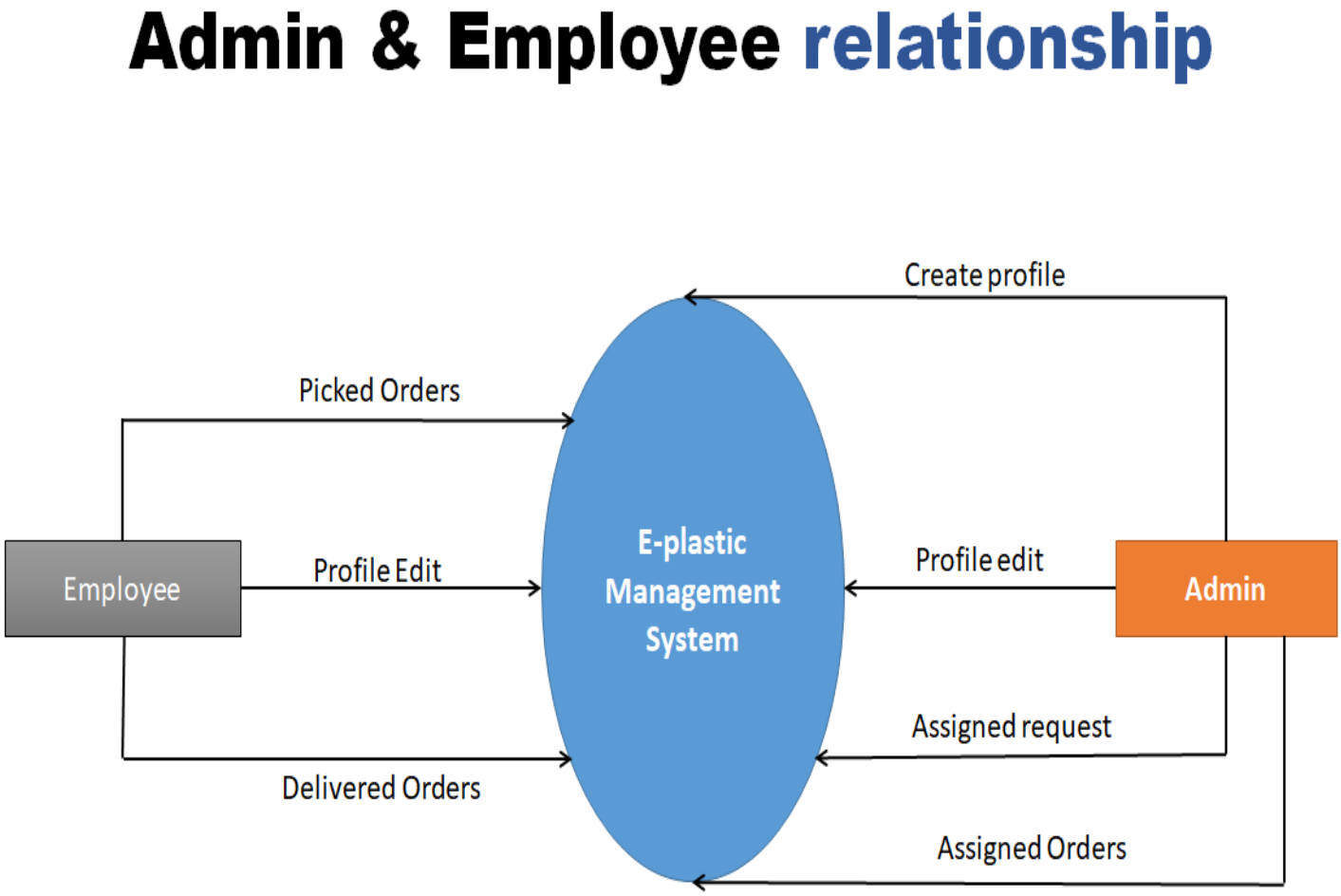


Figure: 6.1.1.8 Admin and employee relationship interface

Employee profile view:

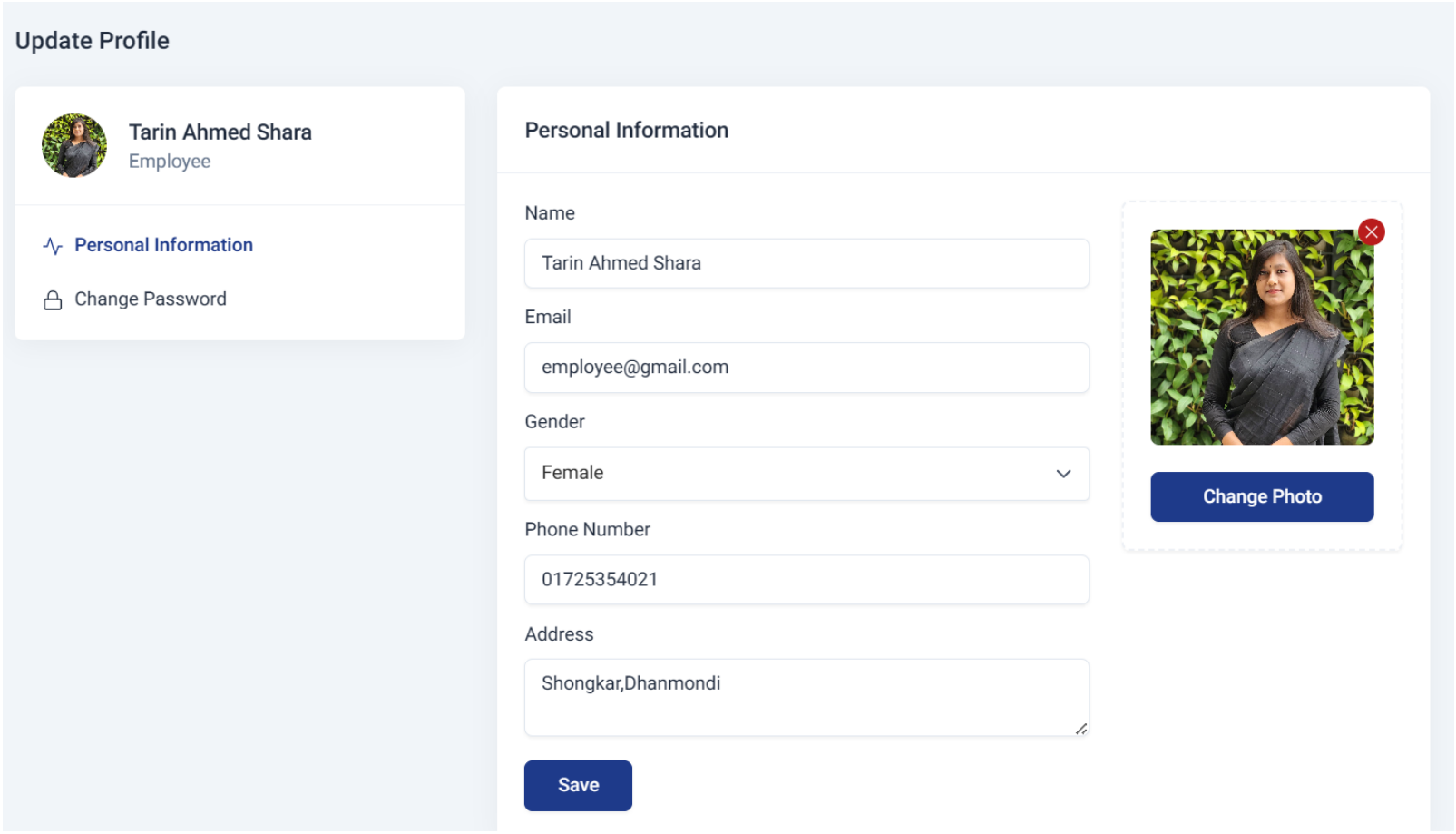


Figure: 6.1.1.9 Employees interface

6.1.2 Manage Products Request by Seller

One Seller is responsible for creating product listings that accurately describe their products or services. This includes providing detailed product information, high quality images, and pricing details. Hare we see the sell request firstly add the product name then the quantity of product the weight, select the category which type you want to sell then the showing the price and enter the pickup address at last choose the image what type you want to sell. Then sell request complete.

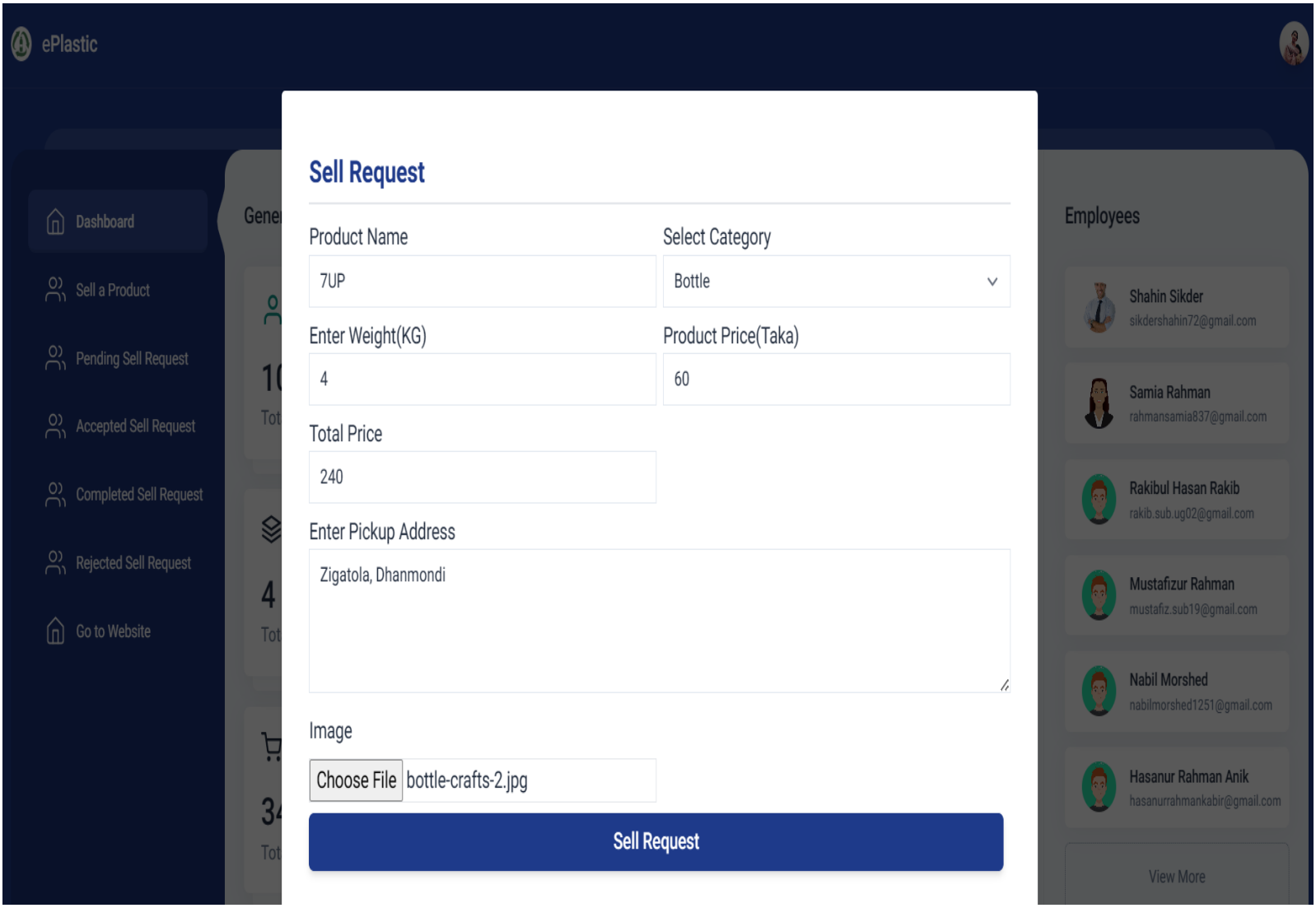


Figure: 6.1.2.1 Sell request page by seller

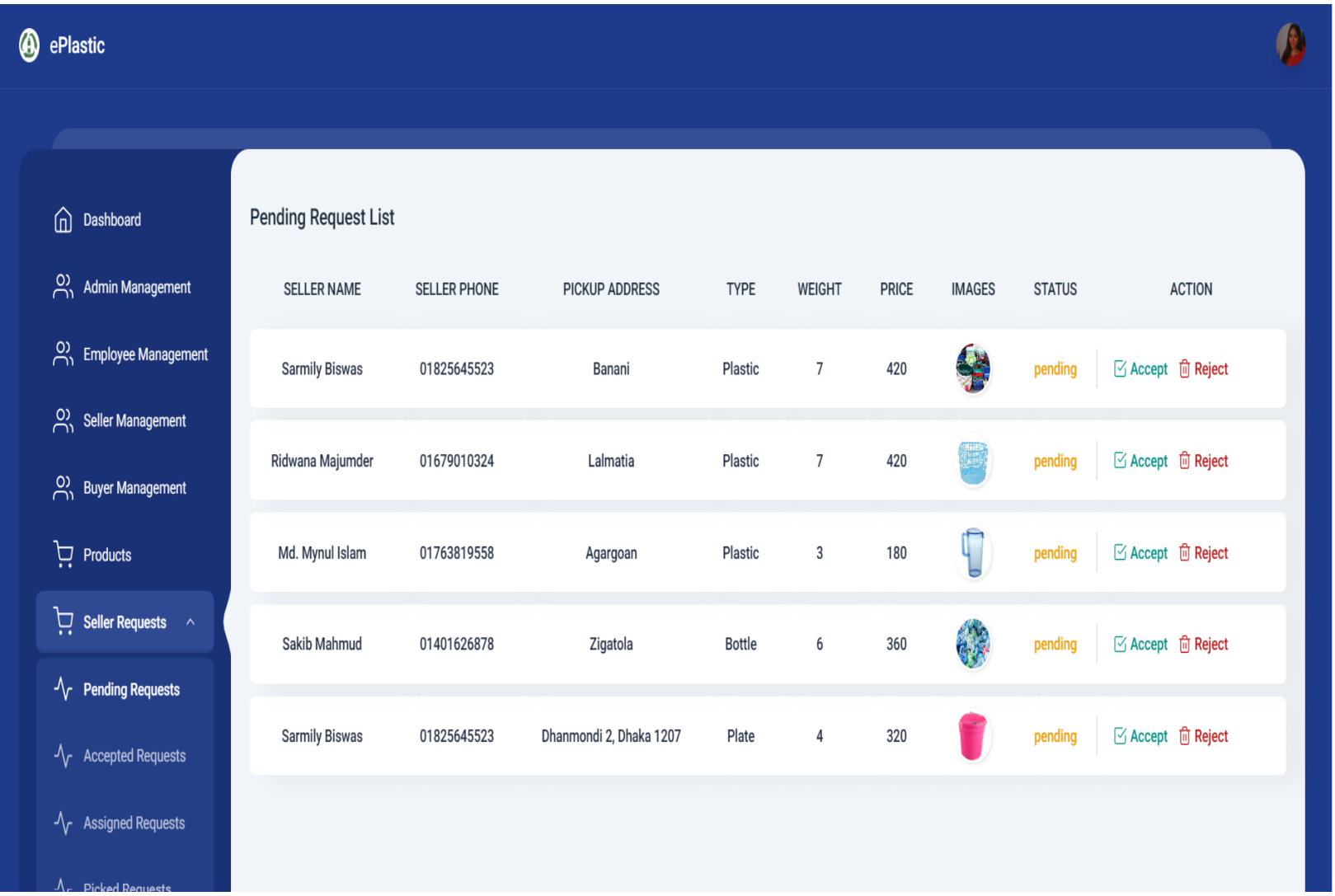


Figure: 6.1.2.2 Admin accepts or rejects seller requests

Figure: 6.1.2.2 here, the pending request list .The instructor has the ability to make changes to accept and delete by admin. The instructor can see the product status which seller are collect the order. Admin accept or reject the seller request.

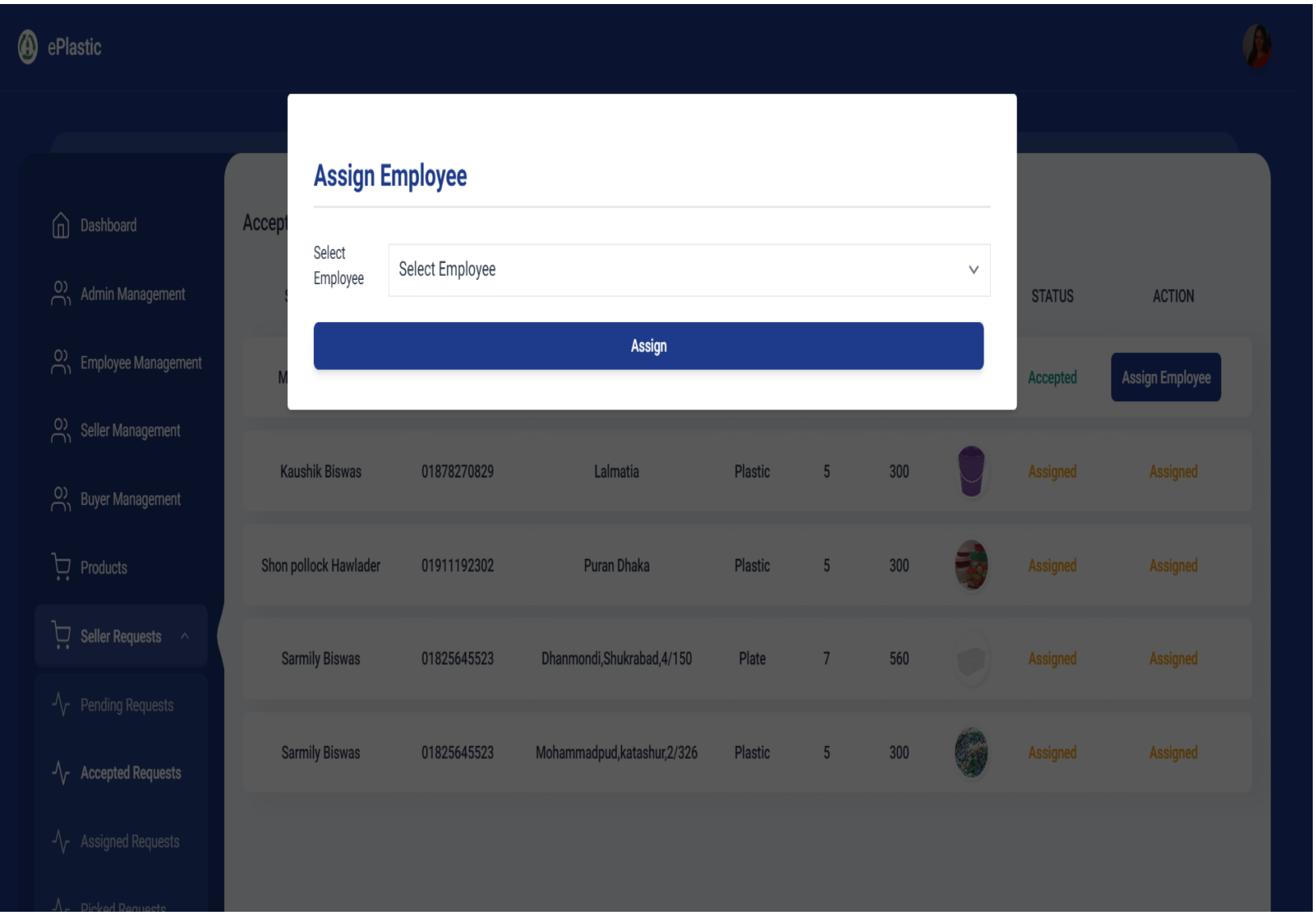


Figure: 6.1.2.3 Employee assign by admin view

Figure: 6.1.2.3 here, the admin select employee and assign to picked the order.

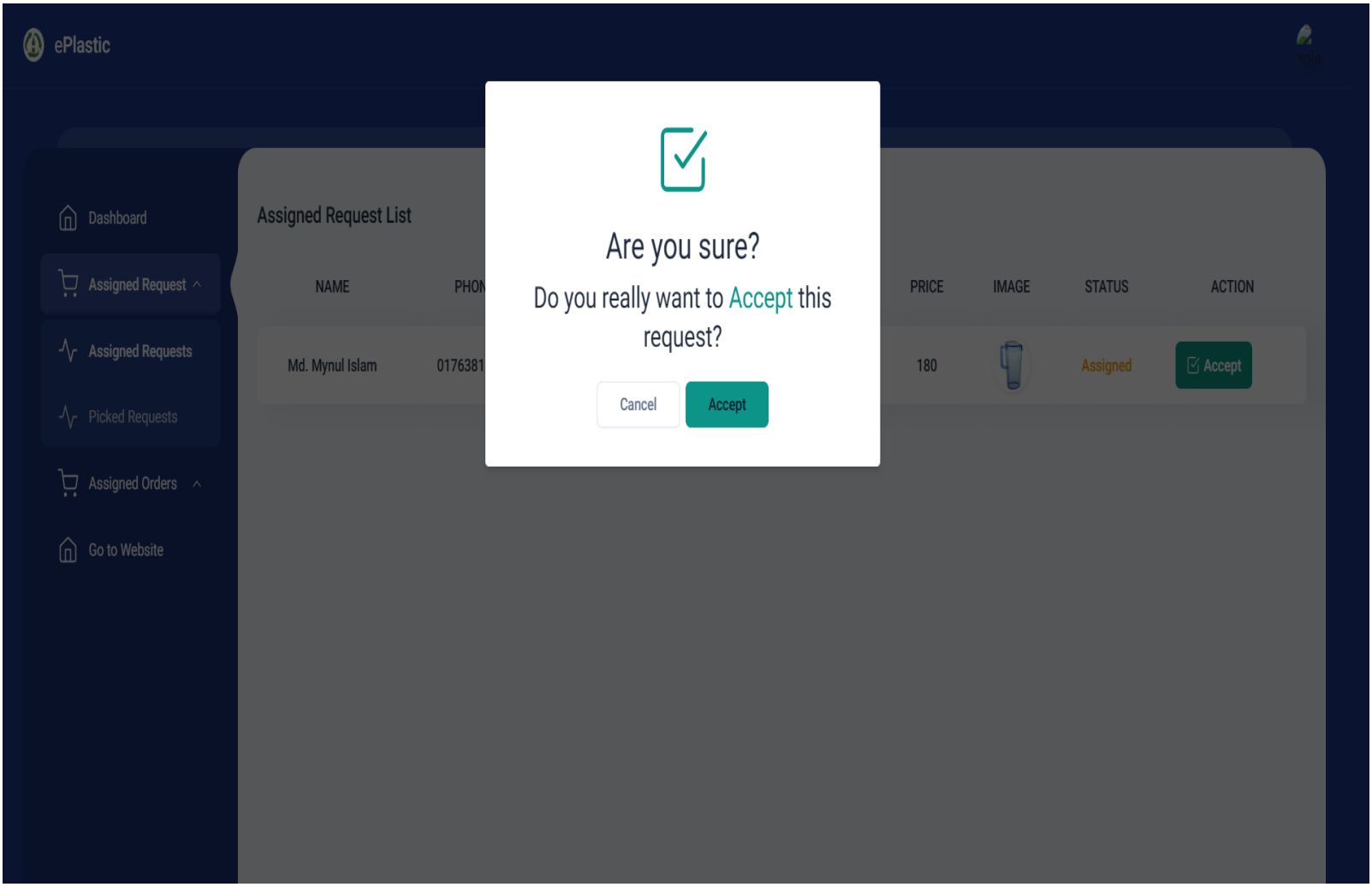


Figure: 6.1.2.4 Assign request accept by employee view

Figure: 6.1.2.4 Assign request acceptor cancel by employee view. Employee can accept or cancel this.

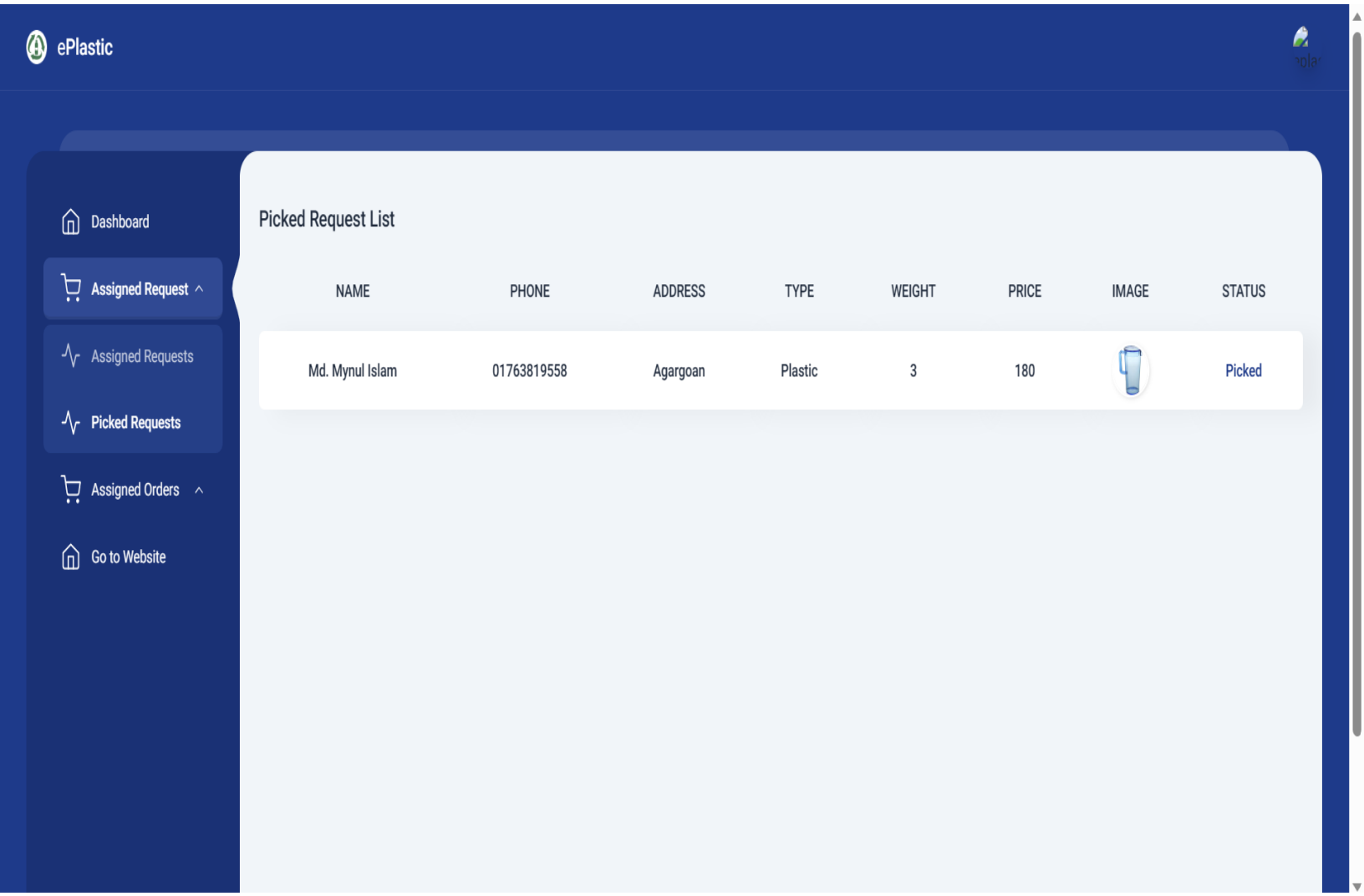


Figure: 6.1.2.5 Picked product by employee view

Figure: 6.1.2.5 there is employee name, phone number, address, type of products, weight, images which status the product has these all things are show picked product by employee view.

6.1.3 Manage Products Purchase by Buyer

Here buyer can buy now products. They can see the price, category, description, total weight and total price. Then buyer can click the buy now to buy their desire product.

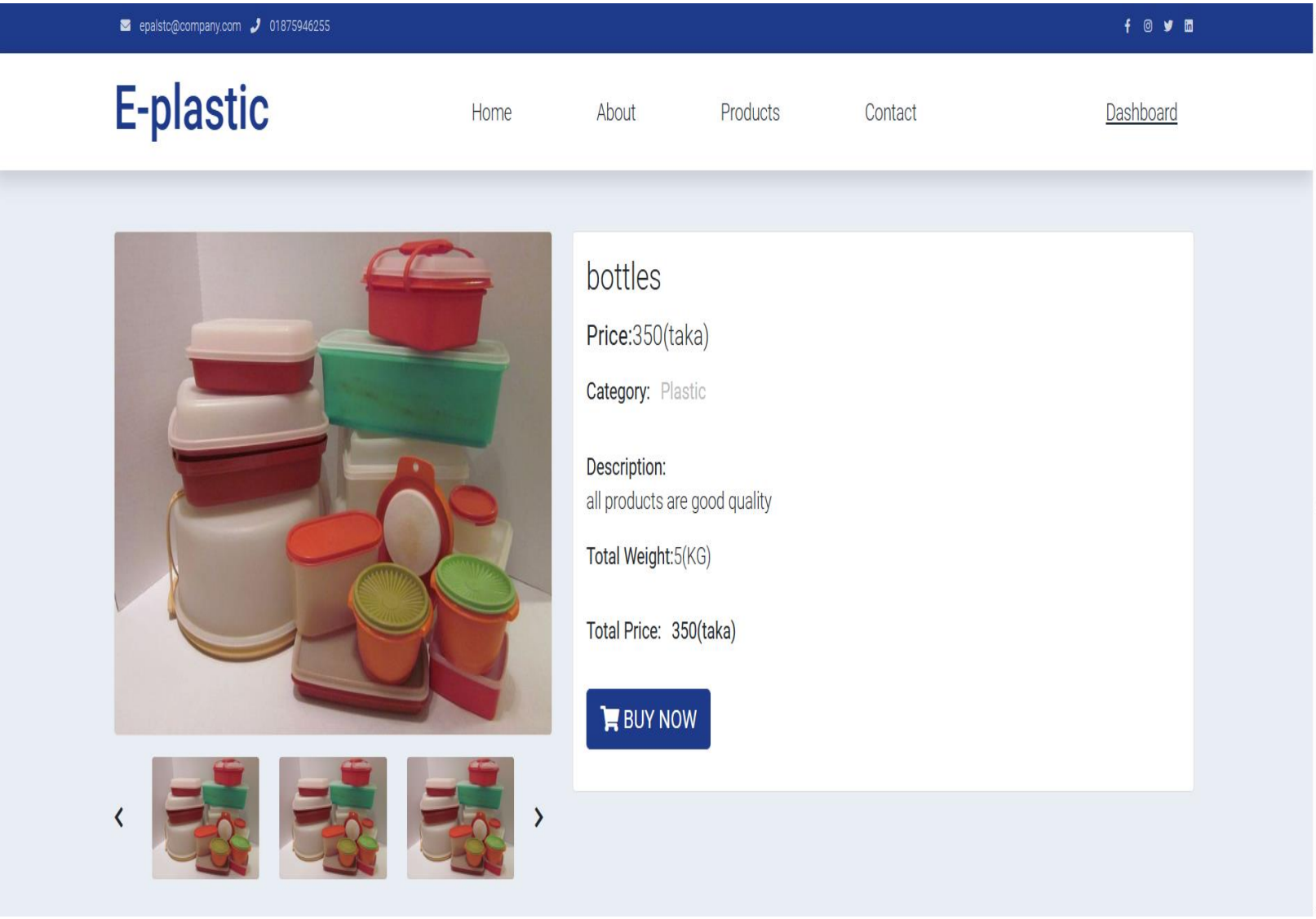


Figure: 6.1.3.1 Buy now products by buyer view page

If the user wanted to purchase the product, he or she would have to click the "Buy Now" button, Product checked by buyer. All information's are given there. Fill-up name ,mobile number, email address, address, country then all the information's give and check out than click buy now button.

There is a view of checkout list-

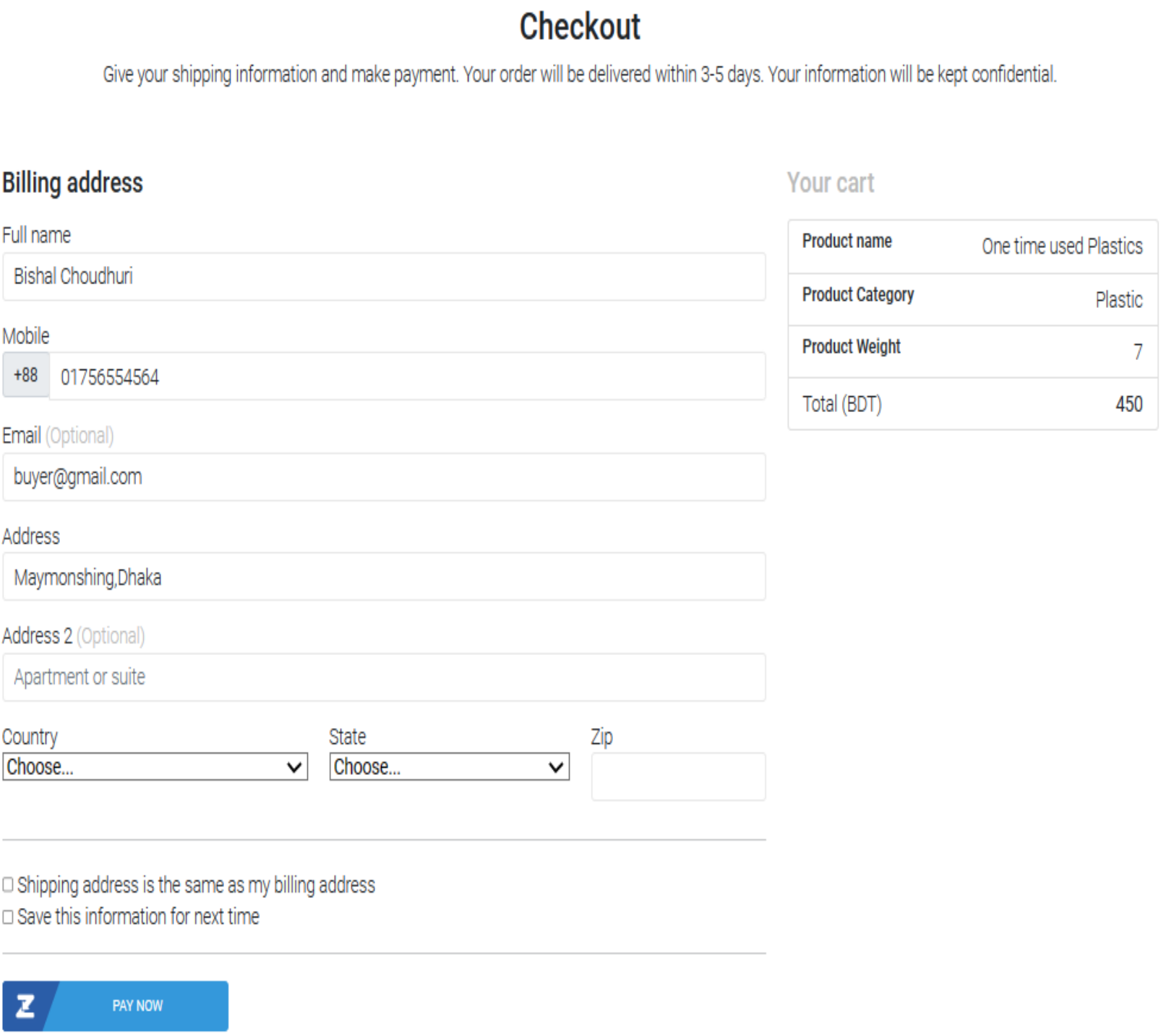


Figure: 6.1.3.2 Products checkout by buyers

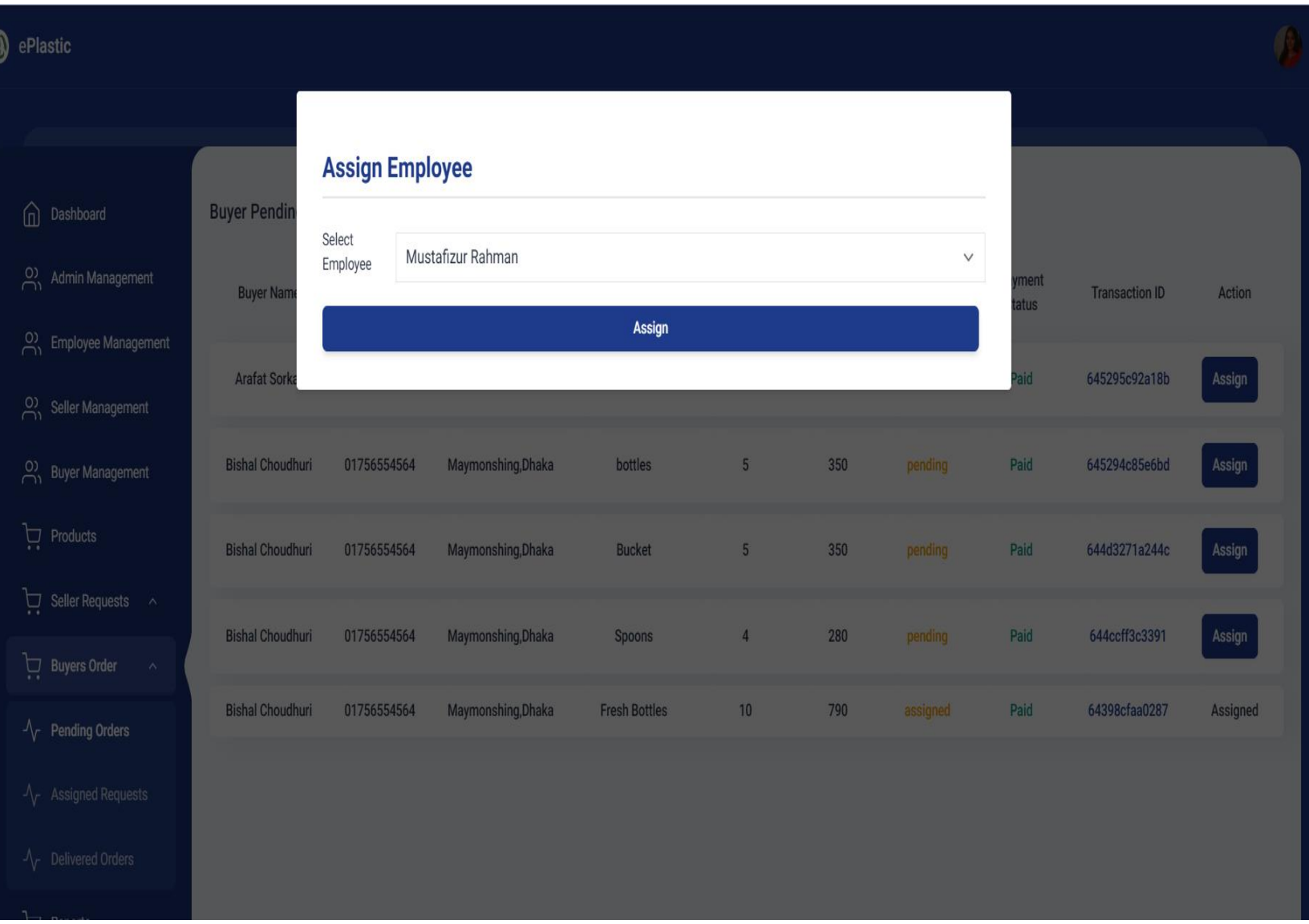


Figure: 6.1.3.3 Assign employee by admin

Figure: 6.1.3.3 products checkout by the buyer and admin assign the employee select the name from category and assign them for delivery products.

Buyer Pending Order List

Buyer Name	Buyer Phone	Buyer Address	Product Name	Product Weight	Product Price	Order Status	Payment Status	Transaction ID	Action
Bishal Choudhuri	01756554564	Maymonshing,Dhaka	Bucket	5	350	pending	Paid	644d3271a244c	Pending
Bishal Choudhuri	01756554564	Maymonshing,Dhaka	Spoons	4	280	pending	Paid	644ccff3c3391	Pending
Bishal Choudhuri	01756554564	Maymonshing,Dhaka	Fresh Bottles	10	790	assigned	Paid	64398cfaa0287	Assigned

Figure: 6.1.3.4 Buyer pending order list

Figure: 6.1.3.4 only admin can assign the employee. Here buyer pending order list shown.

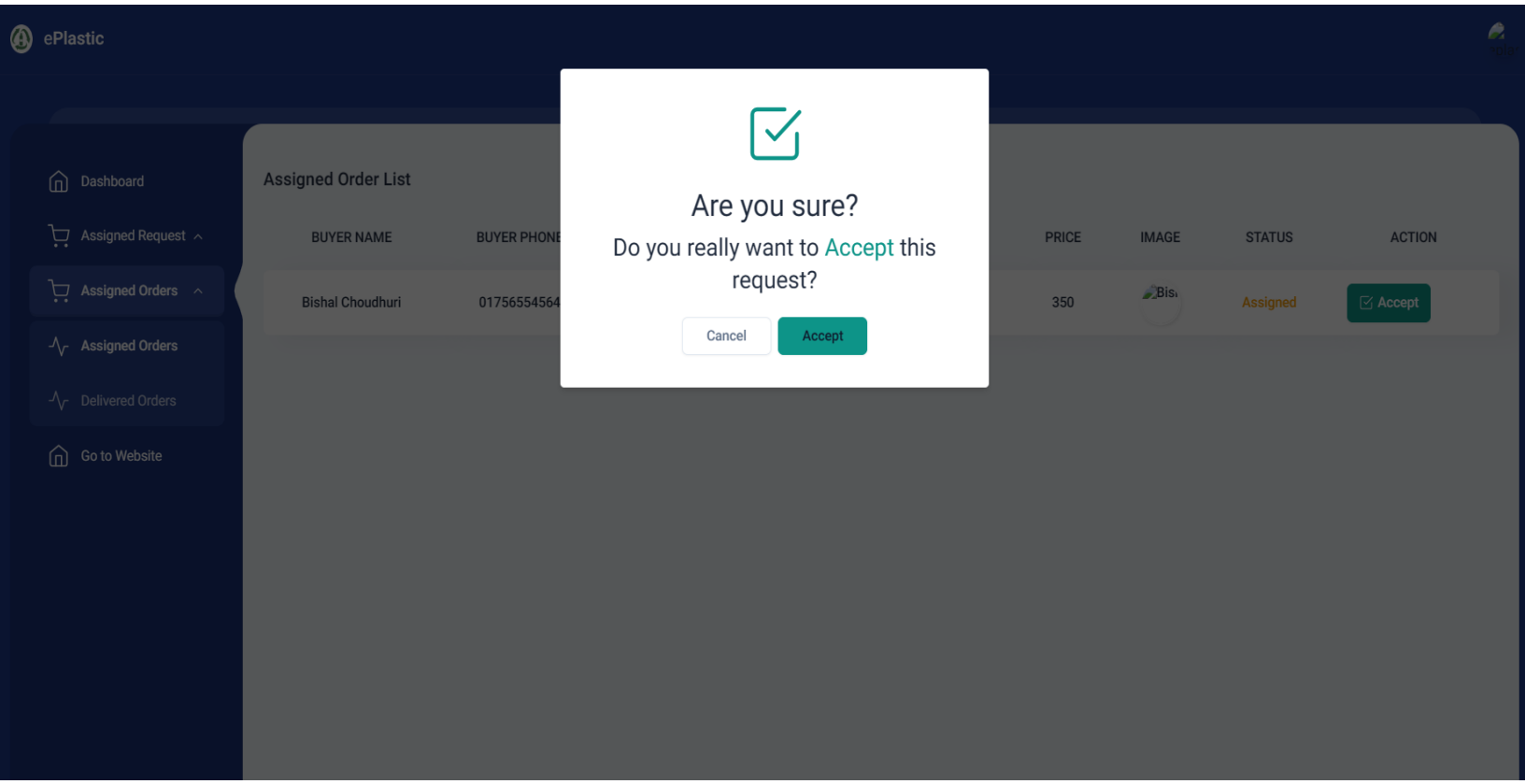


Figure: 6.1.3.5 Assigned request accept by employee

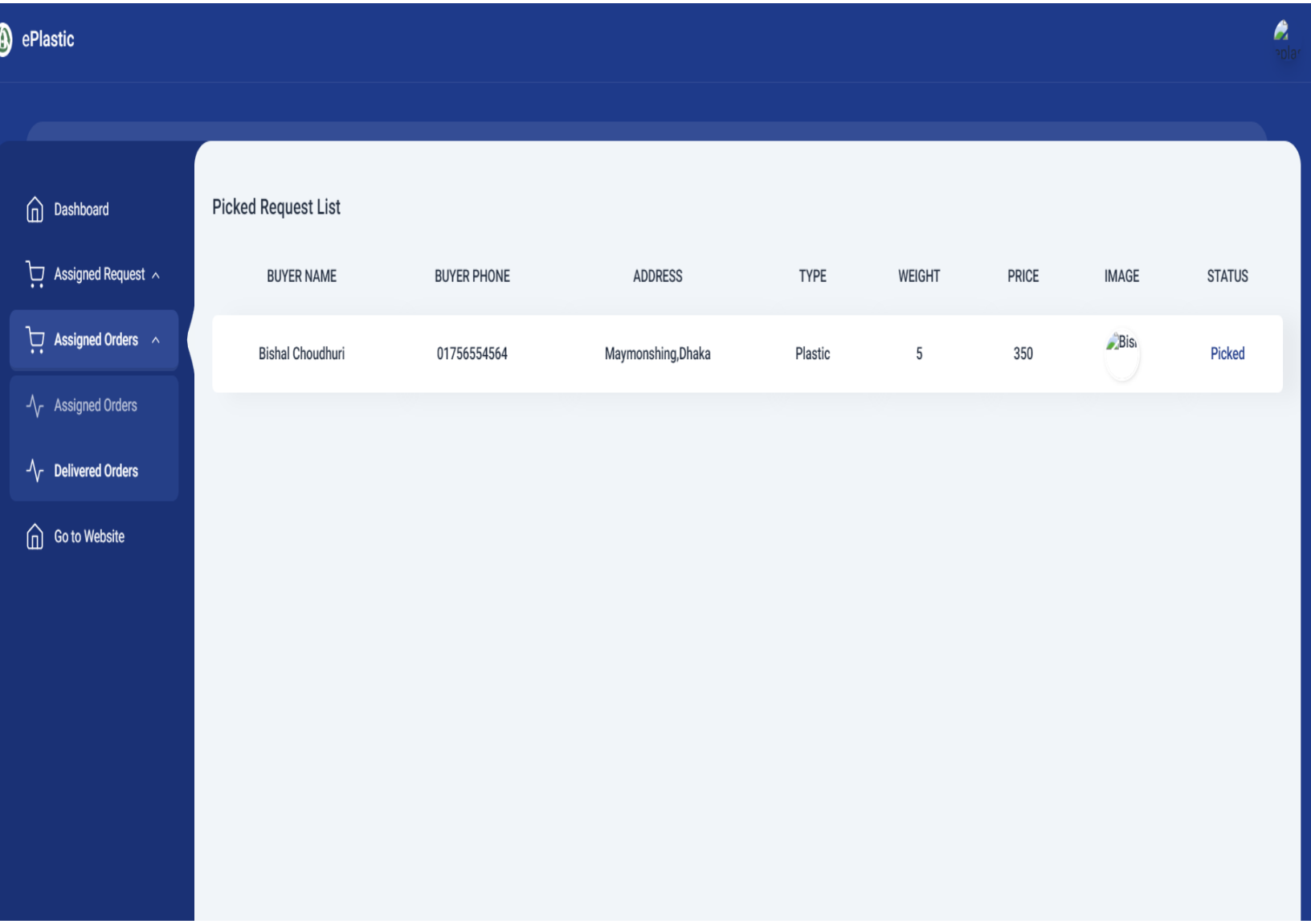


Figure: 6.1.3.6 Product delivered by employee

Figure: 6.1.3.6 here the picked request list- Buyer's name, phone number, address and product category ,weight, price and status. The product delivered by employee.

6.1.4 Payment Method

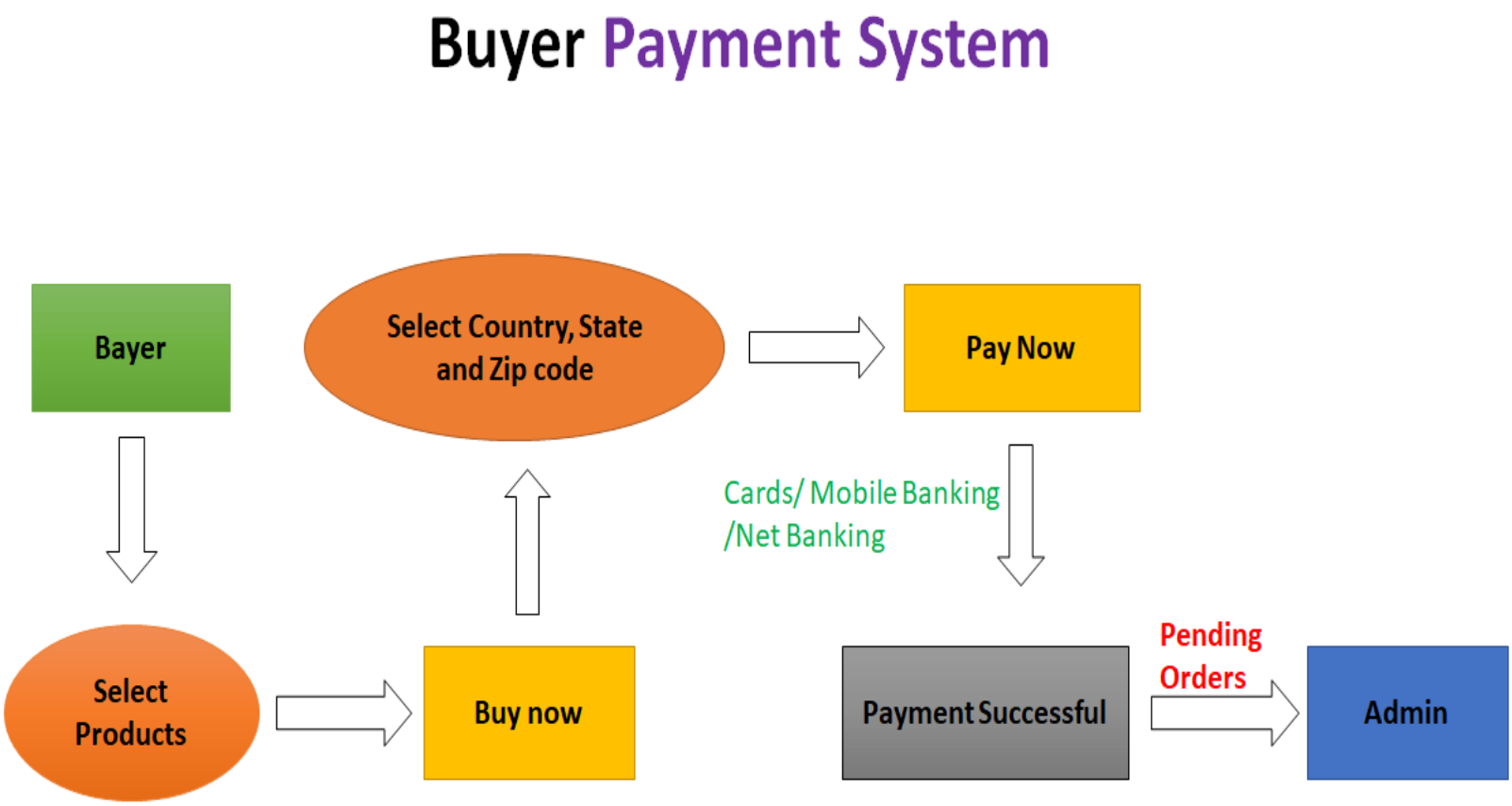


Figure: 6.1.4.1 buyer payment system diagram

Firstly buyer select the product which category he or she wanted to buy then click the buy now button then select the country state and zip code then show then payment method (cards, mobile banking/net banking) when the payment successful then the order is pending admin was approve it.

Here is a view of payment method-

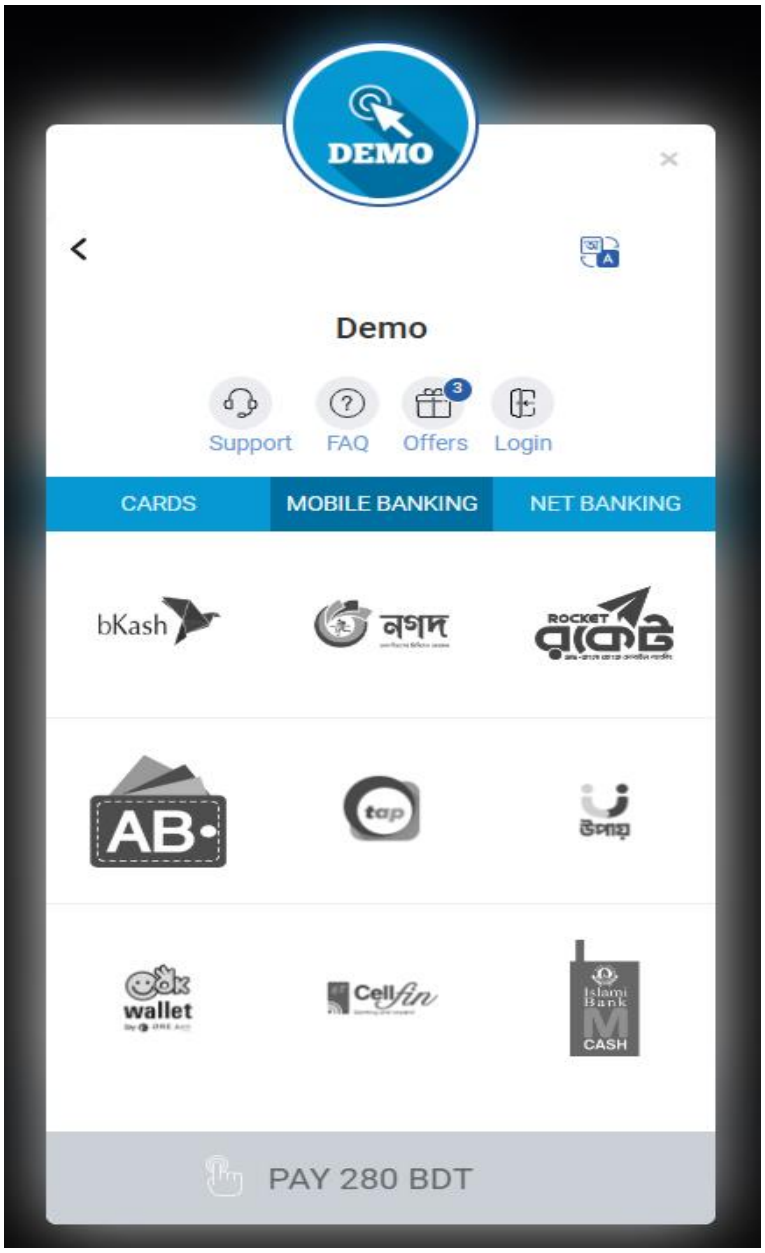


Figure: 6.1.4.2 Payment method page

Figure: 6.1.4.2 here is payment method page, how the user should make payment. User can pay through any of the available method. Cards, mobile banking and net banking After completing the payment user had to fill the field with correct information. Method, how user pay the right amount of money and should enter the specific transaction id. The method and the transaction id will be stored in the database. Admin will compare the data and if the information were correct then the admin will activate the product for the specific user. And then the user can view his course list and see the product status.

6.1.5 Report Summery

This a report of sell delivered. Here, we can see all delivered report of past days. We can also see the reports past 7 days, 1 months or one year. There are four options of sell delivered report, sell pending reports, purchase bought reports and purchase pending reports.

Here is a report of sell delivered-

Product Selling Report

Today | 7 Days | 30 Days | 1 Year

mm/dd/yyyy mm/dd/yyyy Search

Product Name	Product Category	Buyer Name	Buyer Phone	Buyer Address	Product Weight	Date	Status	Product Price
Fresh Bottles	Bottle	Bishal Choudhuri	01756554564	Maymonshing,Dhaka	3	14-09-2023	delivered	220
Fresh Bottles	Bottle	Bishal Choudhuri	01756554564	Maymonshing,Dhaka	10	19-05-2023	delivered	790
coke bottles	Bottle	Bishal Choudhuri	01756554564	Maymonshing,Dhaka	3	15-04-2023	delivered	200
Bottles	Bottle	Kaushik Biswas	01878270829	Badda	7	16-04-2023	delivered	500
Spoons	Plastic	Raian Khan	01777869633	Jatrabari	4	16-04-2023	delivered	280
Spoons	Plastic	Raian Khan	01777869633	Jatrabari	4	16-04-2023	delivered	280
Bottles	Bottle	Afrin Sultana	01722408037	Shyamoli	7	16-04-2023	delivered	500
bottles	Plastic	Bishal Choudhuri	01756554564	Maymonshing,Dhaka	5	03-05-2023	delivered	350

Total:3120

Figure: 6.1.5.1 Sell delivered report summery

Sell request pending report-

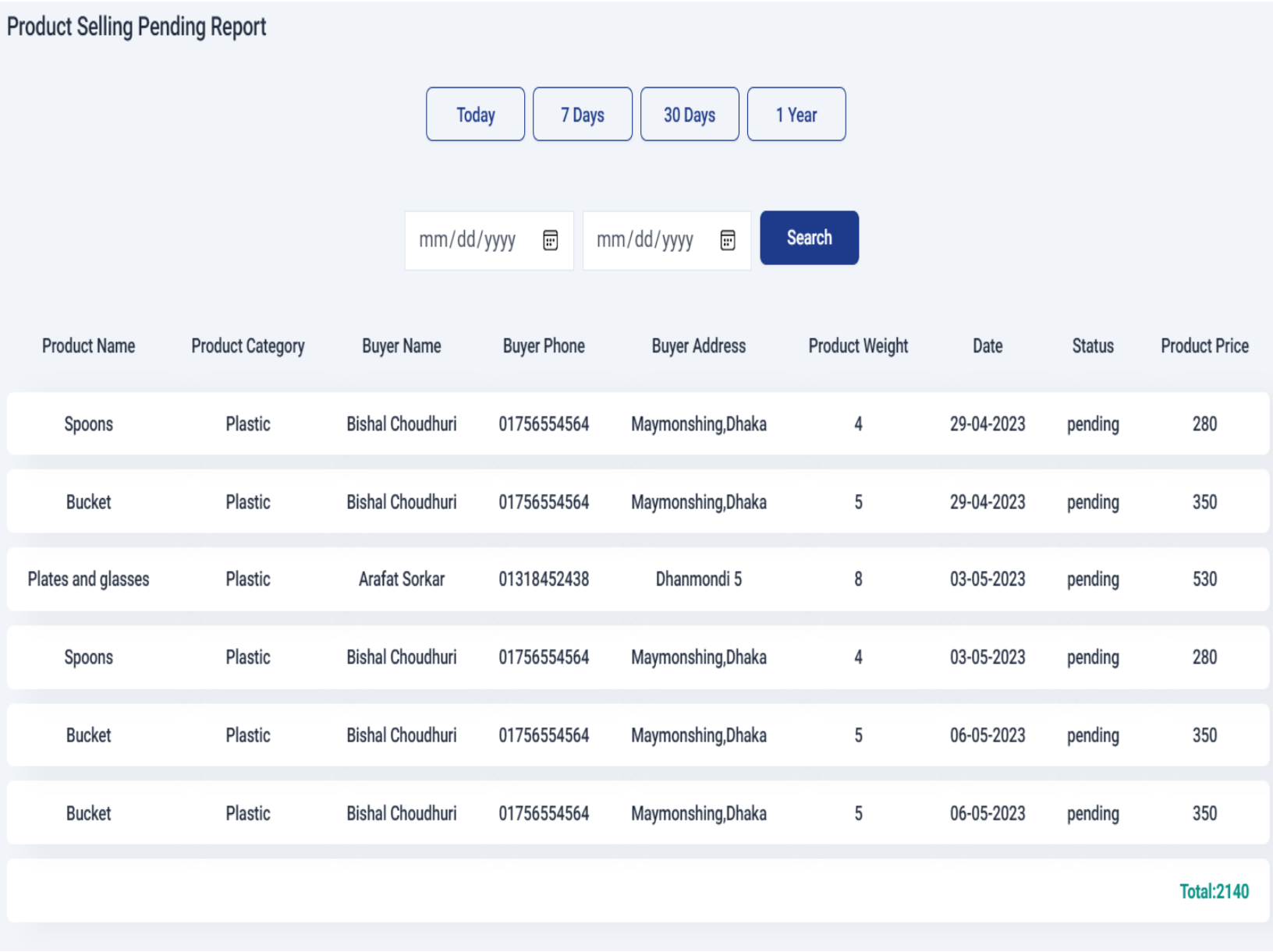


Figure: 6.1.5.2 Sell pending report summery

Purchase bought report-

Product Purchase Report

Today | 7 Days | 30 Days | 1 Year

mm/dd/yyyy mm/dd/yyyy Search

Product Name	Product Category	Seller Name	Seller Phone	Seller Address	Product Weight(KG)	Date	Status	Product Price
plates, glasses and spoons	Plastic	Hasan Mahmud Tahsin	01610027909	purandhaka	7	08-04-2023	bought	420
Lights	Plastic	Hasan Mahmud Tahsin	01610027909	purandhaka	12	16-04-2023	bought	720
Spoons	Plastic	Hasan Mahmud Tahsin	01610027909	purandhaka	4	16-04-2023	bought	240
7UP	Bottle	Mst. Tasmiya Islam Anika	01602248397	12345678	15	16-04-2023	bought	900
Busket	Plastic	Mst. Tasmiya Islam Anika	01602248397	12345678	3	16-04-2023	bought	180
Boxes	Plastic	Mst. Tasmiya Islam Anika	01602248397	12345678	8	16-04-2023	bought	480
Lichi Drinks	Bottle	Mst. Tasmiya Islam Anika	01602248397	12345678	6	16-04-2023	bought	360
Bottles	Bottle	Mst. Tasmiya Islam Anika	01602248397	12345678	7	16-04-2023	bought	420
Fan	Plastic	Kaushik Biswas	01878270829	Badda	20	16-04-2023	bought	1200
Bucket	Plastic	Kaushik Biswas	01878270829	Badda	5	16-04-2023	bought	300

Total:5220

Figure: 6.1.5.3 Product purchase report summery

Purchase pending report-

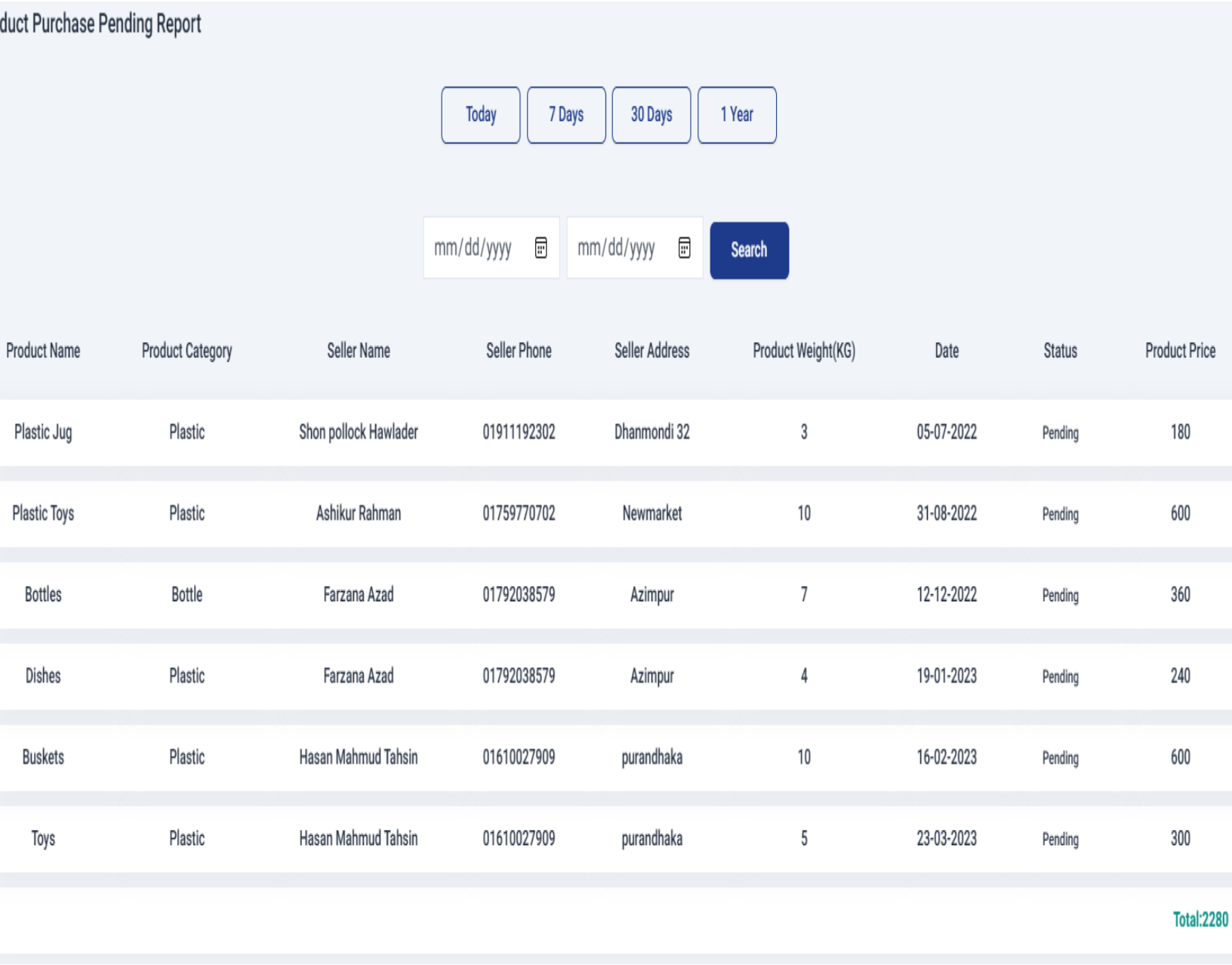


Figure: 6.1.5.4 Product purchase pending report summery

6.3 System Testing

System testing is a complex process that involves different timeframes, procedures, approaches and individuals. As users of an application can vary greatly, it is crucial to ensure that every user is fully compatible with the production system. Ensuring customer satisfaction is a practical way to reduce application failure rates. System testing is essential because it allows for unrestricted error detection and validates client needs. Testers may use different techniques to test software, such as control flow testing, data flow testing, branch testing, and path testing. User acceptance testing is

conducted by various levels of system users, including admins, sellers, and buyers to obtain feedback from users who have accepted the test.

6.4 Impact on the Society

Digital learning can greatly improve the performance of individuals, businesses, and Society by encouraging important skills such as communication, teamwork, technology and education. Making online learning accessible to everyone, from preschoolers to postgraduate students, is crucial for maximizing these benefits. The advantages of online learning are not limited to students; they extend to wider society by creating a smarter, more productive, and more technologically savvy population. As technology dominates society, there has never been a better time to embrace online learning. In addition to acquiring knowledge, online learning also helps develop digital skills and facilitates innovative methods of communication, such as podcasts, file sharing, and social media. Many students also find online learning to be more engaging and interesting than traditional methods. By raising skill levels and technical prowess, online education is essential to enhancing society and promoting a passion for learning. Whether delivered on a corporate or individual basis, everyone can benefit from online learning efforts.

An e-plastic management system can be helpful for society in several ways. Firstly, it can provide a platform for individuals, businesses and organizations to manage their plastic waste more efficiently, thereby reducing the negative environmental impact of plastic waste. This can help to prevent plastic pollution and protect ecosystems and wildlife.

Secondly, an e-plastic management system can help to raise awareness about the importance of responsible plastic usage and waste management. By providing educational resources and information about the environmental impact of plastic waste, such a system can encourage individuals and organizations to adopt more sustainable practices and reduce their plastic consumption.

Thirdly, an e-plastic management system can help to create job opportunities and support local economies by providing a platform for individuals and businesses to sell and purchase recycled plastic products. This can contribute to the growth of the circular economy and support sustainable development.

Waste plastics is an emerging environmental issue of recent global concern. China has formulated policies such as bans and restrictions on plastics to promote the management of plastics. Electronic waste (e-waste) mainly includes various waste home appliances, communication equipment and products, and precision electronic instruments and meters discarded by enterprises and institutions. Waste home

appliances are the main source. The plastic content in waste home appliances accounts for 10–20% of the total weight of plastics consumed in China throughout the year [47].

Overall, an e-plastic management system can be a valuable tool for promoting sustainable practices, protecting the environment, and supporting local communities. [A4]

Chapter 7:

Summary and Conclusion

7. Summary and Conclusion

E-plastic management system is a website project, in the project we are used to recycle the waste plastic it is very helpful in order to overcome the wastage issues of the plastics. The user can able to view the list of plastic categories based on their shapes they can choose any of it. The review of different published literature results that E-waste has potential to be utilized as lower aggregate replacement [48]. All projects must have a work sequence to finish and bring them to; we can see that the methodology development phases for various strategies are identical. The increase of plastic usage as packaging results in more waste in the environment, resulting in significant waste pollution issues. This review presents the plastic waste recycling approaches for the properties of each material, as waste management from an environmental sustainability perspective [49].

7.1 Contribution and Project Cost

Cost for the project

Cost per week – 1500 taka (3 person)

Server cost per month – 2000 taka

Estimated Cost : 17,000 taka

Through the Gantt chart, we will show our contribution in the project-

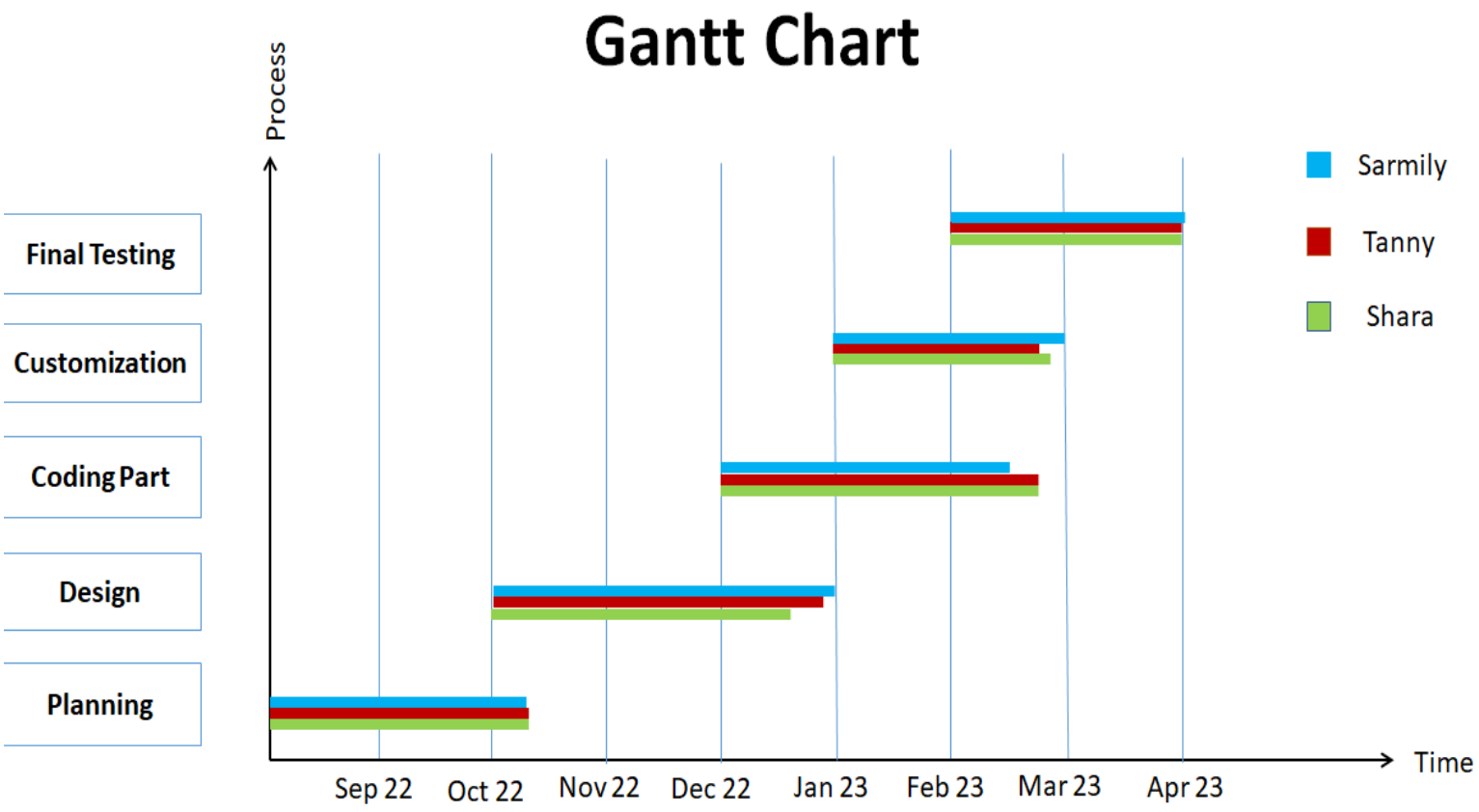


Figure: 7.1.1 working schedule Gantt chart

7.2 Conclusion

E-plastic is a web application which is developed to recycle products collected from users. This application retrieves that user's information returning the date, day and time for e-plastic collection. Users can then do online shopping for the recycled products. Improvements in blending the disparate plastic materials in wastes could lead to the production of better products made from recycled materials. The public must be made aware of the fact that consumer products made of recycled plastics are often as good as those made of good material. And that the resulting environmental benefits as well as energy savings are for the common good [50]. Through this project, some unemployment is eliminated and the environment is balanced, which can be said that the importance of a E-Plastic Management System is great.

7.3 Future Work

Making our system more efficient is part of our future plans. We can include the save in every card option for online shopping. And finally we want more people to work on this system in the future and make the e-plastic system bigger.

References

[1] Qi Y, Gong R, Zeng X, Wang J. Examining the temporal and spatial models of China's circulareconomy based upon detailed data of E-plastic recycling. International Journal of Environmental Research and Public Health. 2022 Feb 28;19(5):2807.

[2] Maitlo G, Ali I, Maitlo HA, Ali S, Unar IN, Ahmad MB, Bhutto DK, Karmani RK, Naich SU, Sajjad RU, Ali S. Plastic waste recycling, applications, and future prospects for a sustainable environment. Sustainability. 2022 Sep 16;14(18):11637.

[3] Maitlo G, Ali I, Maitlo HA, Ali S, Unar IN, Ahmad MB, Bhutto DK, Karmani RK, Naich SU, Sajjad RU, Ali S. Plastic waste recycling, applications, and future prospects for a sustainable environment. Sustainability. 2022 Sep 16;14(18):11637.

[4] Kijo-Kleczkowska A, Gnatowski A. Recycling of Plastic Waste, with Particular Emphasis on Thermal Methods. Energies. 2022 Mar 14;15(6):2114.

[5] Saraswathi G, Abirami P, NN HK, Kumar P, Meyyappan N. Plastic Roads As An Alternative Solution To Solid Waste Management: A Review. ECS Transactions. 2022 Apr 24;107(1):18799.

[6] Rajmohan, Kunju Vaikarar Soundararajan, et al. "Plastic pollutants: effective waste management for pollution control and abatement." *Current Opinion in Environmental Science & Health* 12 (2019): 72-84.

[7] Tiwari, Rahul, et al. "A critical review and future perspective of plastic waste recycling." *Science of The Total Environment* (2023): 163433.

[8] Klemeš, Jiří Jaromír, et al. "Minimising the present and future plastic waste, energy and environmental footprints related to COVID-19." *Renewable and Sustainable Energy Reviews* 127 (2020): 109883.

[9] Alam SN, Shobnam N, Paul S, Rahman MH. Recycling of electronic wastes in Dhaka City. Journal of Modern Science and Technology. 2018 Jun;6(2):43-53.

[10] Lerdorf R, Tatroe K, Kaehms B, McGredy R. Programming Php. " O'Reilly Media, Inc."; 2002 Mar 26.

[11] Meloni JC, Telles M, Telles MA. PHP 6 fast & easy web development. Course Technology PTR; 2007.

[12] Hickson A. HTML, The living standard. Lulu. com; 2014 Jul 23.

[13] Mazinanian D, Tsantalis N. An empirical study on the use of CSS preprocessors. In2016 IEEE 23rd international conference on Software Analysis, Evolution, and Reengineering (SANER) 2016 Mar 14 (Vol. 1, pp. 168-178). IEEE.

[14] Nixon R. Learning PHP, MySQL, JavaScript, and CSS: A step-by-step guide to creating dynamic websites. " O'Reilly Media, Inc."; 2012 Aug 27.

[15] Severance C. Discovering javascript object notation. Computer. 2012 Apr 5;45(4):6-8.

[16] Mariano CL. Benchmarking javascript frameworks.

[17] Delcev S, Draskovic D. Modern javascript frameworks: A survey study. In2018 Zooming Innovation in Consumer Technologies Conference (ZINC) 2018 May 30 (pp. 106-109). IEEE.

[18] "https://en.wikipedia.org," [Online]. Available:

[19] Johnson RW. An introduction to the bootstrap. Teaching statistics. 2001 Jun 1;23(2):49-54.

[20] "https://en.wikipedia.org," [Online]. Available:

https://en.wikipedia.org/wiki/Web_framework.

[21] Newson K. Tools and workflows for Collaborating on static website projects. Code4Lib Journal. 2017 Oct 18(38).

[22] Ernst MD. Static and dynamic analysis: Synergy and duality. InWODA 2003: ICSE Workshop on Dynamic Analysis 2003 May 9 (pp. 24-27).

[23] Purbo OW. A Systematic Analysis: Website Development using Codeigniter and Laravel Framework. Enrichment: Journal of Management. 2021 Dec 27;12(1):1008-14.

[24] "https://www.geeksforgeeks.org," 10 november 2022. [Online]. Available: https://www.geeksforgeeks.org/introduction-to-laravel-and-mvc-framework/.

[25] McHugh J, Abiteboul S, Goldman R, Quass D, Widom J. Lore: A database management system for semistructured data. ACM Sigmod Record. 1997 Sep 1;26(3):54-66.

[26] Garcia-Molina H. Database systems: the complete book. Pearson Education India; 2008.

[27] "https://www.tutorialspoint.com," [Online]. Available: https://www.tutorialspoint.com/mysql/index.htm.

[28] . A. S. Gillis, "https://www.techtarget.com," [Online]. Available: https://www.techtarget.com/searchsoftwarequality/definition/application.

[29] F. Habib M. and . D. M. Alghazzawi, ""New e-learning system methodology a Comparison of eLearning XML with current e-Learning System Development Methodologies.," in *Proceedings of International Conference on Information Human Computer Interaction & Learning Technologies*, Abu Dhabi, UAE, 2012.

[30] A. Graham, "Evaluating E-learning: A Guide to the Evaluation of E-learning, Evaluate Europe Handbook Series, 2006.

[31] F.HabibM.and.D.M.Alghazzawi,""Newe-learningsystem methodologyaComparison ofeLearning XMLwithcurrente-Learning System DevelopmentMethodologies.,"in ProceedingsofInternationalConferenceonInformationHumanComputerInteraction& LearningTechnologies,AbuDhabi,UAE,2012.

[32] R. Heeks, L. Subramanian, and C. Jones, "Understanding e-Waste Management in Developing Countries: Strategies, Determinants, and Policy Implications in the Indian ICT Sector," Inf. Technol. Dev., 2015.

[33] A. Kumar and G. Dixit, "An analysis of barriers affecting the implementation of e-waste management practices in India: A novel ISM-DEMATEL approach," Sustain. Prod. Consum., 2018.

[34] Srivastava D. Review on E-waste along with its management. European Journal of Molecular & Clinical Medicine. 2020;7(6):1323-8.

[35] "https://en.wikipedia.org/," [Online]. Available: https://en.wikipedia.org/wiki/Database_design#:~:text=Database%20design%20is%20the%20organization,data%20to%20the%20database%20model..

[36] R. Peterson, "https://www.guru99.com," 3 december 2022. [Online]. Available: https://www.guru99.com/database-design.html.

[37] Evaluating scenarios toward zero plastic pollution | Science

[38] Plastic waste from recycling centres: Characterisation and evaluation of plastic recyclability -

ScienceDirect

[30] Microplastics in freshwater and terrestrial environments: Evaluating the current understanding to

identify the knowledge gaps and future research priorities - ScienceDirect

[40] Semiyaga S, Acheng PO, Wesonga R, Matovu MJ, Manga M. E-Plastic Waste Use as Coarse-Aggregate in Concrete. InConversion of Electronic Waste in to Sustainable Products 2022 Oct 26 (pp. 143-178). Singapore: Springer Nature Singapore.

[41] . K. Sridharan , and Dr. M. Chitra , Proficient Information Retrieval Using TrustBased Search On Expert And Knowledge Users Query Formulation System,Australian Journal of Basic and Applied Sciences, 9(23) July 2015, Pages: 755-765.

[42] Jankowska, Emilia, Miranda R. Gorman, and Chad J. Frischmann. "Transforming the plastic production system presents opportunities to tackle the climate crisis." *Sustainability* 14.11 (2022): 6539.

[43] K. Members, "https://www.oasis-open.org," [Online]. Available: https://www.oasis-open.org/khelp/members/user_help/html/user_types.html.

[44] " https://davidkerrdesign.com," [Online]. Available: https://davidkerrdesign.com/strategy-web-user-types/.

[45] I. Editorial Team, "https://www.indeed.com/," indeed, 6 April 2021. [Online]. Available: https://www.indeed.com/career-advice/finding-a-job/what-is-website-administrator#:~:text=A%20website%20administrator%20is%20a,a%20website's%20appearance%20and%20usability..

[46] Qi Y, Gong R, Zeng X, Wang J. Examining the temporal and spatial models of China's circular economy based upon detailed data of E-plastic recycling. International Journal of Environmental Research and Public Health. 2022 Feb 28;19(5):2807.

[47] Siddique S, Shakil S, Siddiqui MS. Scope of Utilisation of E-waste in Concrete. International Journal of Advance Research in Science and Emerging Vol. 2015(4).

[48] Damayanti D, Saputri DR, Marpaung DS, Yusupandi F, Sanjaya A, Simbolon YM, Asmarani W, Ulfa M, Wu HS. Current Prospects for Plastic Waste Treatment. Polymers. 2022 Jul 31;14(15):3133.

[49] Howell SG. A ten year review of plastics recycling. Journal of hazardous materials. 1992 Jan 1;29(2):143-64.