

Developing An E-Commerce Website For Enhancing Customer Sales

BY

Lee Yik Fei

A REPORT

SUBMITTED TO

Universiti Tunku Abdul Rahman

in partial fulfilment of the requirements

for the degree of

BACHELOR OF COMPUTER SCIENCE (HONS)

Faculty of Information and Communication Technology

(Kampar Campus)

May 2020

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DECLARATION OF ORIGINALITY

I declare that this report entitled “**DEVELOPING AN E-COMMERCE WEBSITE FOR ENHANCING CUSTOMER SALES**” is my own work except as cited in the references. The report has not been accepted for any degree and is not being submitted concurrently in candidature for any degree or other award.

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Abstract

E-Commerce, a well-known term that had led the world to another level in many sectors such as business, industrial, logistics, etc. As a millennial myself that had been using the Internet for over a decade, it was not a doubt for me to agree that E-Commerce brought a lot of impacts around the globe. The demand for better services in E-Commerce had also kept increasing and it was caused by the serious and harsh competitive environment between all the E-Commerce platforms since it was an effective way to enhance sales. To maximize the profit gained from a particular E-Commerce website, the purpose and objectives of this project were discovered.

The highlight of this project was the “shop virtually” feature development. This feature was discovered by the idea of providing unique and interesting experiences for users while shopping using this website. “In computing, virtual is a digitally replicated version of something real. The replication, which is created with software, may not be an exact copy of the actual item, but it is similar enough in essence to be described as a digital rendition.” (Margaret Rouse, 2015). Hence, this shopping virtually feature provided a virtual environment like how people went shopping in the malls. It was just that they were to control a 2-D digital controlling character to shop in a game. Moreover, there were also built in mini games for users to get highest score in exchange for vouchers while shopping in this website.

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LIST OF ABBREVIATIONS

<i>WWW</i>	World Wide Web
<i>B2B</i>	Business to Business
<i>B2C</i>	Business to Consumer
<i>C2C</i>	Consumer to Consumer
<i>CDM</i>	Cash Deposit Machine
<i>AWS</i>	Amazon Web Services

Chapter 1: Introduction

1.0 Problem Statement

As stated beforehand, the Internet played an important role in E-Commerce. It could be said that languages used to create a website such as Html, JavaScript, Python, CSS, Php, Ruby and many others were the essential tools for a web developer. “As an expert in e-commerce with over 12 years of experience in this niche, I've learned first-hand that the success of your store depends on much more than having a quality product and a nice-looking website. Those basics are essential -- but every other e-commerce store will be doing the same thing.” (Steve Tan, 2018). The growth of Internet technology has enormous potential as it reduces the costs of product and service delivery and extends geographical boundaries in bringing buyers and sellers together. (Thompson, 2005). Hence, developers were required to find out the existing problems of online shopping to develop a successful E-Commerce website. Below is a brief explanation of the problem statements of this project.

1.0.1 Lack of Product Information for Visualization

First of all, the lack of product information for visualization. Issues such as low-quality product photos, the question of how to use the product, insufficient photos of the product to show every part of the product were the common problems caused by bad design of the product page. “Your product page is the most important page on your site. Build your product page effectively and both your traffic and conversions will skyrocket. Fail to do so, and almost all your marketing and advertising efforts will fall short of goal.” (Rachel Jacobs, 2019). To solve these problems, users were required to perform a lot of communications with the sellers via any kind of communication platform. To enhance the ease of understanding the products, the design of the product page should be well-organized and concise. Compulsory elements should be included to solve this problem.

1.0.2 Intricate Website Designs

Also, intricate websites were one of the problems. Bad user experience while browsing through E-Commerce websites using devices other than a computer/laptop. Mobile users were often irritated by a website that was complicated and hard to understand as images and words were everywhere. According to KPI Report 2019 done by Wolfgang digital, the percentage of users that browsed through the E-Commerce website with their mobile phones was 53% compared to Tablet and Desktop.

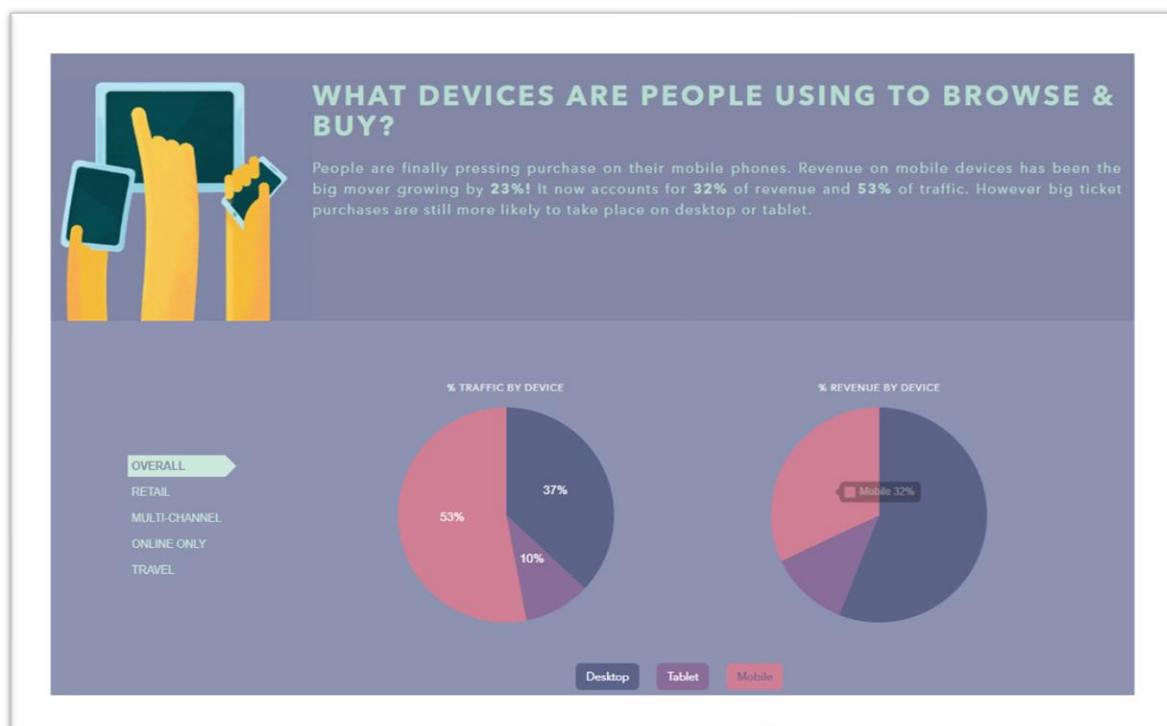


Figure 1.0.1 KPI Report on devices people used to browse by Wolfgang Digital

From this, it was very obvious that mobile users should be one of the E-Commerce main target audiences as almost everyone owned at least one smartphone these days. Smartphone's screen was smaller compared to computers. Hence, a well-designed but not complex website that fit into smartphone screens could provide a good user experience and tremendously increase the rate of "visit-again" from users. Hence, this project would develop a website that looks like a mobile application whereby concise navigation features would also be included.

1.0.3 Lack of Easily Available Resources to Solve Customers' Questions

Next, the problem would be lacking of easily available resources to solve customers' questions. "Through all the work you put into designing your website, it can be easy for details to slip through the cracks. These details are precisely what lead online shoppers to leave your site, distrust your brand, or abandon their shopping carts." (Trajectory, 2019). E-Commerce users would often encounter problems while using the website, from basic navigating problems, add to cart problems to shipping and payment problems. Hence it was important to include more to enough information on an E-Commerce website that was easily available. For this problem, easily available resources such as live chatting, clear contact information and video calling should be included in the E-Commerce website to provide sufficient customer supports.

1.0.4 Lack of Interesting Features that Build Up the Loyalty of Users

Last but not least, the lack of interesting features that build up the loyalty of users. "Gamification is fun, yet often overlooked method of solving some of the most common yet challenging ecommerce hurdles." (Phil Forbes, 2019). Challenges such as abandoned online shopping carts, building up loyalty of users or even creating a memorable first impression for the user were challenges faced by every E-Commerce website. By implementing gamification in the E-Commerce website, not only does it help in solving all these common challenges, but it also attracts users for another visit on the website. The most common factor that leads to a successful gamification strategy is the little effort and reward which came along inside gamification. Rewards can easily provide joy to buyers that elicits their strong emotions. At the end of the day, it will leave a deep impression on buyers' minds. In this project, gamification based online shopping would be developed and implemented for users.

An E-Commerce website was developed in this project to solve the problems faced by all types of E-Commerce users including mobile, tablet and desktop users. Moreover, this project could help to boost sales of any brick and mortar retail stores if they set up their online stores. It was important to solve these problems because it was an undeniable truth that electronic commerce was the next big thing supported by all types of growth analytic researches on the Internet.

1.1 Background and Motivation

E-Commerce, a seemingly simple term had come a long way since 1991. Back in the days where technologies were still not that advance, never had anyone ever thought that E-Commerce could bring the world into a new retail era where everything is almost just one click away. Essentially, E-Commerce was an abbreviation of Electronic Commerce and it was the activity of buying and selling items/products over the Internet. Technology, especially the World Wide Web (WWW) played an important role in E-Commerce whereby WWW allowed people to use E-Commerce services anytime. Ecommerce became possible in 1991 when the Internet was opened to commercial use. Since that date thousands of businesses have taken up residence at web sites. (Kenneth C. Laudon, Carol G. Traver, 2008). It also overcame the geographical barriers indirectly so that people could buy and sell products from anywhere.

Statistically speaking, data compiled by The Global Ecommerce Playbook showed tremendous growth in the E-Commerce sector as shown below.

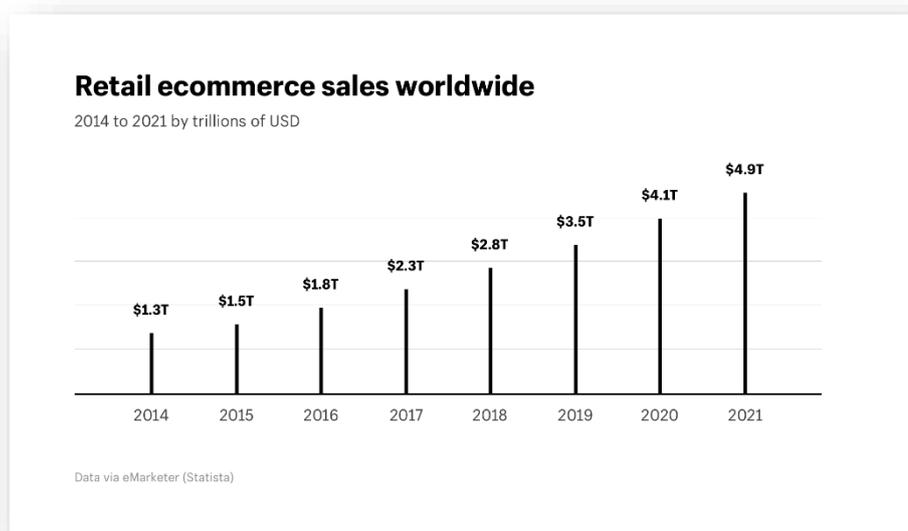


Figure 1.1.1 Retail e-commerce sales worldwide

With all different types of E-Commerce services being developed throughout many years, most of the brick and mortar retailers noticed the capability of E-Commerce so they hired professionals to help them set up their online business stores along with their brick and mortar store to boost their sales effectively. Undoubtedly, E-Commerce had brought a lot of impact to the society and people believe that the trend will still go on for a very long time.

According to the fifth annual UPS Pulse of the Online Shopper study based on a survey of 5000 U.S consumers in 2016, it was the first time in the study's five-year history that more than 50

percent (51 percent) of all purchases made by respondents are made online, up from 48 percent in 2015. Consumers are skilled at using technology to their advantage and thrive on gathering information when shopping. (Teresa Finley, 2016).

On the other hand, Wolfgang Digital 2017 E-Commerce Benchmark Study showed that with the analysis of 143 million sessions and \$531 million in revenue, the percentage of revenue by different devices was shown in Figure 1.1.2.

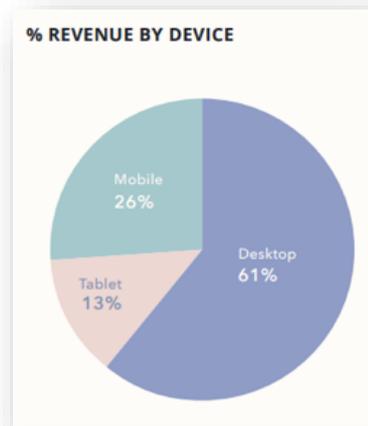


Figure 1.1.2 Percentage revenue by device

This study also proved that even though mobile devices were not the biggest source of revenue, sites that received more mobile traffic earned more money on average. The correlation between mobile pageviews and revenue was 25%.

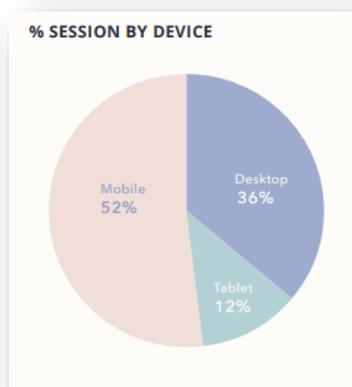


Figure 1.1.3 Percentage online shopping session by device

1.2 Project Objectives

1) To provide users a better understanding and visualization on products

- This website will allow users to view the product on their devices in different angles. (360-degree photos)
- It will also make sure that sellers are required to provide proper product visualization source.

2) To enhance user experience (UX) while using the website

- This website will provide users a ‘mobile applications look-alike’ designed website.
- The design of the website would be constructed to look like a mobile application.

3) To provide more resources to solve users’ question and confusion

- This website will include video call feature to solve the user’s problem as quickly as possible
- Tools such as live chatting and video calling between sellers and consumer would be implemented.

4) To implement gamification to get more users’ attention and interests

- This website will include a simple 2-D game that allows users to buy stuff via the features within the game.
- The 2-D game will also include mini games for more user interactions as in competing against each other to get highest scores for valuable rewards in exchange such as discount vouchers.

1.3 Proposed Approach / Study

Having an idea was the first crucial step for every new project. However, its just an empty talk without proper approach being implemented. Hence to complete this website project, a proper flow of approach and steps were discussed and carried out.

As mentioned, this project was about E-Commerce website. It is about providing a good tool for buying and selling of goods and services online. Therefore, a decent number of researches on different aspects of multiple existing E-Commerce websites had been done to discover the motivation, significance, contribution and so on for this project. All the discovered elements were used as a support in the making process of this project website.

During the proposed approach of this project, plenty of different compulsory and new features were needed. Features such as login, signup, upload products, chats, 2-D game, etc were included in this website. After every feature was built, testing was done so that existing and potential bugs could be fixed in time. Moreover, the feature could be maintained and updated to a better one after testing.

After a series of building and testing, the project was finally finished developed. The repeating process while developing was a great practise so that the built features could always be improved along with the technology.

1.4 Report Organization

This project report consisted of five total chapters which were introduction, literature review, system design, methodology and design. The first chapter discussed about the problem statement, background, and motivation, etc of this project. Secondly, the next chapter talked about the literature review done on multiple existing E-Commerce websites or platforms such as Taobao, e-Bay, Amazon, mrdiy.com and so on. In chapter 3, all the system design flow charts were included. Chapter 4 talked about methodology of this project. It basically included proposed method and tools used for developing this project. Lastly, the conclusion concluded all the previous chapters and stated some future improvements.

CHAPTER 2: Literature Review

After peeking into the history and problems of E-Commerce, it was a must to perform reviews on other similar E-Commerce websites. Reviews about the strength and weaknesses of different features, functionalities allowed users to identify the problems and insufficiencies of the systems and provide solutions. A well-developed website should consist of a bunch of different useful features that ease users while they are using it. Hence, reviews on some key features of the E-Commerce website were involved in this chapter.

Websites	Founded on (year)	E-Commerce Model
Amazon.com	1994	B2C and C2C
eBay.com	1995	B2B and C2C
Lazada.com	2012	B2C and C2C
Shopee.com	2015	B2C and C2C
Taobao.com	2003	C2C
Mrdiy.com	2005	B2C
Zalora.com	2012	B2C

Table 2.1 List of E-Commerce Website

2.1 Amazon.com

Amazon.com was one of the first E-Commerce websites that took off from 1994 until now. Amazon was initially started as an online book marketplace but expanded to sell different kinds of products later. Its success was not achieved in a short period and developers believe that it was the direct result of a strong user shopping experience.

2.1.1 Strength of Amazon.com

One of the useful features in Amazon.com was the unique service named Amazon Prime which had launched back in 2006. This feature could be said as one of the best as it was a big tool to develop more sales for Amazon. Amazon Prime was a service for consumers to subscribe monthly or yearly to enjoy a bunch of benefits. Once subscribed, consumers would keep coming back to enjoy the benefits to its maximum value so that they would not feel scammed. Benefits included are shipping, reading shopping and other benefits. The benefits are shown in the Figure 2.1.1 and Figure 2.1.2 below.

About Amazon Prime

Members receive benefits which include FREE fast shipping for eligible purchases, streaming of movies, TV shows and music, exclusive shopping deals and selection, unlimited reading, and more.

Shipping benefits include:

- **FREE Two-Day Shipping** on eligible items to addresses in the contiguous U.S. and other shipping benefits. For more information, go to [Amazon Prime Shipping Benefits](#).
- **FREE Same-Day Delivery** in eligible zip codes. For more information, go to [Order with Prime FREE Same-Day Delivery](#).
- **Prime Now:** Get FREE 2-Hour Delivery on thousands of items. Check your ZIP Code's availability. For more information go to [Prime Now](#).
- **FREE Release-Date Delivery:** FREE Release-Date Delivery on eligible pre-order items delivered on their release date to ZIP codes within the continental U.S. For more information, go to [Release-Date Delivery](#).
- **FREE No-Rush Shipping:** Don't need your Prime order right away? Select No-Rush Shipping and earn rewards for future purchases.
- **Amazon Day:** Choose a weekly delivery day for the items you buy throughout the week.

Streaming benefits include:

- **Prime Video:** unlimited streaming of movies and TV episodes for paid or free trial members in the U.S. and Puerto Rico. For more information, go to [About Prime Video](#).
- **Amazon Channels:** Watch your favorite shows and movies from HBO, SHOWTIME and STARZ channels — no cable required, cancel anytime and no additional apps to download. \$4.99–\$14.99/month for Prime members.
- **Prime Music:** unlimited, ad-free access to hundreds of Prime Playlists and more than two million songs for members in the U.S. and Puerto Rico. For more information, go to [About Prime Music](#).
- **Amazon Music Unlimited:** Prime members can get discounted Amazon Music Unlimited monthly plans and there are annual plans available exclusively to Prime members. For more information, go to [Amazon Music Unlimited](#).
- **Twitch Prime:** Members will receive exclusive promotions on eligible pre-order games. Twitch.tv users who link their Amazon Prime account get a free Twitch channel subscription every month, and exclusive access to free game content. For more information, go to [Twitch.tv](#).

Shopping benefits include:

- **Whole Foods Market:** Exclusive savings for Prime members, 5% back for eligible Prime members with the Amazon Prime Rewards Visa Card, and 2-hour Delivery via Prime Now in select cities (with more to come). For more information go to [Prime at Whole Foods Market](#).
- **Amazon Prime Rewards Visa Signature Card:** Eligible Prime members earn 5% back every day on all Amazon.com purchases, in addition to rewards everywhere else you shop. For more information go to [Amazon Prime Rewards Visa Signature Card](#).
- **Amazon Prime Store Card:** Eligible Prime members can get 5% back every day on Amazon.com purchases and access to exclusive financing offers. For more information go to [Amazon Prime Store Card](#).
- **Amazon Dash for Prime:** Never run out of your favorite products with Amazon Dash Button. For more information, go to [Amazon Dash Button](#).
- **Amazon Fresh:** Prime members in select regions can pay an additional monthly membership fee to receive FREE shipping on all Amazon Fresh orders of \$50 or more, or pay a flat delivery fee for each order they place under \$50. For more information, go to [About AmazonFresh](#).
- **Prime Wardrobe:** Prime Wardrobe is a Prime-exclusive program where you can try before you buy from eligible items across women's, men's, kids', and baby clothing, shoes, and accessories. You get seven days to try-on the items at home and you will only be charged for the items you decide to keep. For more information, go to [About Prime Wardrobe](#).
- **Prime Pantry:** Prime members in select regions can shop for groceries and household products in everyday sizes and pay an additional delivery fee. Prime Pantry orders cannot be shipped to addresses in Alaska, Hawaii and Puerto Rico. For more information, go to [About Prime Pantry](#).
- **Deals and Discounts, Compliments of Amazon Family:** These include up to 20% off diapers, baby food, and more through Subscribe & Save and 15% off eligible products from your baby registry. For more information go to [Get Up To 20% Off Diapers, Baby Food, and More](#) or [About the Completion Discount](#).
- **Prime Early Access:** Get 30-minute early access to Lightning Deals on Amazon.com. For more information, go to [About Prime Early Access](#).
- **Amazon Elements:** Access to [Amazon Elements](#) products, Amazon's own line of everyday essentials.

Reading benefits include:

- **Prime Reading:** You can borrow books, magazines, and more from the Prime Reading catalog and read them on your Fire tablet, Kindle e-reader, or the Kindle reading apps for iOS and Android. For more information, go to [Borrow Books from Amazon Prime Reading](#).
- **Amazon First Reads:** Early access for members in the U.S. to download a new book for free every month from the Amazon First Reads picks. For more information, go to [Amazon First Reads](#). You can also purchase hardcover titles at exclusive prices.
- **Audible Channels for Prime:** Unlimited listening to original audio series and playlists handcrafted for every interest. For more information go to [Audible Channels for Prime](#).

Other benefits include:

- **Membership Sharing:** Two adults living in the same household can create an Amazon Household to share certain Amazon Prime benefits. For more information, go to [About Amazon Households](#).
- **Amazon Photos:** Secure unlimited photo storage and enhanced search and organization features in Amazon Drive for you and the members of your Family Vault. For more information, go to [About Prime Photos](#).

Figure 2.1.1 and Figure 2.1.2 Benefits of Amazon Prime Membership

Moreover, the search engine of Amazon.com was also very useful. The results displayed after users searching were clear and straight forward. For instance, if users searched for “book”, they were able to look at book results divided into different categories like best sellers, hot new releases and most wished books. This feature would prevent users from getting lost if the results were vague and unclear. The results of searching were shown below in Figure 2.1.3.

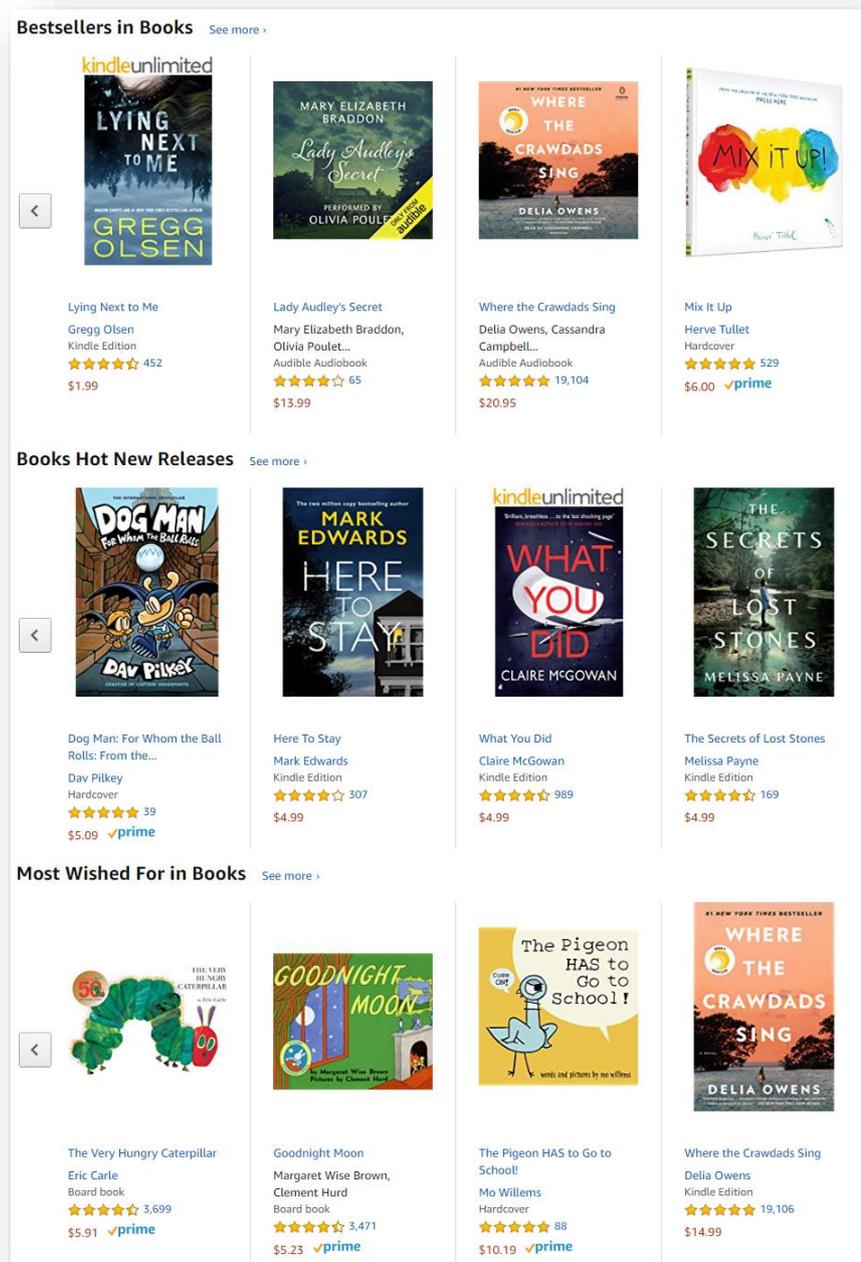


Figure 2.1.3 Result page of searching “Book” in Amazon.com

2.1.2 Weakness of Amazon.com

On the other hand, one of the disadvantages of Amazon was the navigation bar on the website. The problem with this was that when users were browsing through the website and scrolled down to the bottom, the navigation bar, especially the search bar within it would not be visible for users to navigate easily. Another disadvantage was the lack of live chatting feature for customer service. These problems would downgrade its impressions to the users as it did not provide a fully user-friendly environment. The position difference of navigation bar before and after scrolling down on Amazon.com was shown below in Figure 2.1.4 and Figure 2.1.5.

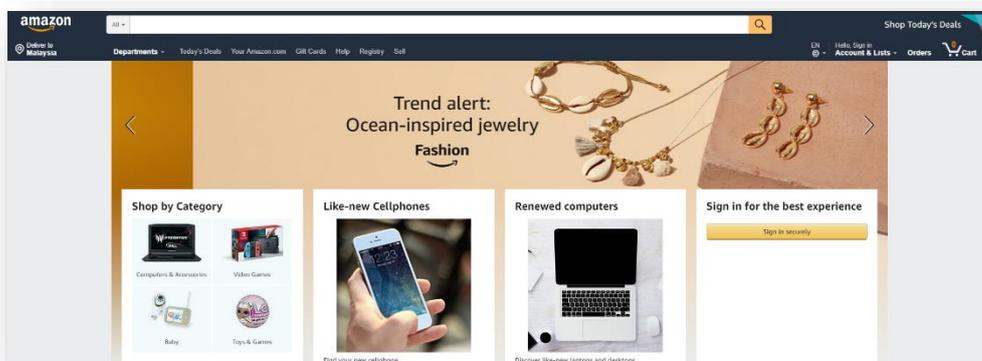


Figure 2.1.4 Navigation bar in Amazon.com before scrolling down

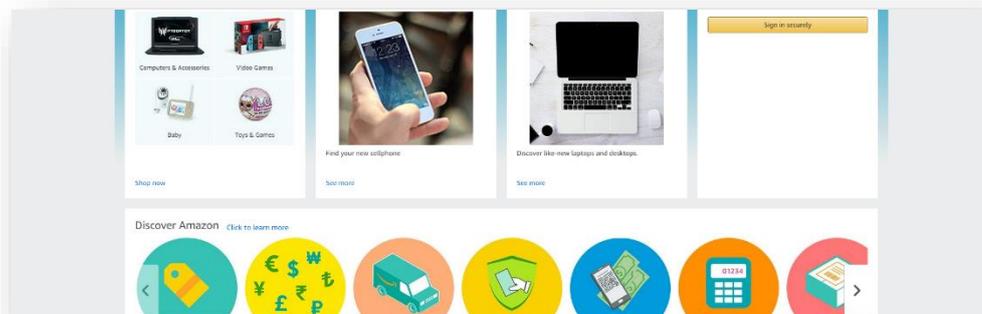


Figure 2.1.5 Navigation bar in Amazon.com after scrolling down

Although Amazon was one of the biggest E-Commerce websites in the world, but its design was not perfect. Adjustments and more features should be included.

Table 2.1.1 Review on some features of Amazon.com

Features	Review
Search Bar	<ul style="list-style-type: none"> ➤ Good position for the user to perform quick searching. ➤ Able to search in a specific product category. ➤ Has an autocomplete drop-down product list.
Shopping Cart	<ul style="list-style-type: none"> ➤ Able to purchase as gifts that allow the buyer to include a packing slip so the recipient knows who it's from, hide prices on the packing slip, include a personalized gift message, add optional gift wrap. ➤ Related items will be displayed after one product is added into the shopping cart.
Sign Up/Login	<ul style="list-style-type: none"> ➤ It does not support third-party login such as (Google, Facebook, etc.). ➤ Able to log in using email or mobile phone number ➤ Must sign up with email
Navigation Bar	<ul style="list-style-type: none"> ➤ Fixed and separated position from the product area, so it appears on every page. But it is not shown when the website is scrolled.
Different Pay Methods	<ul style="list-style-type: none"> ➤ Credit/Debit card, Amazon Gift card, etc. ➤ Has own e-wallet system Amazon Pay
Category/Department	<ul style="list-style-type: none"> ➤ Included in the navigation bar. ➤ Automatic drop-down list of a bunch of departments when mouse hovers over.
Rating/Review System	<ul style="list-style-type: none"> ➤ Rate in a range of 1 to 5 stars ➤ Users can review and comment on the reviews.
Product Details	<ul style="list-style-type: none"> ➤ Q&A section located below product details. ➤ Zoom option for pictures is available ➤ Videos are included ➤ Product images must follow their required standard

2.2 Shopee.com

Shopee.com was founded by a Singaporean billionaire businessman named Forrest Li Xiao and first launched in Singapore in 2015 and until now it serves more than 5 countries in South East Asia.

2.2.1 Strength of Shopee.com

The ultimate strength of Shopee was its charging rate of commission fees. Compared to another E-Commerce website, Shopee was quite different in terms of commission fees as it did not charge sellers for selling on their website. By making this first move, it helped Shopee to surpass Lazada.com, another popular online marketplace in Malaysia, to become rank 1 in terms of estimated earnings.

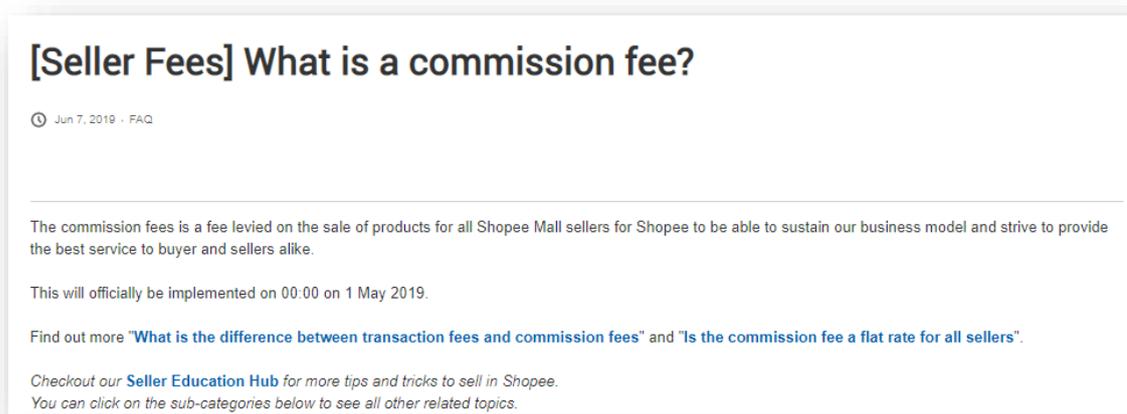


Figure 2.2.1 Official statement of commission fees levied on Shopee.com

However, Shopee started charging commission fees starting from recent date 1st of May, 2019. This statement was made clear on Shopee’s FAQ page as shown in Figure 2.2.1 and the rates of new commission fees are shown in Figure 2.2.2.

The commission fee is still ZERO at the moment, except for Shopee Mall Seller as Shopee will start charging 3% to 5% (depending on the product category) starting from 1 May 2019 onwards.

	Categories	Rates
Electronics	Home Appliances	3%
	Gaming & Consoles	
	Computer & Accessories	
	Mobile & Accessories	
Fashion	Women's Clothing	5%
	Men's Clothing	
	Women's Bags & Purses	
	Muslim Fashion	
	Women's Shoes	
	Fashion Accessories	
	Watches	
	Men's Bags & Wallets	
	Men's Shoes	
	Travel & Luggage	
Lifestyle	Home & Living	
	Sports & Outdoors	
	Automotive	
	Tickets & Vouchers	
	Games, Books, & Hobbies	
	Others	
Consumer Goods	Health & Beauty	5%
	Groceries & Pets	
	Baby & Toys	3%

Figure 2.2.2 New rate of commission implemented by Shopee.com

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Another strength of Shopee.com was the chat box feature located at the bottom of every page. It allowed the ease of communication between sellers and consumers regarding their selling and buying so that a trustworthy relationship would be established. This chat function was shown in Figure 2.2.3 and Figure 2.2.4 below. Besides, Shopee had launched its eWallet system named Shopee Pay that made checking out orders much easier and faster for users.

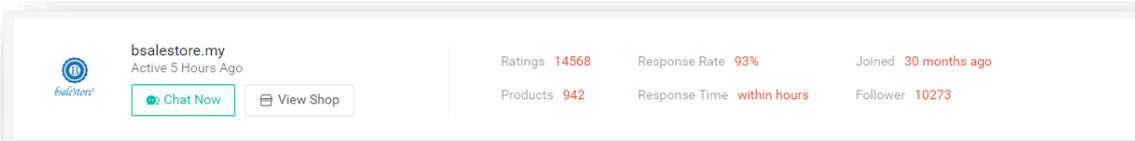


Figure 2.2.3 Chatting features between sellers and consumers on Shopee.com

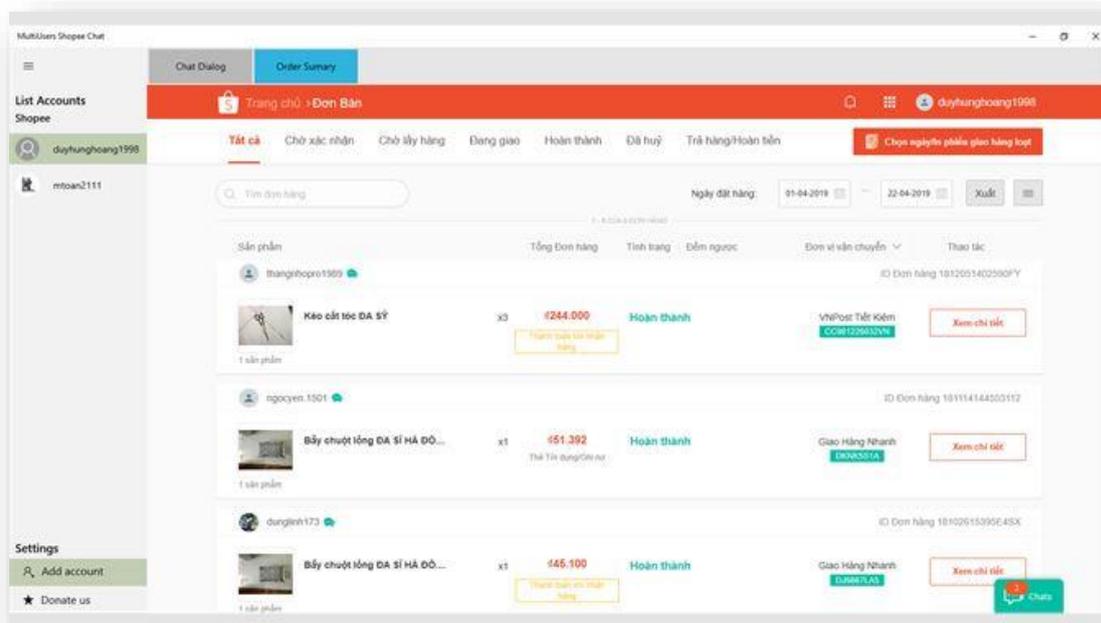


Figure 2.2.4 Chatbox feature located at the bottom of Shopee.com

2.2.2 Weakness of Shopee.com

One of the weaknesses of Shopee was the video of the product was not a must-have element in product details when listing a product to sell. Only photos, specifications and descriptions of product included as shown in Figure 2.2.5 and Figure 2.2.6. It was not enough as video could allow consumers to view the product in a better way.

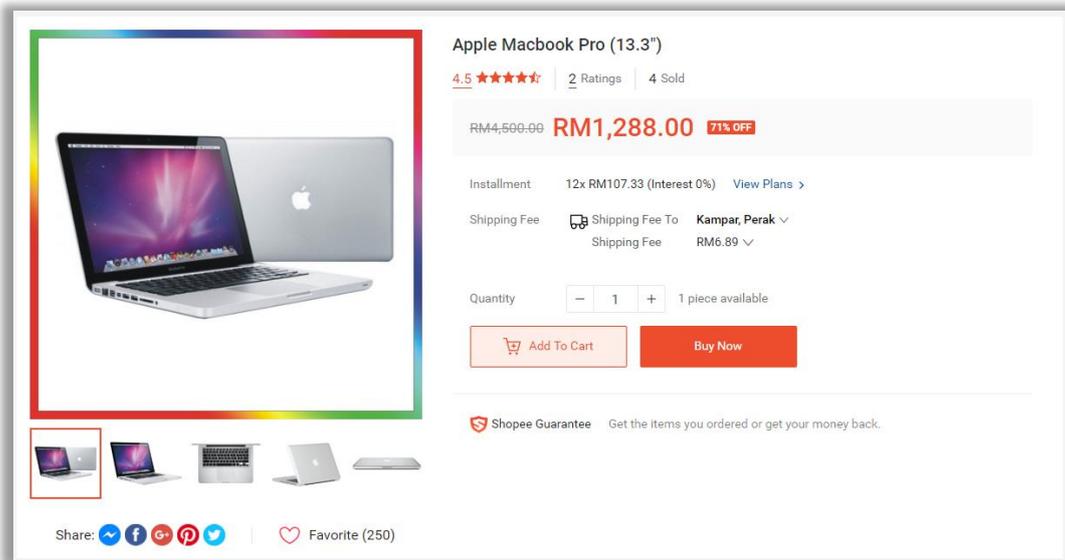


Figure 2.2.5 Product visualization top area on product page of Shopee.com

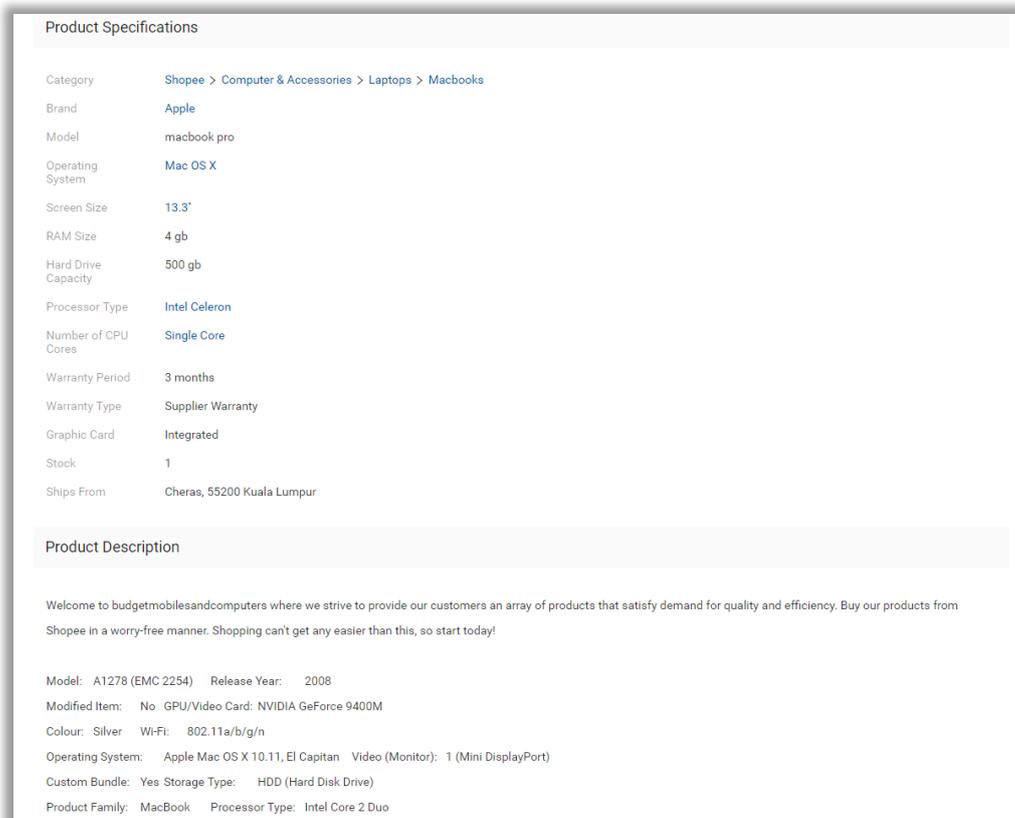


Figure 2.2.6 Product visualization bottom area on the product page of Shopee.com

Another weakness was the lack of categories of product features in the navigation bar as shown in Figure 2.2.8. It was only available on the homepage as shown in Figure 2.2.7 but not in the navigation bar on every page of Shopee.

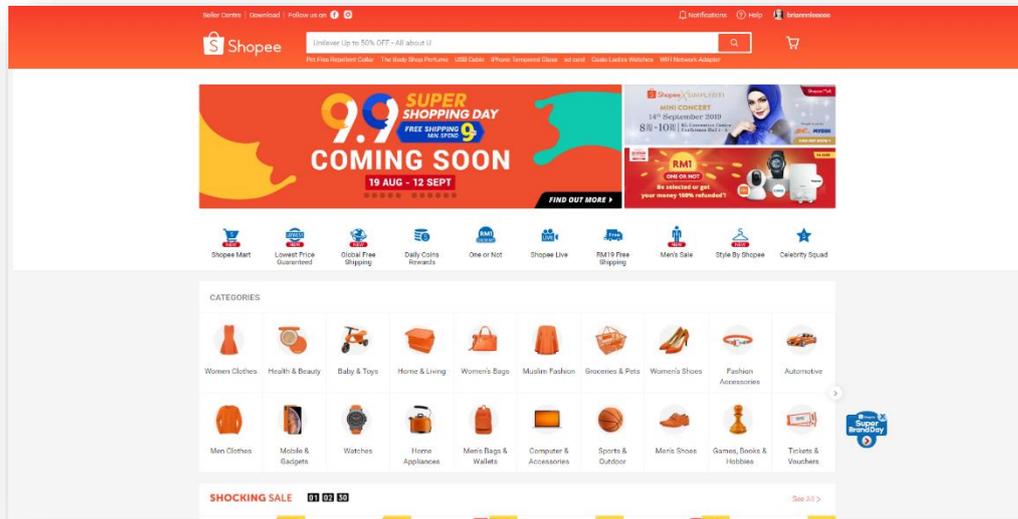


Figure 2.2.7 Categories of product in the homepage of Shopee.com

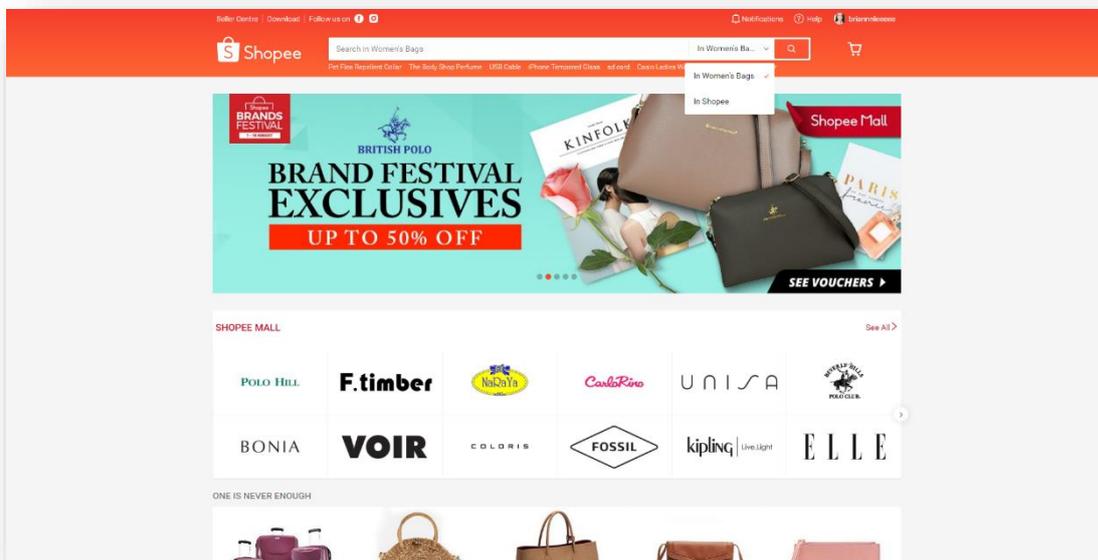


Figure 2.2.8 Categories of product is not available in the navigation bar on Shopee.com

As a sum up, the content of Shopee should be improved and more features should be included to achieve a better UX design.

Table 2.2.1 Review on some features of Shopee.com

Features	Review
Search Bar	<ul style="list-style-type: none"> ➤ Good position for the user to perform quick searching. ➤ Able to search in a specific product category. ➤ Has an autocomplete drop-down product list.
Shopping Cart	<ul style="list-style-type: none"> ➤ Related items will be displayed underneath the shopping cart but not many. ➤ Vouchers/Shopee coins can be applied for the discount in the cart before checking out.
Sign Up/Login	<ul style="list-style-type: none"> ➤ Able to sign up using Email, Phone Number and Facebook. ➤ Support third-party login such as Phone Number and Facebook.
Navigation Bar	<ul style="list-style-type: none"> ➤ Fixed and separated position from the product area, so it appears on every page. ➤ It is shown on the top of the page even if users scroll down to the bottom.
Different Pay Methods	<ul style="list-style-type: none"> ➤ Cash payment at 7-Eleven, Online Banking, CDM, Credit/Debit card. ➤ Can pay with Shopee Pay (eWallet of Shopee).
Category/Department	<ul style="list-style-type: none"> ➤ Not included in Navigation Bar.
Rating/Review System	<ul style="list-style-type: none"> ➤ Rate in a range of 1 to 5 stars ➤ Users can review reviews but not comment. (Determine if the review is helpful or not)
Product Details	<ul style="list-style-type: none"> ➤ Q&A section is not located below product details. ➤ Zoom option for pictures is available. ➤ Videos of product are not included.

2.3 Lazada.com

Lazada.com was founded by German entrepreneurs in 2012 and owned by Alibaba Group in China by 2014. It was an online marketplace that focused on customers in South East Asia countries. It was one of the top E-Commerce websites in Malaysia.

2.3.1 Strength Lazada.com

One of the useful features in Lazada.com was its eWallet system. Lazada.com launched Lazada Wallet back in early April 2018 and its goal was to provide convenient one-click payments when users checkout orders. Other than that, users were able to earn rebates on their purchases using Lazada Wallet.

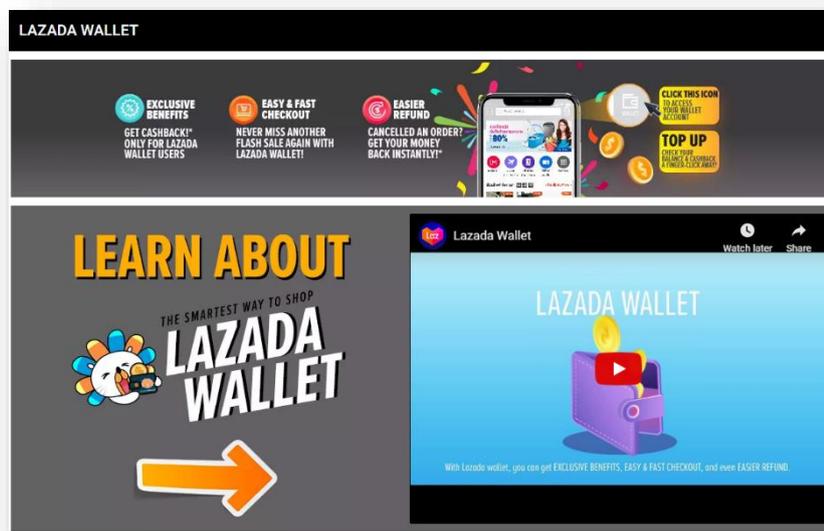


Figure 2.3.1 Lazada wallet on Lazada.com

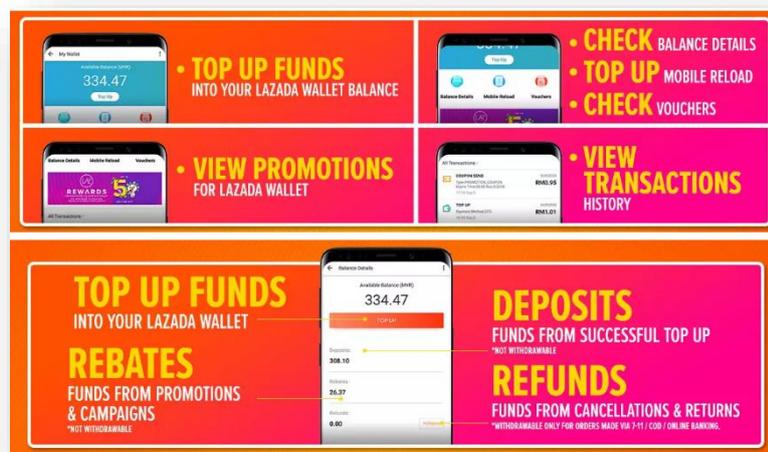


Figure 2.3.2 Benefits of Lazada wallet on Lazada.com

Moreover, Lazada.com had launched a new membership program (LiveUp Membership) for users to enjoy 5 percent cash rebates, expedited shipping, etc. LiveUp members could also enjoy benefits from other Lazada partners such as Uber and Netflix. However, so far it was only available in Singapore. Similar to Amazon Prime, once subscribed, consumers would keep coming back to enjoy the benefits to its maximum value so that they would not feel scammed.

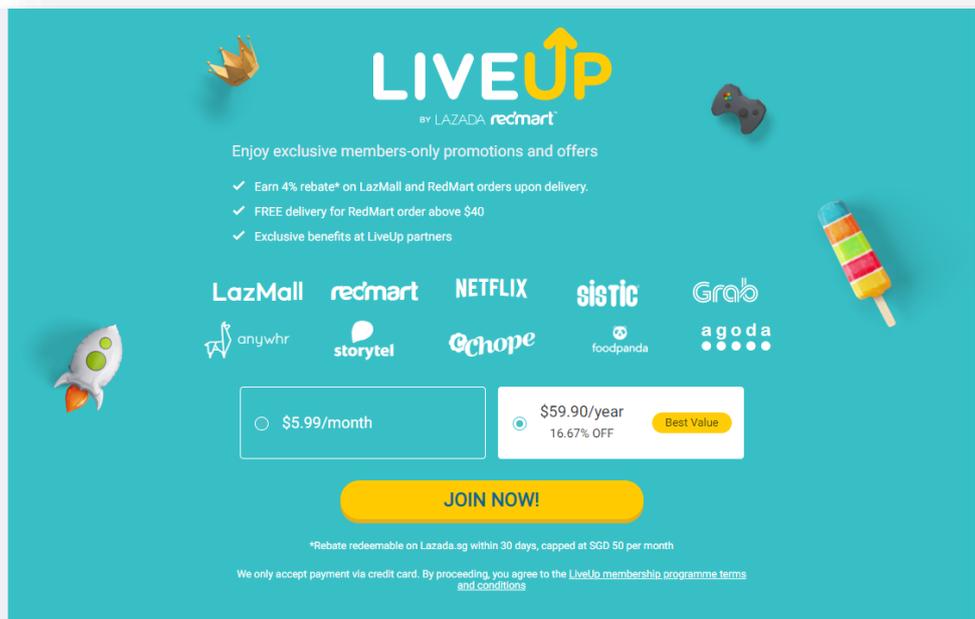


Figure 2.3.3 Lazada LiveUp Membership on Lazada.sg

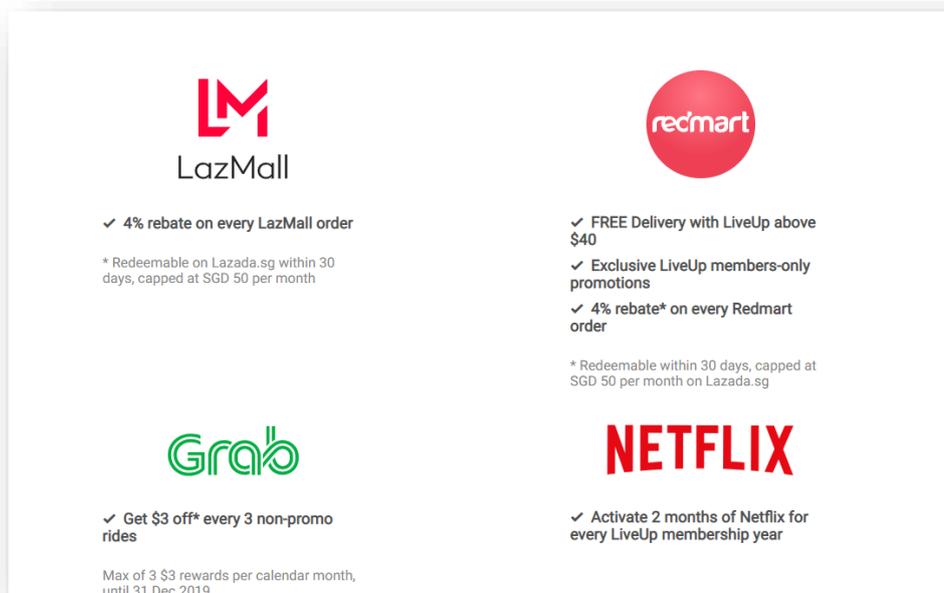


Figure 2.3.4 Some benefits of Lazada LiveUp Membership on Lazada.sg

2.3.2 Weakness of Lazada.com

The weakness of Lazada.com was product visualizations. The number of product images required was in a range of 1 to 8 which was not enough for visualizing a particular product.

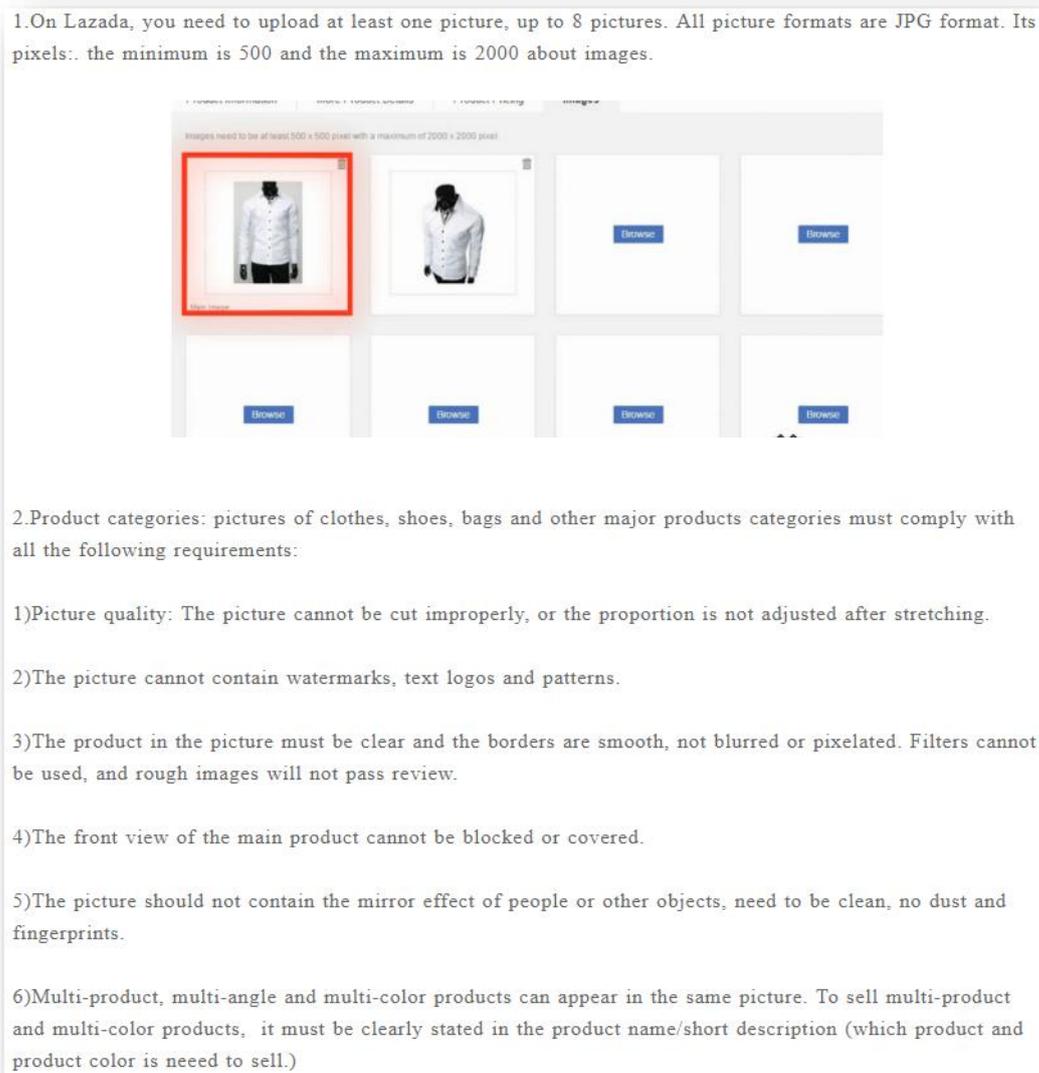


Figure 2.3.5 Specific Requirements for Pictures on Lazada Online Shop

Users might find it hard to have a brief visualization of the product. Video should be a must-have component.



Figure 2.3.6 Product visualization top area on product page of Lazada.com

In sum of reviewing Lazada.com, more features should be included and the design of UI should be more vivid.

Table 2.3.1 Reviews on some features of Lazada.com

Features	Review
Search Bar	<ul style="list-style-type: none"> ➤ Good position for the user to perform quick searching. ➤ Unable to search in a specific product category. ➤ Has an autocomplete drop-down product list.
Shopping Cart	<ul style="list-style-type: none"> ➤ Related items will be displayed underneath the shopping cart ➤ Vouchers code can be applied for the discount in the cart before checking out.
Sign Up/Login	<ul style="list-style-type: none"> ➤ Able to sign up using Email, Phone Number, Facebook and Google. ➤ Support third-party login such as Phone Number, Facebook and Google.
Navigation Bar	<ul style="list-style-type: none"> ➤ Fixed and separated position from the product area, so it appears on every page. ➤ It is shown on the top of the page even if users scroll down to the bottom.
Different Pay Methods	<ul style="list-style-type: none"> ➤ Cash payment at 7-Eleven, Online Banking, Credit/Debit card. ➤ Can pay with Lazada Wallet (eWallet of Lazada). ➤ Maybank installments on selected items and only for Maybank Credit Card users.
Category/Department	<ul style="list-style-type: none"> ➤ Not included in Navigation Bar. ➤ Automatic drop-down list of a bunch of departments when mouse hovers over.
Rating/Review System	<ul style="list-style-type: none"> ➤ Rate in a range of 1 to 5 stars ➤ Users can review reviews but not comment. (Determine if the review is helpful or not)
Product Details	<ul style="list-style-type: none"> ➤ Q&A section is located below product details. ➤ Zoom option for pictures is available. ➤ Videos of product are not included.

2.4 eBay.com

eBay.com was founded by Pierre Omidyar, an American entrepreneur. eBay.com was founded as an auction-style sales website and further evolved into a modern E-Commerce website.

2.4.1 Strength of eBay.com

One of the strengths of eBay.com was the multiple selling methods. eBay offered different kinds of selling methods for sellers from traditional negotiable sales (Figure 2.4.1) to auction sales (Figure 2.4.2) and lastly fixed price sales (Figure 2.4.3). By offering these methods, allowed sellers to use it to prevent them from getting the risk of selling their products with a price less than the market value.

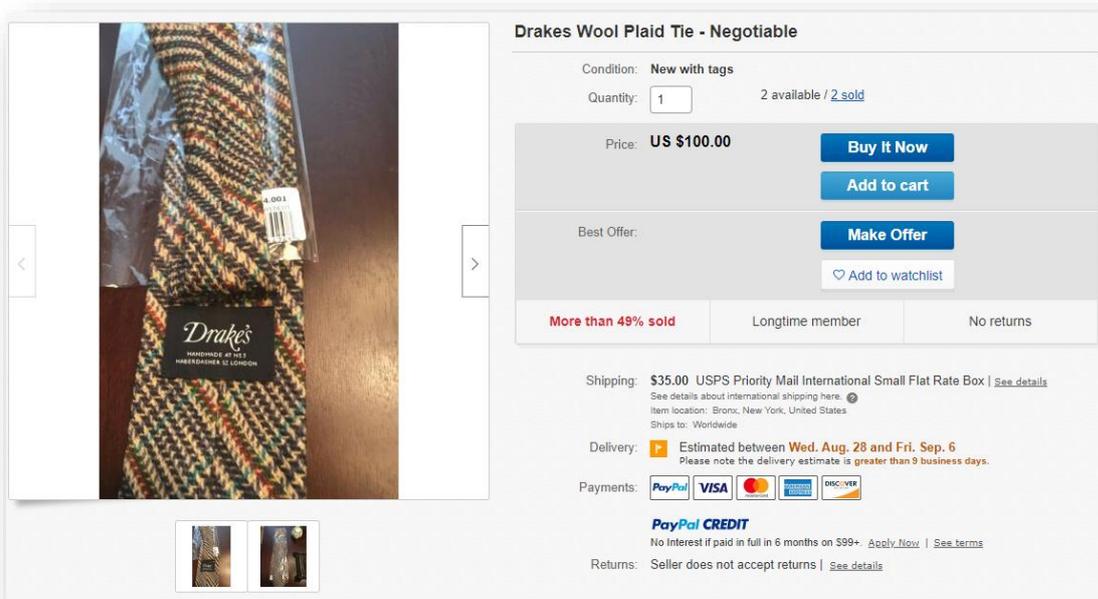


Figure 2.4.1 Negotiable sales method on eBay.com

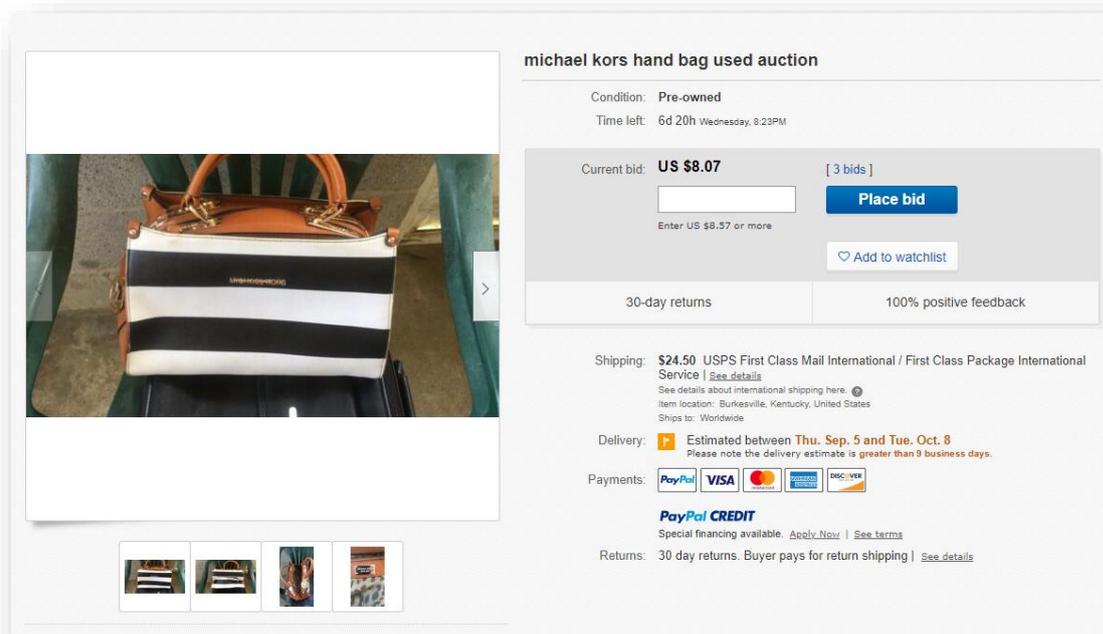


Figure 2.4.2 Auction style sales method on eBay.com

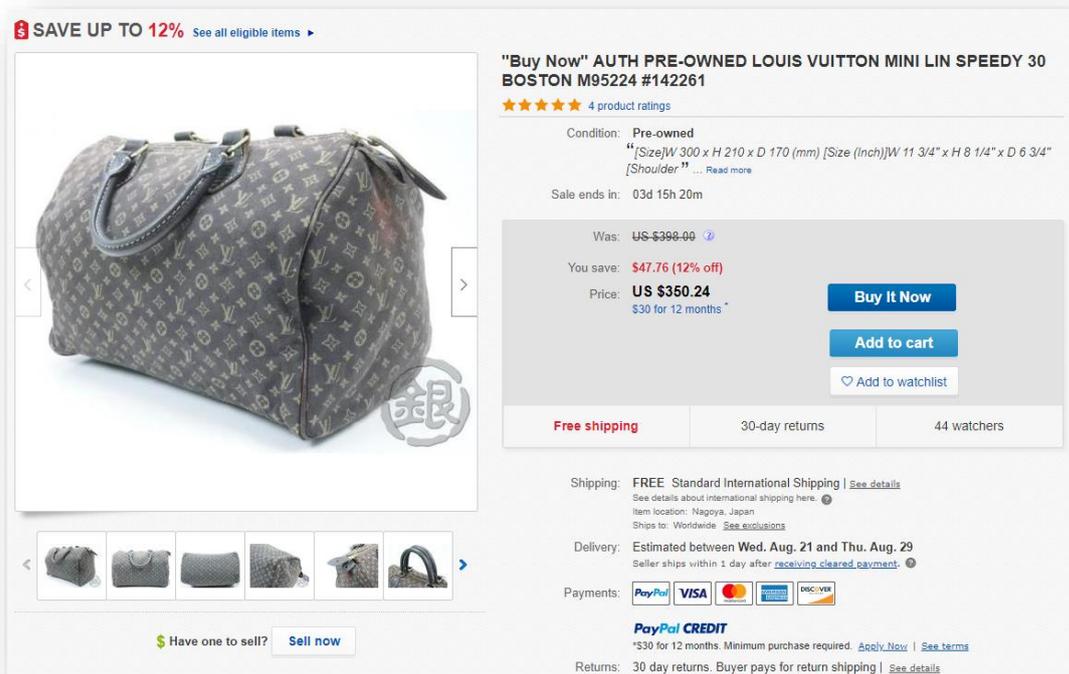
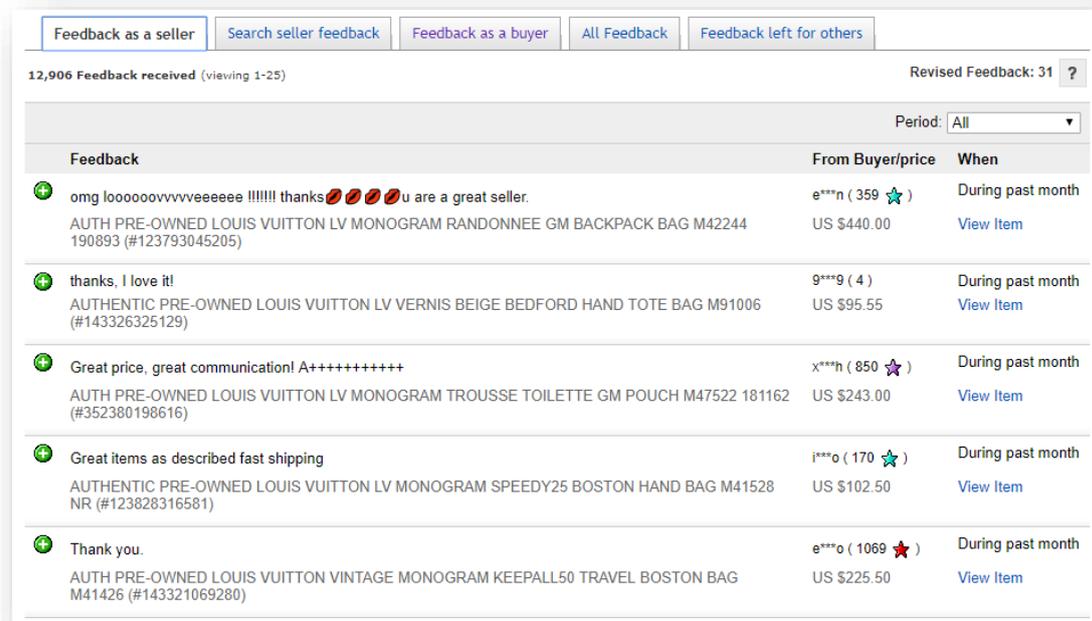


Figure 2.4.3 Fixed-price sales method on eBay.com

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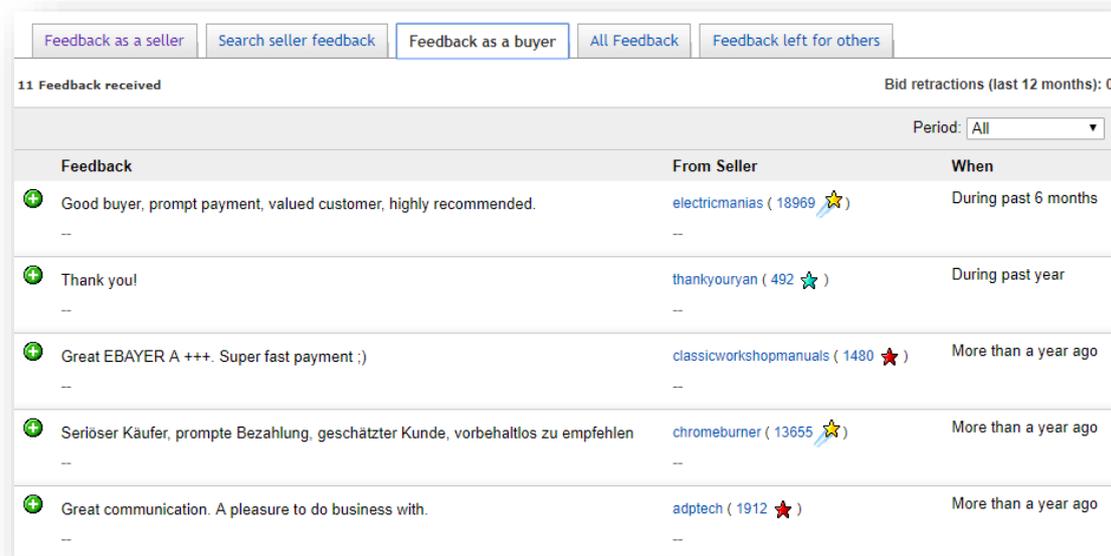
Another strength of eBay was the feedback feature. eBay introduced a bidirectional feedback process between sellers and buyers after every completed transaction. By introducing this method, reputations of both buyers and sellers could be used to prove themselves as a reputable user. This could result in more sales.



The screenshot shows the 'Feedback as a seller' page on eBay. It displays a list of 12,906 feedback entries received by the seller. The page includes navigation tabs for 'Feedback as a seller', 'Search seller feedback', 'Feedback as a buyer', 'All Feedback', and 'Feedback left for others'. A 'Revised Feedback: 31' indicator is visible. The feedback entries are shown in a table with columns for 'Feedback', 'From Buyer/price', and 'When'. Each entry includes a green plus icon, a feedback message, the buyer's name and rating, the price paid, and the time period. A 'View Item' link is provided for each entry.

Feedback	From Buyer/price	When
omg loooooovvvveeeeeee !!!!!!! thanks 🍌🍌🍌🍌 u are a great seller. AUTH PRE-OWNED LOUIS VUITTON LV MONOGRAM RANDONNEE GM BACKPACK BAG M42244 190893 (#123793045205)	e***n (359 ⭐) US \$440.00	During past month View Item
thanks, I love it! AUTHENTIC PRE-OWNED LOUIS VUITTON LV VERNIS BEIGE BEDFORD HAND TOTE BAG M91006 (#143326325129)	9***9 (4) US \$95.55	During past month View Item
Great price, great communication! A+++++++ AUTH PRE-OWNED LOUIS VUITTON LV MONOGRAM TROUSSE TOILETTE GM POUCH M47522 181162 (#352380198616)	x***h (850 ☆) US \$243.00	During past month View Item
Great items as described fast shipping AUTHENTIC PRE-OWNED LOUIS VUITTON LV MONOGRAM SPEEDY25 BOSTON HAND BAG M41528 NR (#123828316581)	i***o (170 ⭐) US \$102.50	During past month View Item
Thank you. AUTH PRE-OWNED LOUIS VUITTON VINTAGE MONOGRAM KEEPALL50 TRAVEL BOSTON BAG M41426 (#143321069280)	e***o (1069 ☆) US \$225.50	During past month View Item

Figure 2.4.4 Feedbacks as a seller on eBay.com



The screenshot shows the 'Feedback as a buyer' page on eBay. It displays a list of 11 feedback entries received by the buyer. The page includes navigation tabs for 'Feedback as a seller', 'Search seller feedback', 'Feedback as a buyer', 'All Feedback', and 'Feedback left for others'. A 'Bid retractions (last 12 months): 0' indicator is visible. The feedback entries are shown in a table with columns for 'Feedback', 'From Seller', and 'When'. Each entry includes a green plus icon, a feedback message, the seller's name and rating, and the time period. A 'View Item' link is provided for each entry.

Feedback	From Seller	When
Good buyer, prompt payment, valued customer, highly recommended. --	electricmanias (18969 ☆) --	During past 6 months
Thank you! --	thankyouryan (492 ⭐) --	During past year
Great EBAYER A +++ Super fast payment :) --	classicworkshopmanuals (1480 ☆) --	More than a year ago
Seriöser Käufer, prompte Bezahlung, geschätzter Kunde, vorbehaltlos zu empfehlen --	chromeburner (13655 ☆) --	More than a year ago
Great communication. A pleasure to do business with. --	adptech (1912 ☆) --	More than a year ago

Figure 2.4.5 Feedbacks as a buyer on eBay.com

2.4.2 Weakness of eBay.com

One of the weaknesses of eBay.com was the design of UI was somewhat “boring”. It could be said that some UI designs were still quite old school such as many of the hyperlinks were just hyperlinks without any further beautify design process. Below showed an example of the top navigation bar design of eBay.com that contains lots of simple and small navigation hyperlinks in Figure 2.4.6 and Figure 2.4.7.

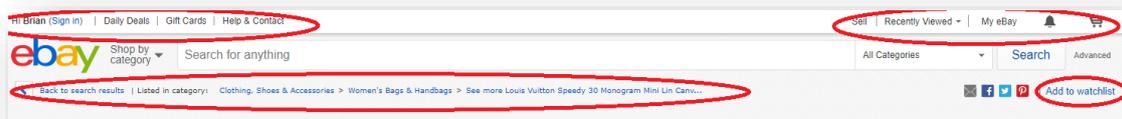


Figure 2.4.6 Top navigation bar of eBay.com

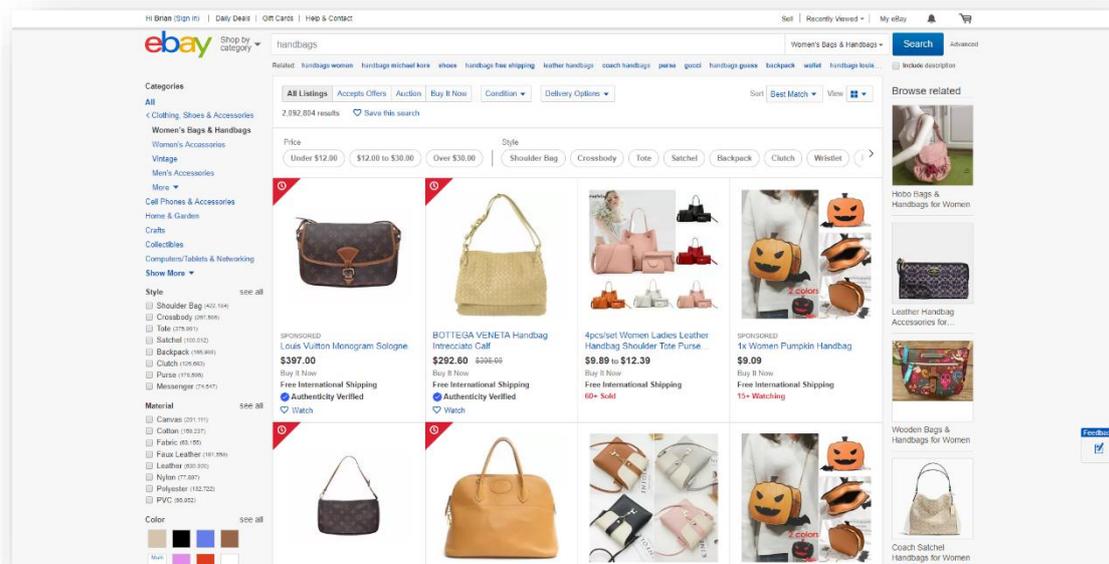


Figure 2.4.7 Result page of searching “handbags” on eBay.com

eBay.com might be a good online marketplace for sellers to earn profit but UX and UI design was not good enough. Hence, better UX and UI design should be implemented.

Table 2.4.1 Reviews on some features of eBay.com

Features	Review
Search Bar	<ul style="list-style-type: none"> ➤ Good position for the user to perform quick searching. ➤ Able to search in a specific product category. ➤ Has an autocomplete drop-down product list.
Shopping Cart	<ul style="list-style-type: none"> ➤ Related items will be displayed underneath the shopping cart ➤ “Save for later” option is available where users can temporarily remove unsure products.
Sign Up/Login	<ul style="list-style-type: none"> ➤ Able to sign up using Email, Username, Facebook and Google. ➤ Support third-party login such as Facebook and Google.
Navigation Bar	<ul style="list-style-type: none"> ➤ Fixed and separated position from the product area, so it appears on every page. ➤ It is not shown on the top of the page even if users scroll down to the bottom.
Different Pay Methods	<ul style="list-style-type: none"> ➤ Paypal, Online Banking, C.O.D, Credit/Debit card, personal cheques, cashier's cheques, and money orders. ➤ It does not have its eWallet.
Category/Department	<ul style="list-style-type: none"> ➤ Not included in Navigation Bar. ➤ Automatic drop-down list of a bunch of departments when mouse hovers over.
Rating/Review System	<ul style="list-style-type: none"> ➤ Rate in a range of 1 to 5 stars ➤ Includes feedback score system divided into 3 categories, negative, neutral and positive (each seller has his/her score)
Product Details	<ul style="list-style-type: none"> ➤ Q&A section is not available. ➤ Zoom option for pictures is available. ➤ Videos of product are not included.

2.5 Taobao.com

Taobao.com was launched in May 2003 by Alibaba Group. Until now, it became the world's biggest E-Commerce website.

2.5.1 Strength of Taobao.com

One of the strengths of Taobao.com was that it was built with a convenient paying system (Alipay), created by its parent company. What made Alipay convenient was that after users setting up their Alipay accounts by linking bank cards and accounts on Taobao.com, all they had to do clicking the pay button on their smartphones.



Figure 2.5.1 Some functions/services of Alipay



Figure 2.5.2 Linking Alipay settings in Taobao.com

2.5.2 Weakness of Taobao.com

Nonetheless, one of the weaknesses of Taobao was its complex product categories navigation menu design. The product categories navigation menu of Taobao.com consisted of numerous subcategories and different items for each sub-category. The screenshot of the menu is provided below:

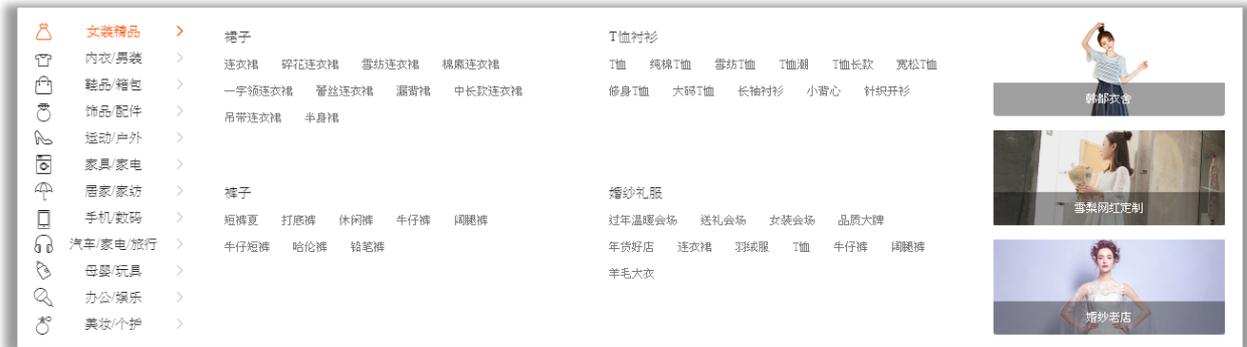


Figure 2.5.3 Product categories navigation menu of Taobao.com

Although it may enhance UX while browsing through the website, but some of the users may also find it hard to deal with the complexity. Not only the navigation menu, the UI design was quite complex as different product images were displayed together (Figure 2.5.4).

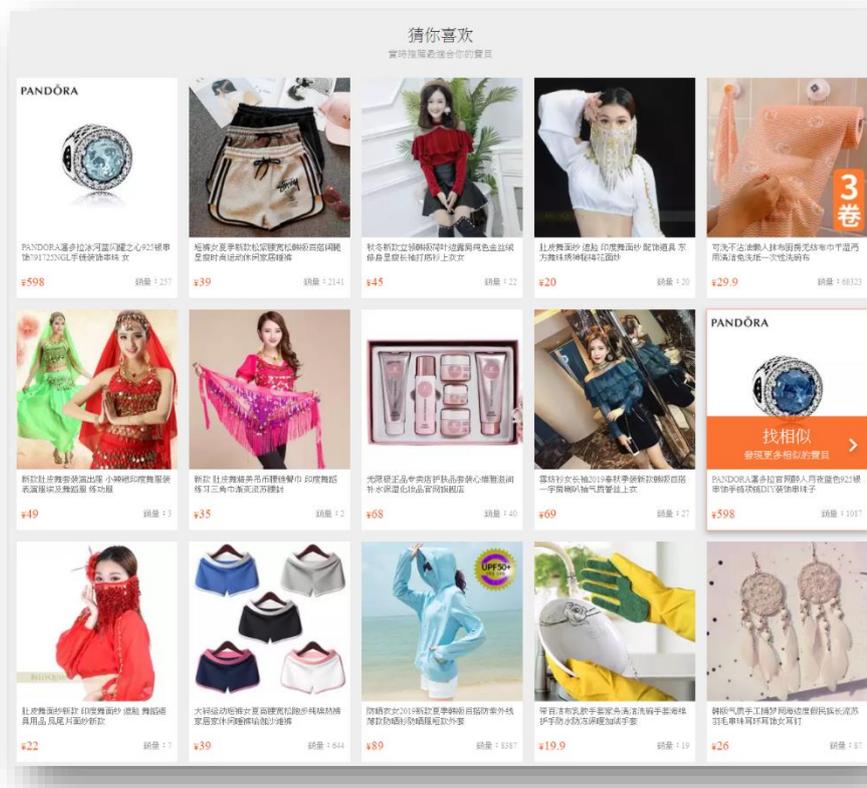


Figure 2.5.4 “I guess you like these” product area on Taobao.com

Below showed some of the users' online rant on a forum about the bad design of Taobao UI.



Figure 2.5.5 User's online rant about bad UI design of Taobao.com on a forum

Translation: "Why can't Taobao design a better UI? It is so complex, seriously I do not have any desire to shop once I browse through Taobao.com."

Taobao.com might be a good online marketplace for sellers to earn profit but UX and UI design was not good enough. Hence, UX and UI design should be enhanced.

Table 2.5.1 Reviews on some features of Taobao.com

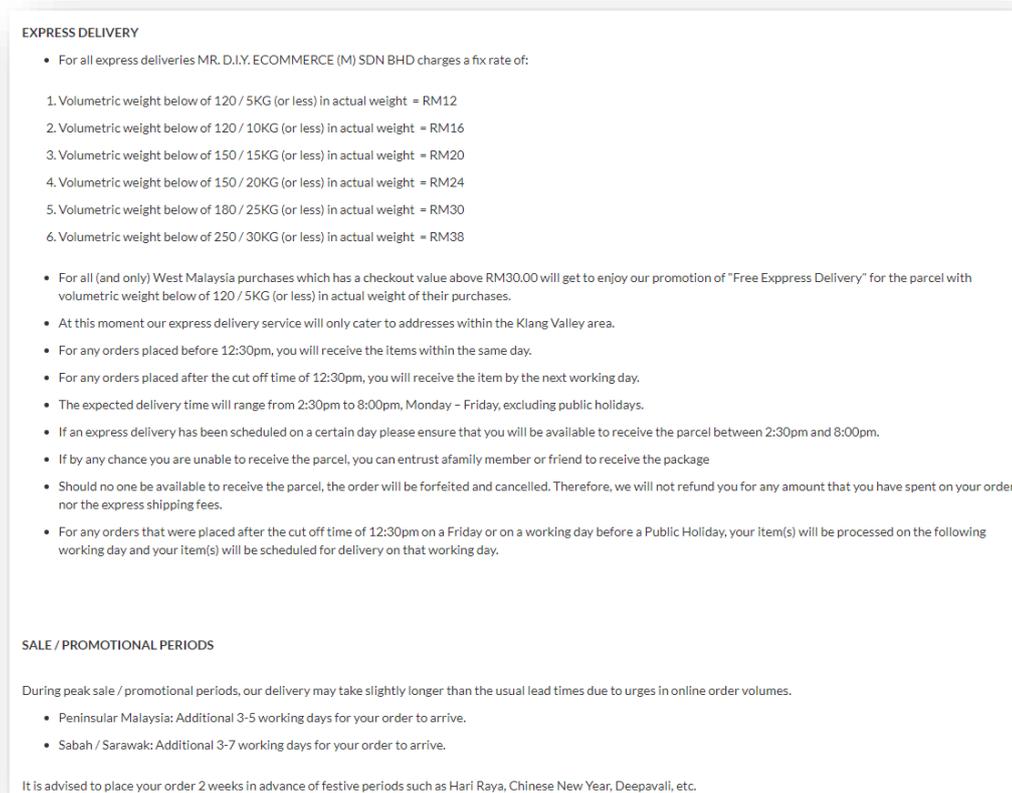
Features	Review
Search Bar	<ul style="list-style-type: none"> ➤ Good position for the user to perform quick searching. ➤ Unable to search in a specific product category. ➤ Has an autocomplete drop-down product list.
Shopping Cart	<ul style="list-style-type: none"> ➤ Related items will be displayed underneath the shopping cart ➤ “Save to collection” option is available where users can temporarily remove unsure products.
Sign Up/Login	<ul style="list-style-type: none"> ➤ Able to sign up using Username, Facebook and Phone Number. ➤ Support third-party login such as Facebook and Phone Number.
Navigation Bar	<ul style="list-style-type: none"> ➤ Fixed and separated position from the product area, so it appears on every page. ➤ It is shown on the top of the page even if users scroll down to the bottom.
Different Pay Methods	<ul style="list-style-type: none"> ➤ Online Banking (FPX) and Credit/Debit card for Malaysia users ➤ It does not have its eWallet.
Category/Department	<ul style="list-style-type: none"> ➤ Not included in Navigation Bar. ➤ Automatic drop-down list of a bunch of departments when mouse hovers over.
Rating/Review System	<ul style="list-style-type: none"> ➤ Rate in a range of 1 to 5 stars
Product Details	<ul style="list-style-type: none"> ➤ Q&A section is not available. ➤ Zoom option for pictures is available. ➤ Videos of product are included.

2.6 Mrdiy.com

MRDIY was one of the largest home improvement retailer stores in Malaysia and many other countries such as Thailand, Brunei, Indonesia, Philippines and Singapore. It was often recognized by its company motto, “Always Low Prices”.

2.6.1 Strength of Mrdiy.com

One of the strengths of Mrdiy.com was its product distribution system. On this E-Commerce website, there were two types of product distribution methods. Firstly, Monday had its logistic system to deliver products to consumers in Malaysia. It was called as Mrdiy express (24 hours delivery). Below showed the figure of its rules and regulations.



EXPRESS DELIVERY

- For all express deliveries MR. D.I.Y. ECOMMERCE (M) SDN BHD charges a fix rate of:
 1. Volumetric weight below of 120 / 5KG (or less) in actual weight = RM12
 2. Volumetric weight below of 120 / 10KG (or less) in actual weight = RM16
 3. Volumetric weight below of 150 / 15KG (or less) in actual weight = RM20
 4. Volumetric weight below of 150 / 20KG (or less) in actual weight = RM24
 5. Volumetric weight below of 180 / 25KG (or less) in actual weight = RM30
 6. Volumetric weight below of 250 / 30KG (or less) in actual weight = RM38
- For all (and only) West Malaysia purchases which has a checkout value above RM30.00 will get to enjoy our promotion of "Free Express Delivery" for the parcel with volumetric weight below of 120 / 5KG (or less) in actual weight of their purchases.
- At this moment our express delivery service will only cater to addresses within the Klang Valley area.
- For any orders placed before 12:30pm, you will receive the items within the same day.
- For any orders placed after the cut off time of 12:30pm, you will receive the item by the next working day.
- The expected delivery time will range from 2:30pm to 8:00pm, Monday – Friday, excluding public holidays.
- If an express delivery has been scheduled on a certain day please ensure that you will be available to receive the parcel between 2:30pm and 8:00pm.
- If by any chance you are unable to receive the parcel, you can entrust a family member or friend to receive the package
- Should no one be available to receive the parcel, the order will be forfeited and cancelled. Therefore, we will not refund you for any amount that you have spent on your order nor the express shipping fees.
- For any orders that were placed after the cut off time of 12:30pm on a Friday or on a working day before a Public Holiday, your item(s) will be processed on the following working day and your item(s) will be scheduled for delivery on that working day.

SALE / PROMOTIONAL PERIODS

During peak sale / promotional periods, our delivery may take slightly longer than the usual lead times due to surges in online order volumes.

- Peninsular Malaysia: Additional 3-5 working days for your order to arrive.
- Sabah / Sarawak: Additional 3-7 working days for your order to arrive.

It is advised to place your order 2 weeks in advance of festive periods such as Hari Raya, Chinese New Year, Deepavali, etc.

Figure 2.6.1 Rules and Regulations of mr.diy express delivery

Secondly, the other product distribution was a system that allowed users to purchase online and collect at any of the 84 selected Mrdiy brick and mortar retail stores. These two product distribution systems were able to increase their sales and convenience for customers

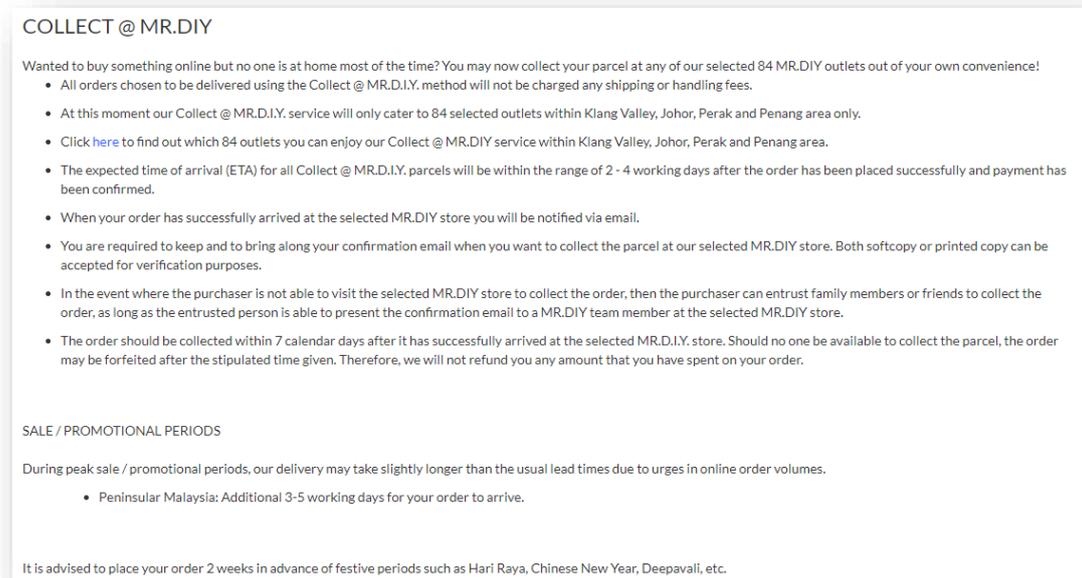


Figure 2.6.2 Rules and regulations of collect @ mr.diy

2.6.2 Weakness of Mrdiy.com

Next, the weakness of Mrdiy.com was the lack of product details in the product page. As we can see in Figure 2.6.3, it only consisted of a few pictures of the product.

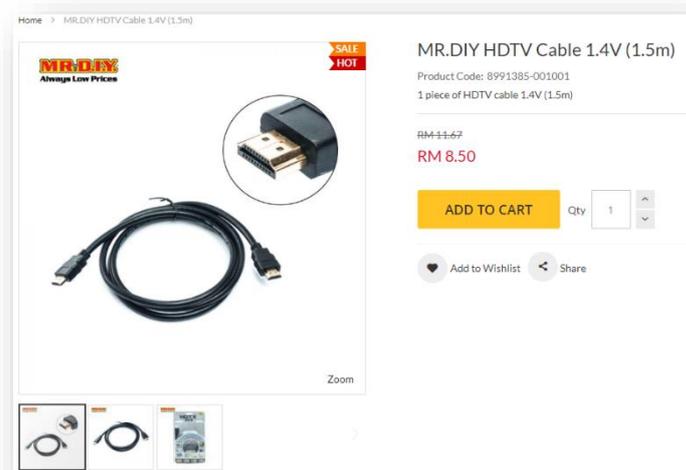


Figure 2.6.3 Product image area on the product page of Mrdiy.com

Moreover, the reviews section had 0 reviews in it. This weakness would downgrade the impression and trust of consumers on this site.

The screenshot shows a product page with three tabs: 'Description', 'Specifications', and 'Reviews'. The 'Reviews' tab is selected and highlighted with a yellow underline. Below the tabs, the text reads 'You're reviewing: MR.DIY HDTV Cable 1.4V (1.5m)'. Underneath this text is a row of five empty circles, likely representing a star rating system. The form contains three input fields: 'Name *', 'Title *', and 'Review *'. Each field is followed by a small red asterisk indicating it is a required field. The 'Name' and 'Title' fields are single-line text boxes, while the 'Review' field is a larger multi-line text area. At the bottom of the form is a yellow button with the text 'SUBMIT REVIEW' and a right-pointing arrow.

Figure 2.6.4 Review section on product page of Mrdiy.com

Table 2.6.1 Reviews on some features of Mrdiy.com

Features	Review
Search Bar	<ul style="list-style-type: none"> ➤ Good position for the user to perform quick searching. ➤ Unable to search in a specific product category. ➤ Has an autocomplete drop-down product list.
Shopping Cart	<ul style="list-style-type: none"> ➤ Related items are not displayed underneath the shopping cart ➤ Discount code can be applied for the discount in the cart before checking out
Sign Up/Login	<ul style="list-style-type: none"> ➤ Able to sign up using Username, Facebook and Google ➤ Support third-party login such as Facebook and Google
Navigation Bar	<ul style="list-style-type: none"> ➤ Fixed and separated position from the product area, so it appears on every page. ➤ It is shown on the top of the page even if users scroll down to the bottom. However, the search bar is not shown at this time.
Different Pay Methods	<ul style="list-style-type: none"> ➤ Online Banking (FPX), Credit/Debit card, Boost pay and GrabPay. ➤ It does not have its eWallet.
Category/Department	<ul style="list-style-type: none"> ➤ Included in Navigation Bar. ➤ Automatic drop-down list of a bunch of departments when mouse hovers over.
Rating/Review System	<ul style="list-style-type: none"> ➤ Rate in a range of 1 to 5 stars ➤ Reviews are written in a “form” tag in HTML
Product Details	<ul style="list-style-type: none"> ➤ Q&A section is not available. ➤ Zoom option for pictures is available. ➤ Videos of product are not included.

2.7 Zalora.com.my

Zalora.com was founded by Zalora Group and it was an E-Commerce website that focused on selling fashion products such as clothes.

2.7.1 Strength of Zalora.com.my

One of the strengths of Zalora.com.my was the notification of order status via SMS. This feature allowed consumers to know their order status as quickly as possible as they would carry their mobile phones with them almost all the time these days. Below attached a sample message sent by Zalora.com.my regarding a COD delivery order.

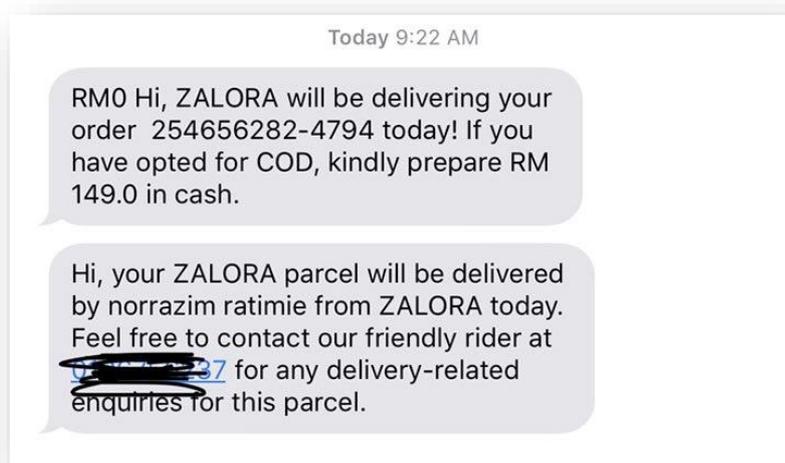


Figure 2.7.1 SMS notification sent by Zalora.com.my regarding COD delivery



Figure 2.7.2 SMS notification sent by Zalora.com.my regarding unpaid orders

Another strength of Zalora was its membership system. The objective of the Zalora membership system was similar to Amazon Prime which had been reviewed in this chapter before. It was a system to provide benefits to users and the benefits are stated below.

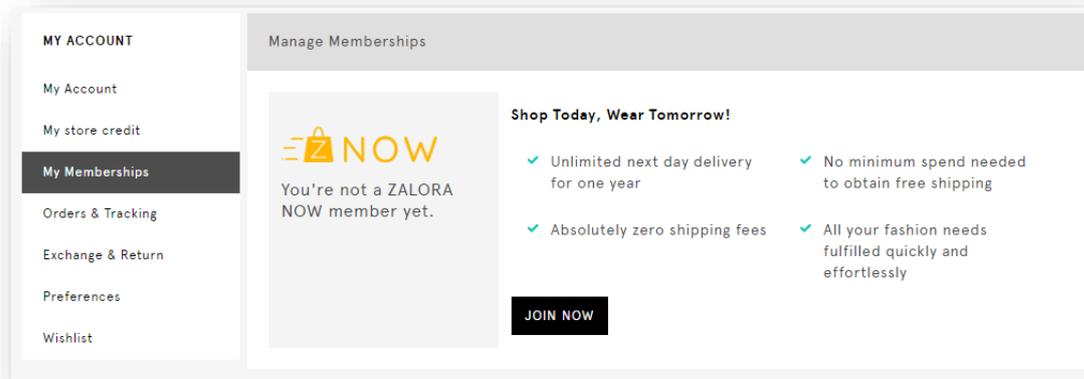


Figure 2.7.3 Benefits of Zalora membership

What made Zalora membership different was that it was not a monthly nor yearly subscription type. It offered a one-time payment of RM19.90 for a year of benefits to be enjoyed by users.

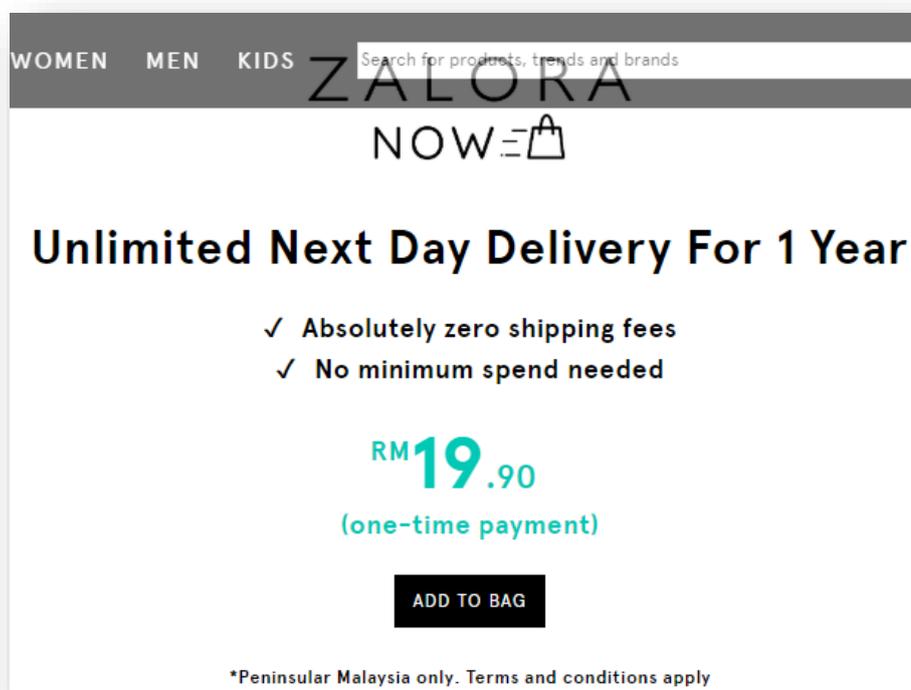


Figure 2.7.4 One-time-payment of Zalora membership

Table 2.7.1 Reviews on some features of Zalora.com.my

Features	Review
Search Bar	<ul style="list-style-type: none"> ➤ Good position for the user to perform quick searching. ➤ Unable to search in a specific product category. ➤ Has an autocomplete drop-down product list.
Shopping Cart	<ul style="list-style-type: none"> ➤ Related products are displayed underneath the shopping cart ➤ Promo code can be applied for the discount in the cart before checking out
Sign Up/Login	<ul style="list-style-type: none"> ➤ Able to sign up using Email and Facebook ➤ Support third-party login such as Facebook
Navigation Bar	<ul style="list-style-type: none"> ➤ Fixed and separated position from the product area, so it appears on every page. ➤ It is shown on the top of the page even if users scroll down to the bottom.
Different Pay Methods	<ul style="list-style-type: none"> ➤ Online Banking (FPX), Credit/Debit card, Boost pay, Paypal and GrabPay. ➤ It does not have its eWallet.
Category/Department	<ul style="list-style-type: none"> ➤ Included in Navigation Bar. ➤ Automatic drop-down list of a bunch of departments
Rating/Review System	<ul style="list-style-type: none"> ➤ Rate in a range of 1 to 5 stars in terms of quality, appearance and price ➤ Reviews are written in a “form” tag in HTML
Product Details	<ul style="list-style-type: none"> ➤ Q&A section is not available. ➤ Zoom option for pictures is available. ➤ Videos of product are not included.

2.8 Summary

Features	Proposed Project	Amazon	eBay	Lazada	Shopee	Taobao
Search Bar	✓	✓	✓	✓	✓	✓
Good and usable Shopping cart	✓	✓	✓	✓	✓	✓
User-Friendly Navigation Bar	✓			✓	✓	✓
Product categories that are not complex	✓	✓	✓	✓	✓	
Rating/Review System	✓	✓	✓	✓	✓	✓
Product details (must include videos)	✓	✓				✓
Live Chat	✓			✓	✓	✓
Price Filters	✓	✓	✓	✓	✓	✓
Users' collections/wish lists	✓	✓	✓			✓
Sharing Option		✓			✓	✓
Mobile Responsiveness	✓	✓	✓	✓	✓	✓
Third-party logins (Facebook, Google)	✓		✓	✓	✓	✓
E-Wallet		✓		✓	✓	
Different Payment Methods	✓	✓	✓	✓	✓	✓
Gamification	✓		✓	✓	✓	✓

Table 2.8.1 Summary of Literature Review (Part 1)

Features	Proposed Project	Mydiy	Zalora
Search Bar	✓	✓	✓
Good and usable Shopping cart	✓	✓	✓
User-Friendly Navigation Bar	✓	✓	✓
Product categories that are not complex	✓		✓
Rating/Review System	✓	✓	✓
Product details (must include videos)	✓		
Live Chat	✓		✓
Price Filters	✓	✓	✓
Users' collections/wish lists	✓		✓
Sharing Option		✓	✓
Mobile Responsiveness	✓	✓	✓
Third-party logins (Facebook, Google)	✓	✓	✓
E-Wallet			
Different Payment Methods	✓	✓	✓
Gamification	✓		

Table 2.8.2 Summary of Literature Review (Part 2)

After reviewing multiple existing E-Commerce websites, some must-have functions should be included in the proposed project. The weaknesses of existing websites should be improved or eliminated from the proposed project. Websites used in these reviews could be classified into low class, middle class, and high class. By doing so, it helped to enhance the understanding of the importance of key components of an E-Commerce website. Significant differences between different classes of websites could help to determine how to improve the features so that it could achieve the objectives of this project.

Chapter 3 System Design

3.1 System Design / Overview

3.1.1 Block Diagram Design

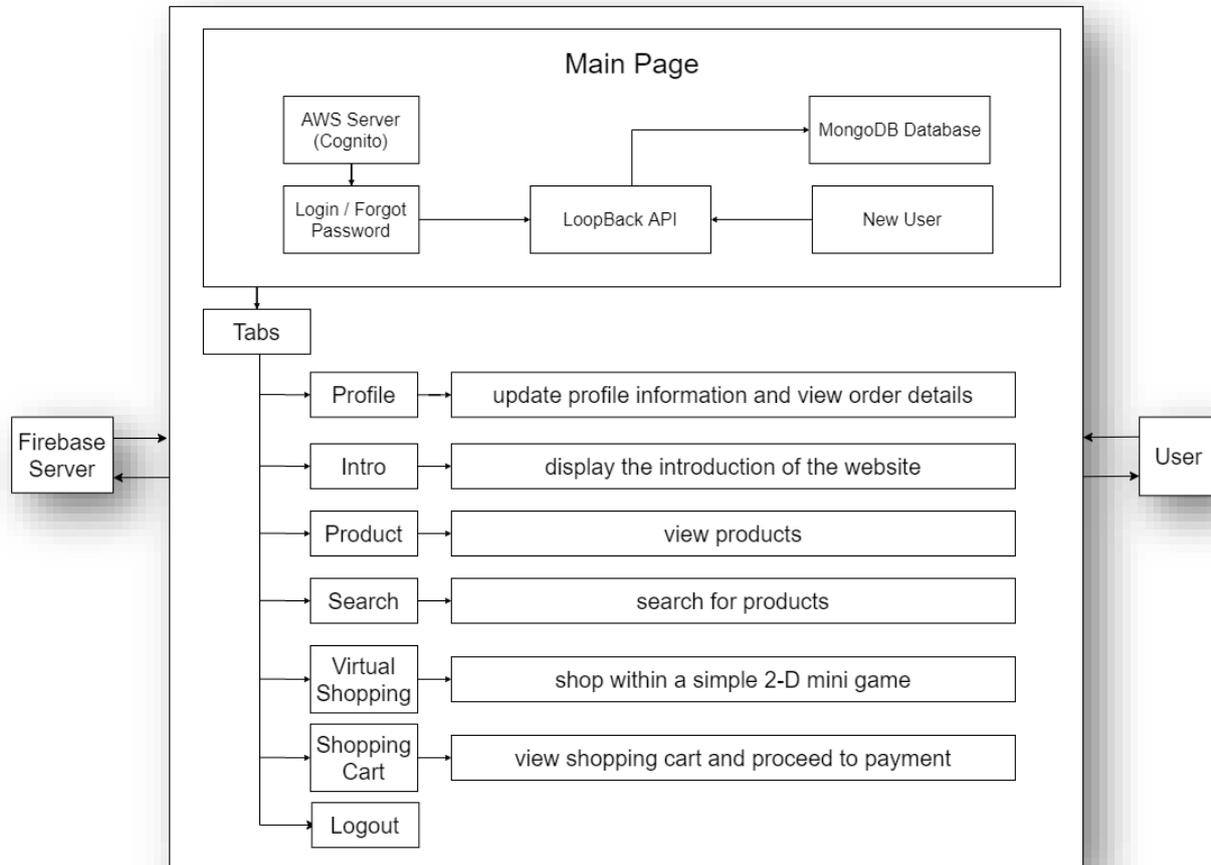


Figure 3.1.1 Block Diagram

The figure above showed the design of the block diagram for this project. It was developed with multiple compulsory components for an E-Commerce website such as login/logout, search and view products, shopping cart and payments. However, some of the features can only be accessed if the user was logged in. For example, users were not allowed to view shopping cart if he or she did not own an account and log into it. This project used several online servers that provide developing services such as Amazon Web Services (AWS) and MongoDB (Database). To link the website to the MongoDB server, Loopback was implemented as it acted as an API middleware. Lastly, the website was hosted on Google Firebase for users to surf using the Internet.

3.1.2 System Flow Charts

3.1.3 Sign Up Flow Chart

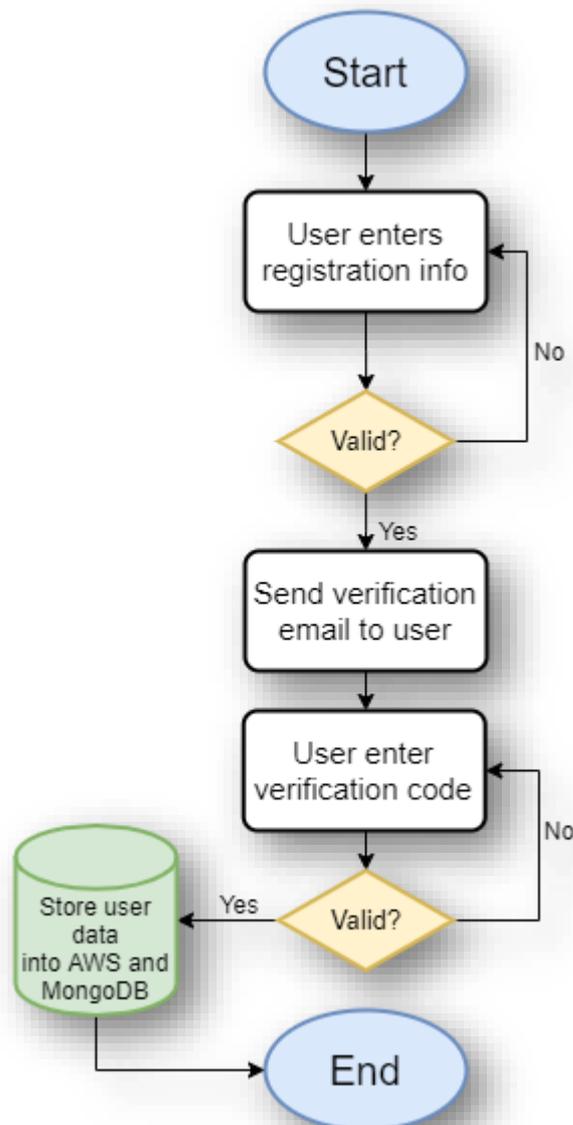


Figure 3.1.3 Sign Up Flow Chart

The picture above depicted the flow of a user signing up. The user was required to enter basic registration info such as username, password, email, phone number and gender. If the registration info did not meet the requirement then the user would be prompted to enter again. After that, verification code would also be verified before completing registration. Lastly, user data would be stored into the AWS Cognito service and MongoDB online database.

3.1.4 Login Flow Chart

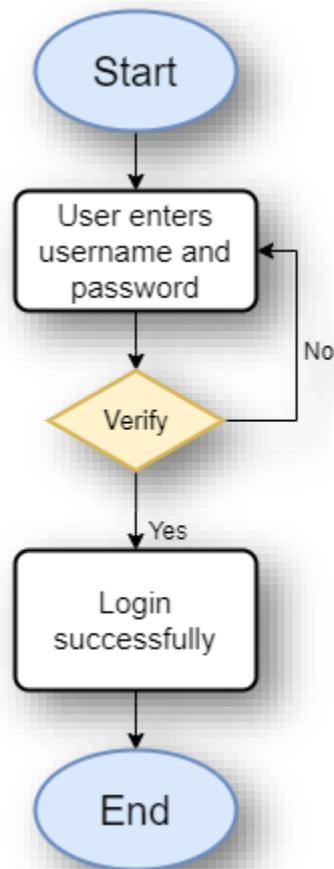


Figure 3.1.4 Login Flow Chart

The figure above showed the flow of a user logging in. It was a simple login flow that followed the general step. User could only log in with username and password but not email. Methods were called to verify the user's input and display whether or not he or she login successfully.

3.1.5 Reset Password Flow Chart

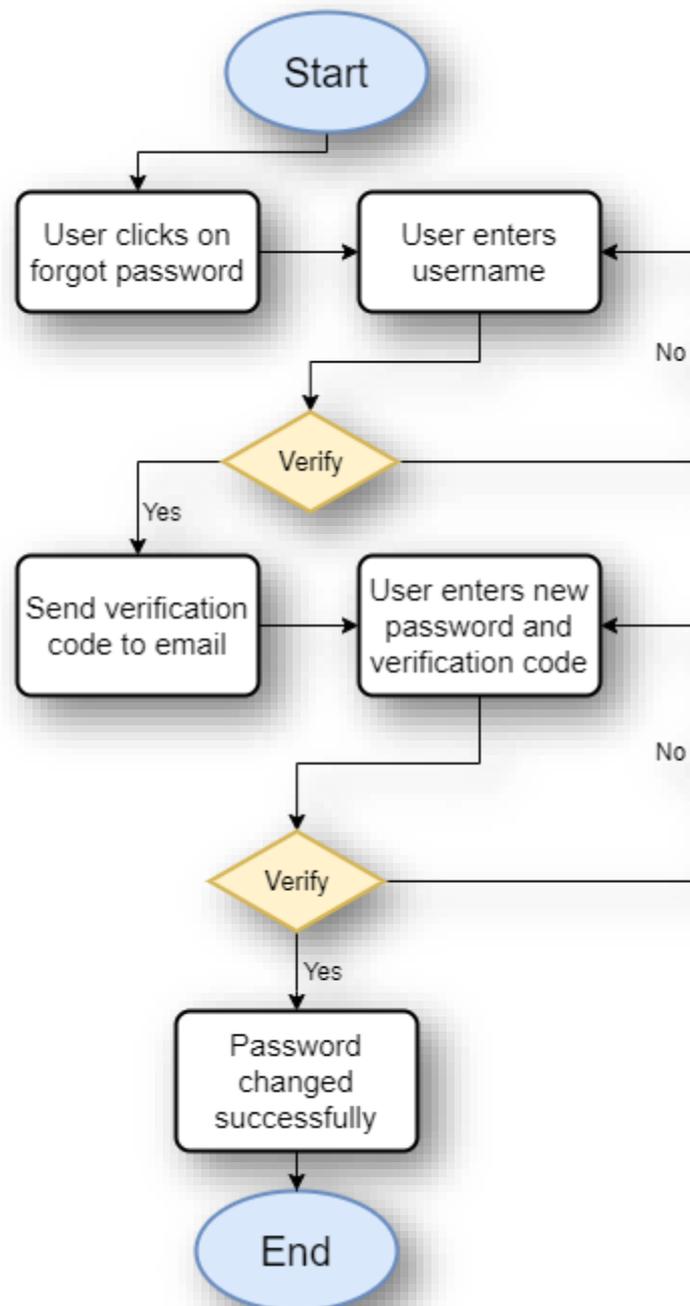


Figure 3.1.5 Reset Password Flow Chart

The picture above showed the steps of resetting the password of a user. The user was required to enter his or her username so that a function would be called to check if the username was existed or not. If existed, a verification code would be sent to the email linked to the account and the user could reset a new password successfully.

3.1.6 Edit Profile Flow Chart

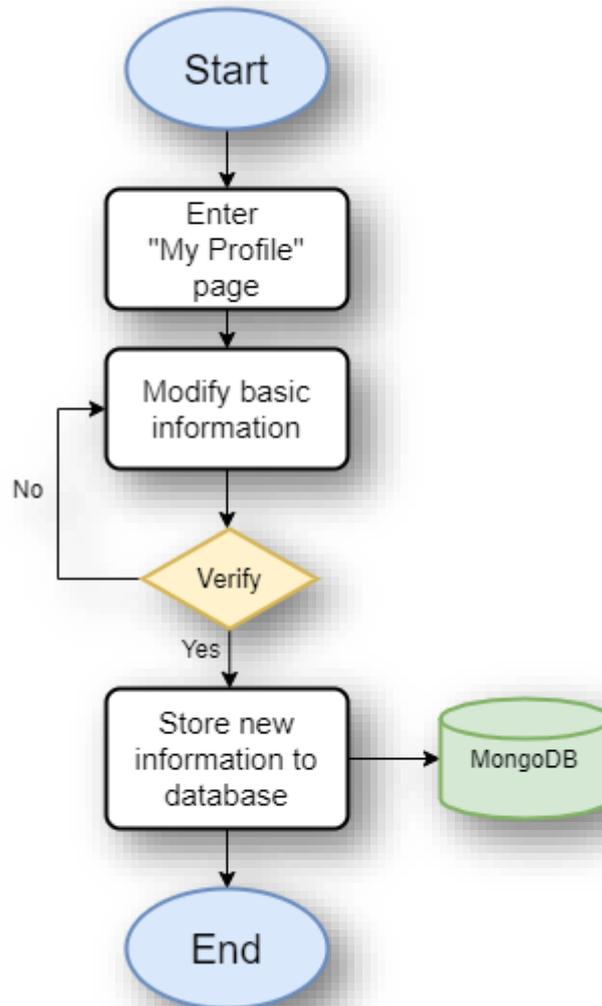


Figure 3.1.6 Edit Profile Flow Chart

The figure above showed the steps of editing the profile information of a user. After the user clicked into the “My Profile” page, he or she could modify some basic information such as profile picture and display name of his or her account. After verification, newly modified data would be stored in the online database.

3.1.7 Search Product Flow Chart

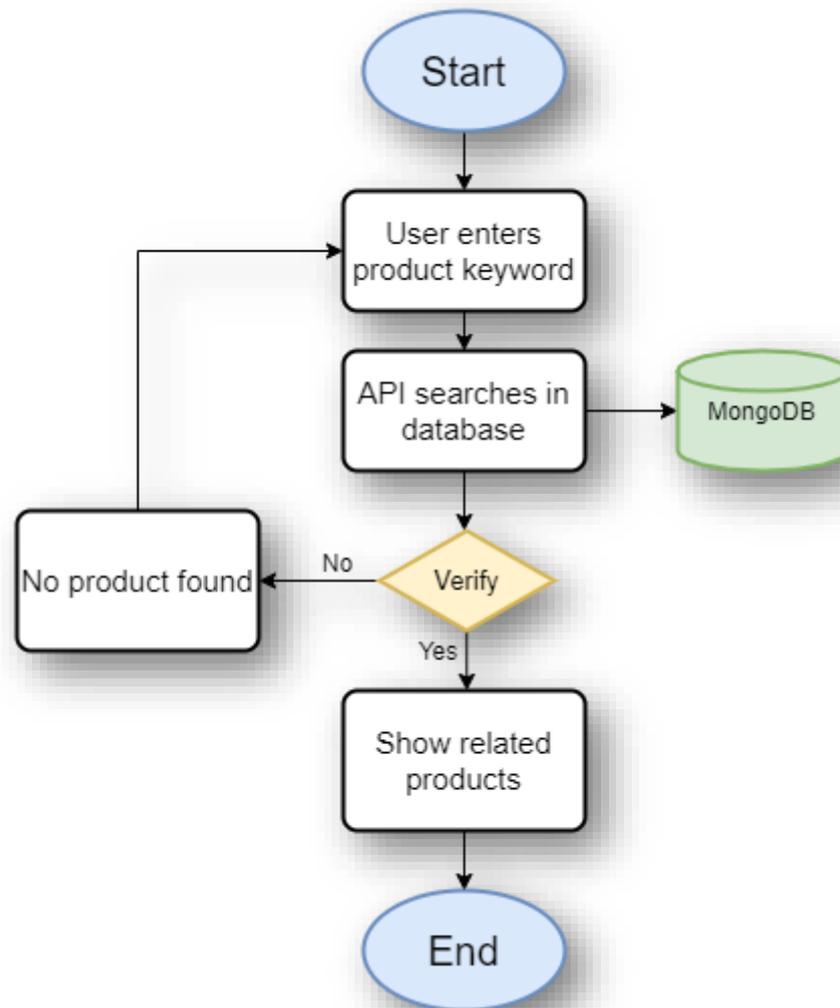


Figure 3.1.7 Search Product Flow Chart

The picture above depicted the flow of searching for a product on this website. When the user enters a searching term in the search bar provided, an API method would be called to perform searching in the online database for matching product names. If found, similar products would be shown on the screen. Else, there would be no result.

3.1.8 Add Product to Cart and Checkout Flow Chart

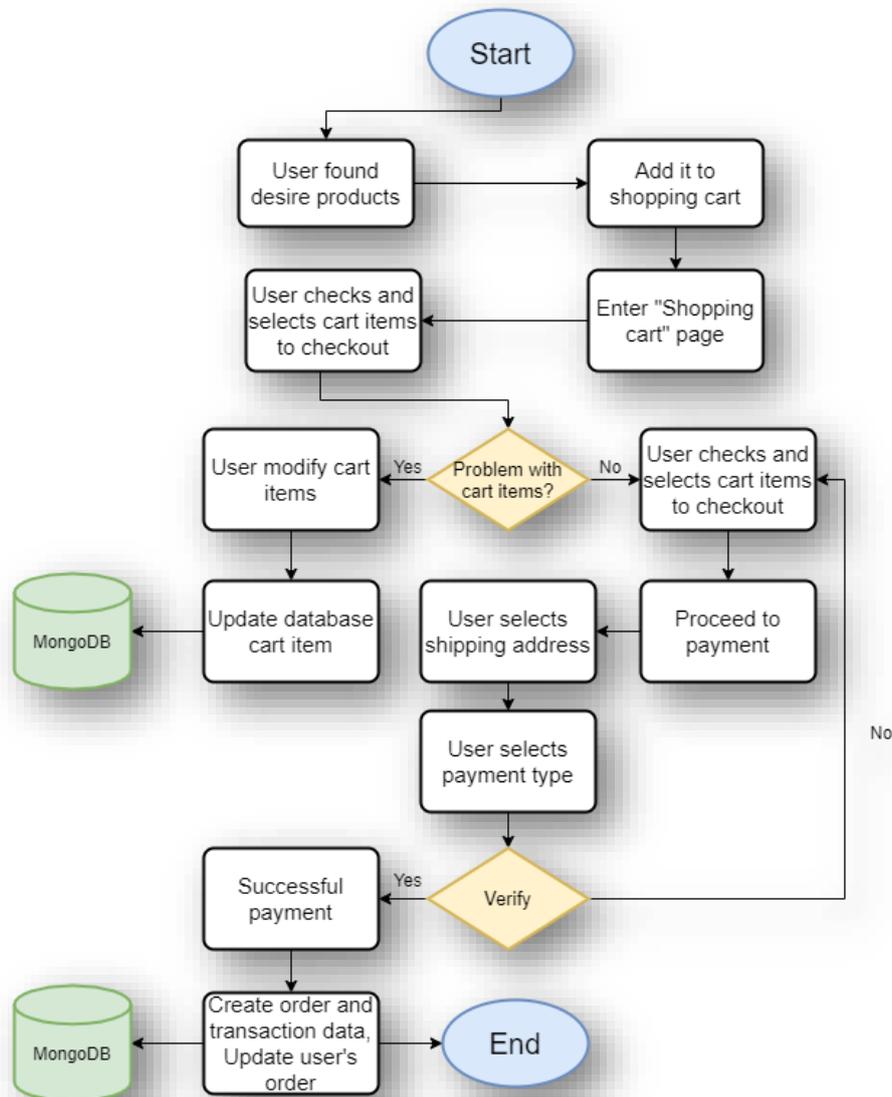


Figure 3.1.8 Add Product to Cart and Checkout Flow Chart

The figure above showed the flow of a user adding products into their shopping cart and proceeding to checkout. Firstly, users found desire products and add them to the shopping cart. The user was allowed to select or deselect items in the cart before checking out. If the user modified the amount in the shopping cart, data in the online database would be updated on the spot. If the user clicked checkout with selected items, it would proceed to select the shipping address. Next step, the user would be required to select payment type but for now the website only offers the “PayPal” payment type. After payment verification successful, order and transaction data would be created in the database and the user’s data would be updated too.

3.1.9 2-D Game Flow Chart

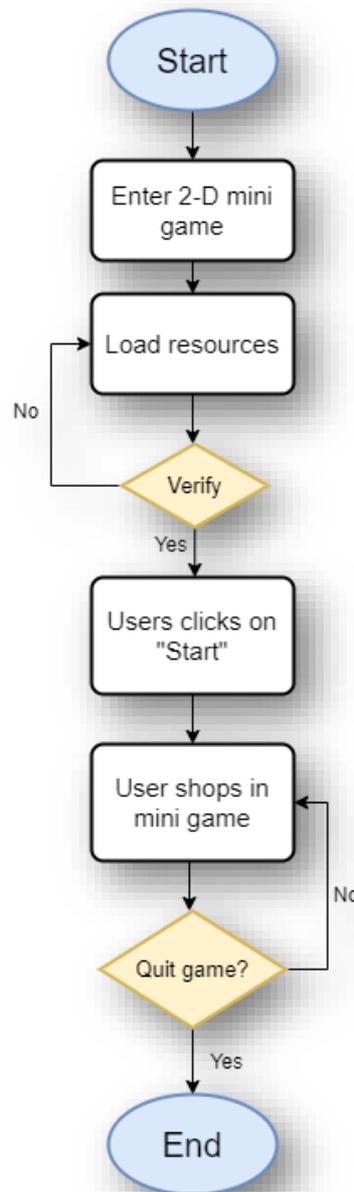


Figure 3.1.9 2-D Game Flow Chart

In this project, a simple 2-D mini-game was developed and the picture above showed the flow of the game. First, the user clicked on the “Shop Virtually” tab and the website would enter to the 2-D mini-game platform. After loading resources, a game menu would be shown for the user to select “play” or “quit”. If the user clicked “start”, the game interface would be loaded and the user could shop inside the game by controlling a 2-D character using keyboard keys such as ‘w’, ‘a’, ‘s’ and ‘d’.

3.1.10 Chat Box Flow Chart

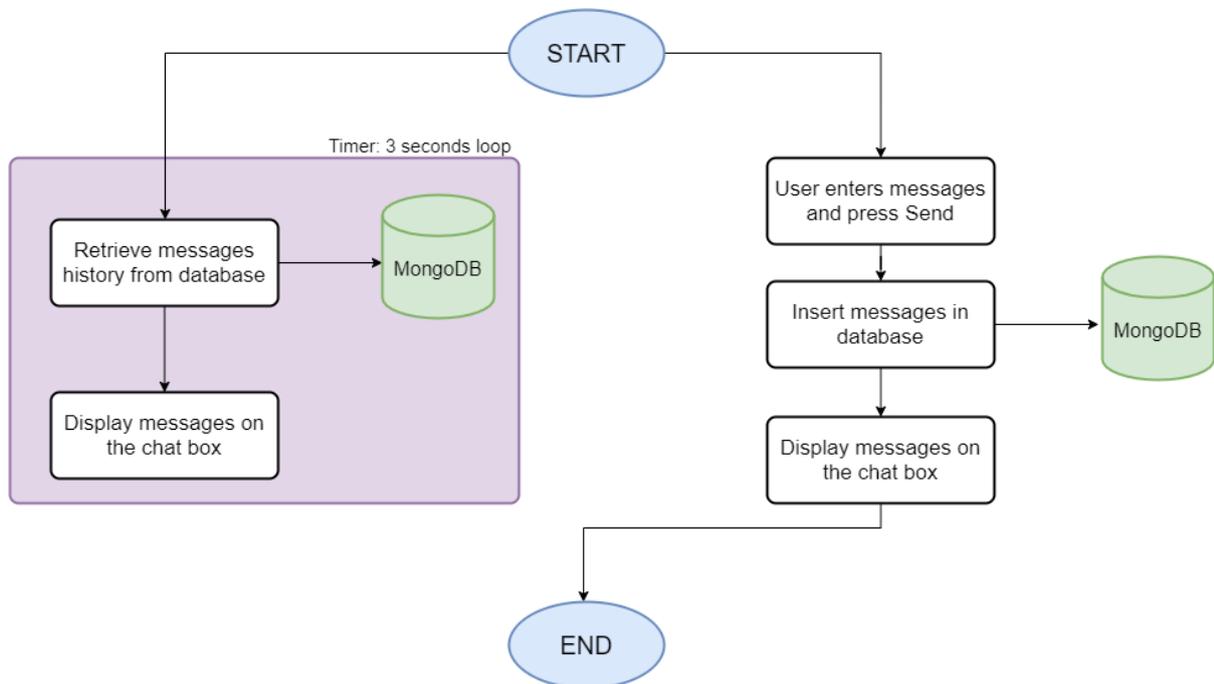


Figure 3.1.10 Chat Box Flow Chart

The figure above showed the steps of how the chatbox work in this project. Firstly, a 3 seconds loop would be initiated to retrieve old and new messages from the database when the user joined the chat. If the user entered a message and pressed send, the new message would then be recorded in the online database and display for another user to see it.

3.1.11 Project Design Flow Chart

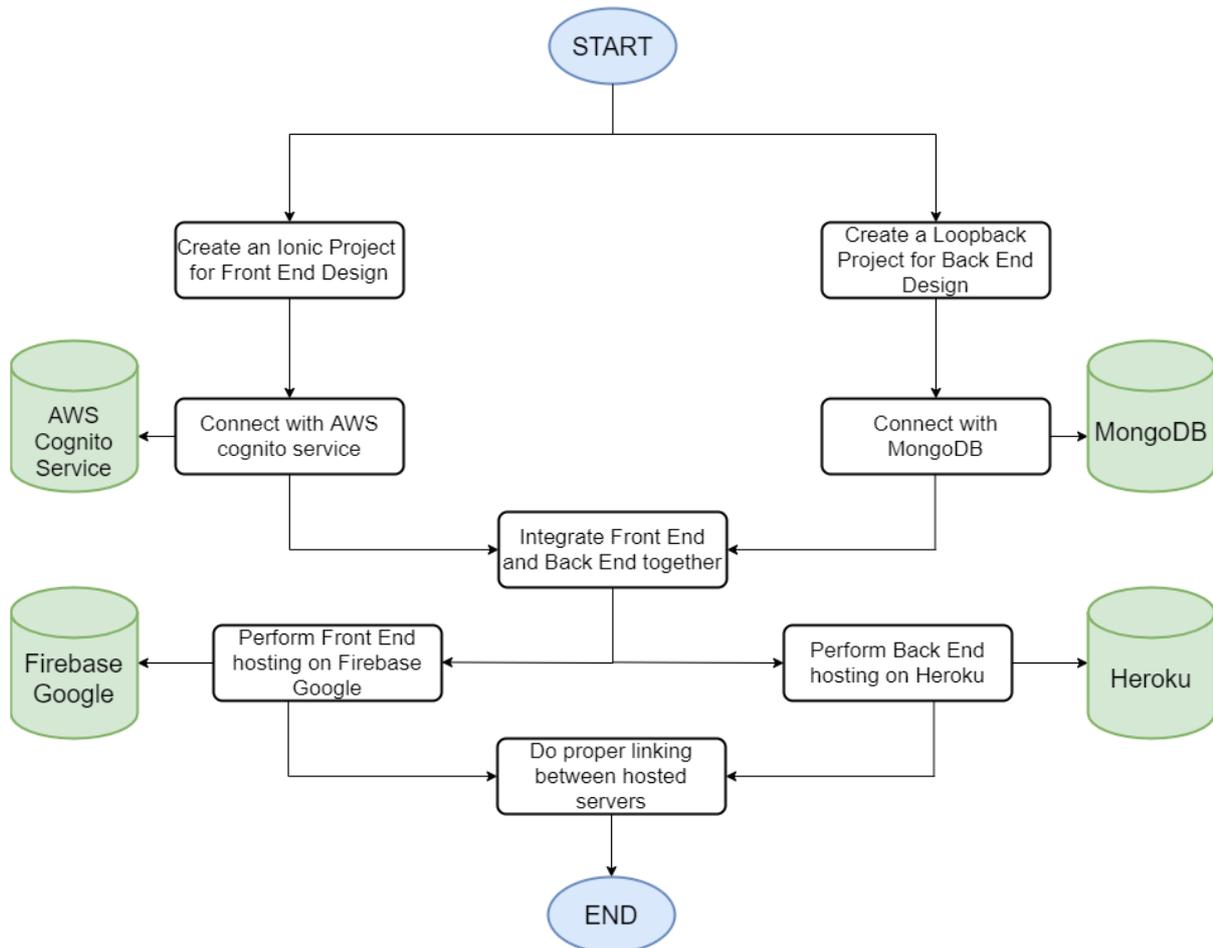


Figure 3.1.11 Project Design Flow Chart

The chart above depicted the flow of design for this website. It started with creating two application projects for front-end and back-end development respectively. To be exact, the ionic platform was used for front-end development and the loopback platform was used for back-end development. Both front-end and back-end applications were connected with different database. Front-end application was connected with Amazon Web Services (AWS) for Cognito service and back-end application was connected with MongoDB for online database service. After development, both front-end and back-end applications were hosted on different online service providers too. Front-end application was hosted on Firebase Google and the back-end application was hosted on Heroku. Lastly, the website was functional for everyone by doing proper linking between these hosted domains.

3.2 Implementation Issues and Challenges

During this project, there were quite some issues and challenges faced. In the beginning, challenge such as identifying the problem statements and objectives of this project. It was difficult to discover non-existent problems and issues regarding the project title. However, these starting difficulties were just the tip of an iceberg and there were more to come when it came to implementation.

After stepping into development and implementation phases, issues like setting up a development environment in local machine and getting proper versions of development tools such as Java SDK, Ionic Platform and Loopback versioning issues started to pop out. It was due to every major version update of these tools could make the tools oddly different from the previous version. Next, stepping into designing phases raised a lot of issues too. It was hard to finalize a design for the project. Besides, the implementation of third-party plugins in the project was a must. Hence, it was challenging to use unfamiliar plugins and it could cause weeks to understand it. These were only the issues and challenges confronted during front end development.

Not to mention the back-end development, firstly it was hard to find dummy product details dataset online to be used in this project. After that, issues such as linking the back-end to front-end was raised because it was quite difficult to make sure all the data were correct. Last but not least, hosting front-end and back-end application online could be mind-twisting. It was extremely difficult to find a free and easily set up hosting service provider online.

3.3 Timeline

It was important to have a project plan that acted as a document reference for the whole developing process so that developer would not be lost after every phase. A project plan could guide developers and help them to keep track of the progress. The project plan used for this project was the Gantt Chart.

Developing An E-Commerce Website For Enhancing Customer Sales

Student Name LEE YIK FEI

Student ID 17ACB5787

Mon, 6/15/2020

Display Week:

1

TASK	PROGRESS	START	END	DURATION (DAYS)
1.0 Requirement Analysis	0%			
Problem Statement	5%	6/15/20	6/16/20	1
Background and Motivation	10%	6/16/20	6/18/20	2
Project Objectives	13%	6/18/20	6/21/20	3
Proposed Approach / Study	17%	6/21/20	6/24/20	3
Report Organization	19%	6/24/20	6/26/20	2
2.0 Literature Review	20%			
Amazon.com	22%	6/26/20	6/28/20	2
Shopee.com	24%	6/28/20	6/30/20	2
Lazada.com	26%	6/30/20	7/2/20	2
eBay.com	28%	7/2/20	7/4/20	2
Taobao.com	30%	7/4/20	7/6/20	2
Mrdiy.com	32%	7/6/20	7/8/20	2
Zalora.com.my	34%	7/8/20	7/10/20	2
Summary	38%	7/10/20	7/12/20	2
3.0 System Design	38%			
System Design/Overview	45%	7/12/20	7/26/20	14
4.0 Methodology	45%			
Methodology and Tools	52%	7/26/20	7/28/20	2
Tools and Technologies Used	55%	7/28/20	7/30/20	2
Specifications: Analysis, Design and Verification Plan	60%	7/30/20	8/6/20	7
Implementation and Testing	75%	8/6/20	8/20/20	14
Result	85%	8/20/20	8/30/20	10
Summary	90%	8/30/20	9/2/20	3
5.0 Conclusion	90%			
Conclusion	100%	9/2/20	9/5/20	3
Novelties and Contribution	100%	9/5/20	9/8/20	3
Future Plan	100%	9/8/20	9/10/20	2

Figure 3.3 Gantt Chart

Chapter 4: Methodology

4.1 Methodology and Tools

4.1.1 Methodology

In this project, Feature Driven Development (FDD) was chosen as the methodology to develop the E-Commerce website to enhance sales. It was a methodology that aligned with Agile Development methodology. Unlike other methodologies such as SDLC and waterfall, FDD focused on short iterative processes and each iterative delivers a certain part of the system's functionality. By using FDD, it also focused on the features the client values and expects. FDD was divided into 5 steps as shown in Figure 4.1.1.

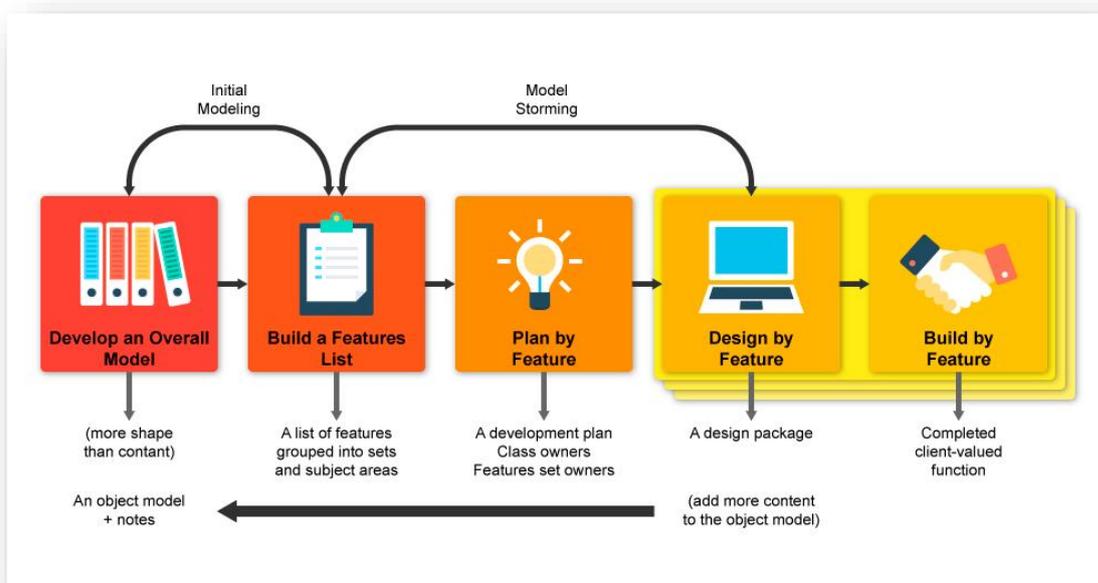


Figure 4.1.1 Steps of Feature Driven Development

4.1.2 Phases in Feature Driven Development

Phase 1 – Develop an Overall Model

In phase one of Feature Driven Development (FDD), target users were analyzed to determine the content, context and structure of the system. In this case, google form was used to design a simple survey. The target users were mostly youngsters because they had more experience in using online shopping platforms. As a result, all the related documents will be combined as the domain model.

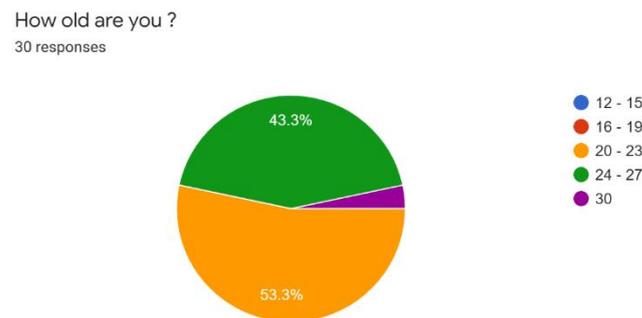


Figure 4.1.2 Pie Chart on Age of Target Users

According to the response chart above, 30 totals of responses were gathered using google form. As mentioned just now, most of the target users were youngster and they were between 20 to 30 years old.

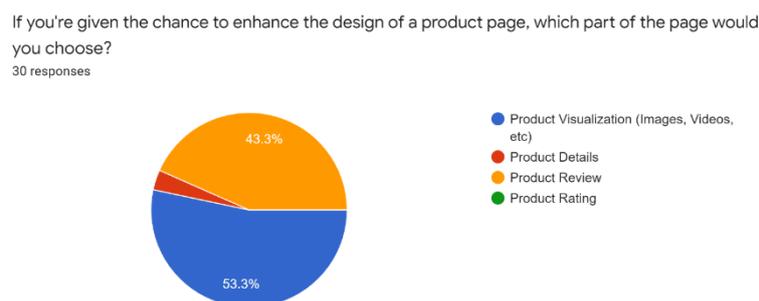


Figure 4.1.3 Pie Chart on Options to Enhance the Design of Product Page

The figure above showed that more than half of the users chose to enhance product visualization (images, videos, etc) part of a product page. Product review was the part that came after product visualization. Hence, this resulted in one of the objectives of this project, which was to provide users a better understanding and visualization of products.

Which do you prefer for customer service ?
30 responses

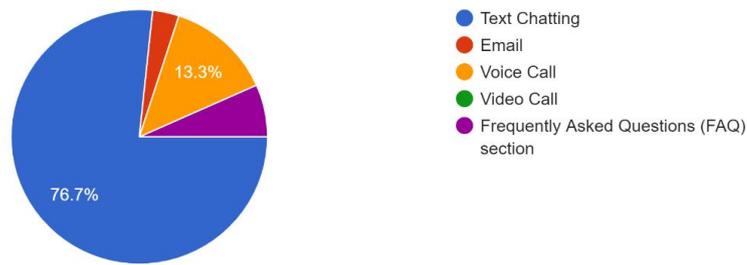


Figure 4.1.4 Pie Chart on Preferable Ways of Customer Service

The pie chart above depicted the preferable ways of customer service on an E-Commerce website. It was obvious that users prefer text chatting more than other options. 76.7% of responses were on text chatting and followed by 13.3% on voice calls. This analysis resulted in one of the objectives of this project which was to provide more resources to solve users' questions and confusion.

Which platform do you prefer to shop online ?
30 responses

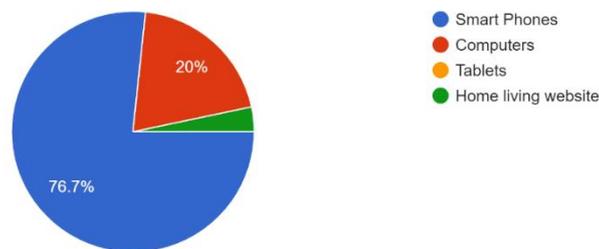


Figure 4.1.5 Pie Chart on Preferable Platforms to Shop Online

The pie chart above showed the preferable platforms to shop online by target users. It showed that most of them would prefer to shop online on Smart Phones as 76.7% of the responses shown in the chart. Computers came second in the chart with 20% of responses. Hence, this resulted in one of the objectives of this project which was to enhance user experience (UX) when users are using mobile devices.

What do you think of implementing 2-D game for online shopping? (e.g. control a character to walk in a virtual market) For example, 2-D games like Pokemon or Maple Story if you've played before.
30 responses

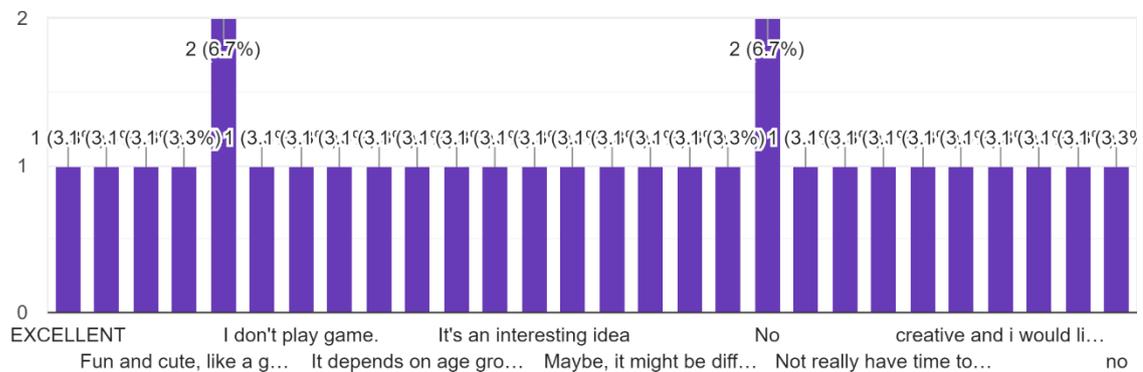


Figure 4.1.6 Bar Chart on Users’ Opinion on Implementation of Gamification

The chart above showed the responses of users’ opinions on the implementation of gamification during online shopping. Here were some of the responses,

- Good
- For us youngster may be a good idea but for those elderly people who never play games before might be confuse for them
- It would be great it is real, I mean it
- Good Idea
- Never
- Interesting works to have fun
- It could be a fun and interesting way of online shopping. However, it depends on the design and overall performance of that online shopping platform and how it can attract the visitors.

These responses indicated that the results of implementing gamification could go both ways as not every user was interested in playing games. However, this analysis resulted in the last objectives of this project which was to implement gamification to get more users’ attention and interests.

Phase 2 – Build a Feature List

After phase 1 of analysing target users to determine the content, context and structure of the system, a feature list was built to get more insight into how this project was going to be designed according to the selected features.

Features	Details
Login	Users should be able to login to his or her account.
Logout	Users should be able to logout from his or her account.
Sign Up	Users should be able to register an account.
Forgot Password	Users should be able to reset the password of his or her account.
Profile Page	User should have his or her profile page. Users should be able to view and update account details. Users should be able to view and update shipping addresses. Users should be able to view order details.
Product	Users should be able to search for products with input. Users should be able to view products.
Shopping Cart	Users should be able to add a product to his or her shopping cart. User should be able to update his or her shopping cart.
Payment	Users should be able to perform check out.
Chat Box	User should be able to chat
2-D Game	Users should have access to a 2-D Game. Users should be able to use the interface of the 2-D Game.

Table 4.1.1 Feature List Table

Phase 3 – Plan by Feature

During this phase, features to be implemented as planned in a proper order to ensure a progressive project. In this project, the order of features to be implemented was followed accordingly to the feature list built. All the UI designs were planned by drawing a simple concept design. The plan started with login, logout, sign up and forgot password. It was to make sure that users could have their account.



Figure 4.1.7 Design of Login /Sign Up button

Next, a profile page was planned to be created so users could view and update their account details.

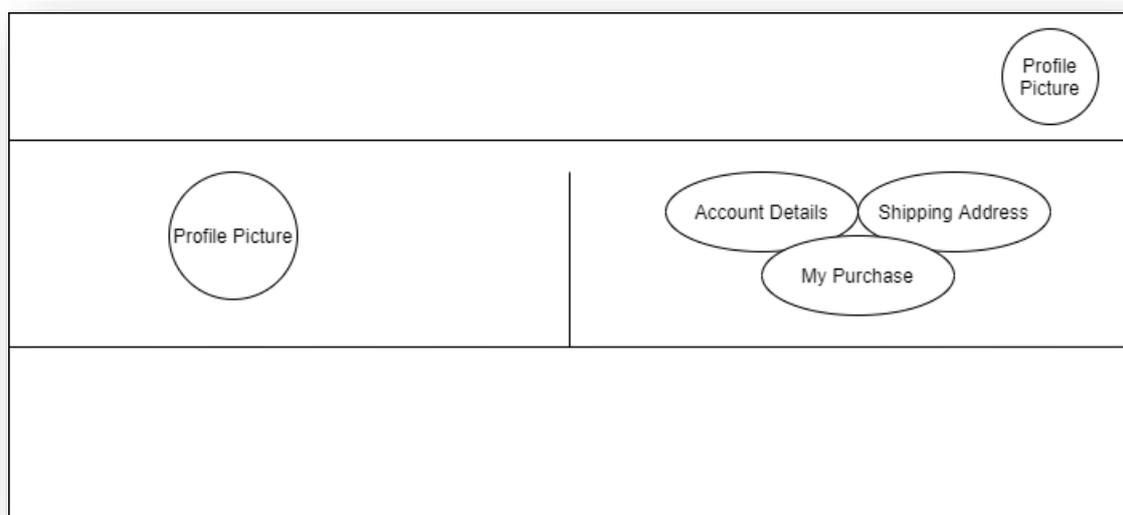


Figure 4.1.8 Design of Profile Page

The product page named 'Discover' was the next plan to be created after this to let the user view the products.

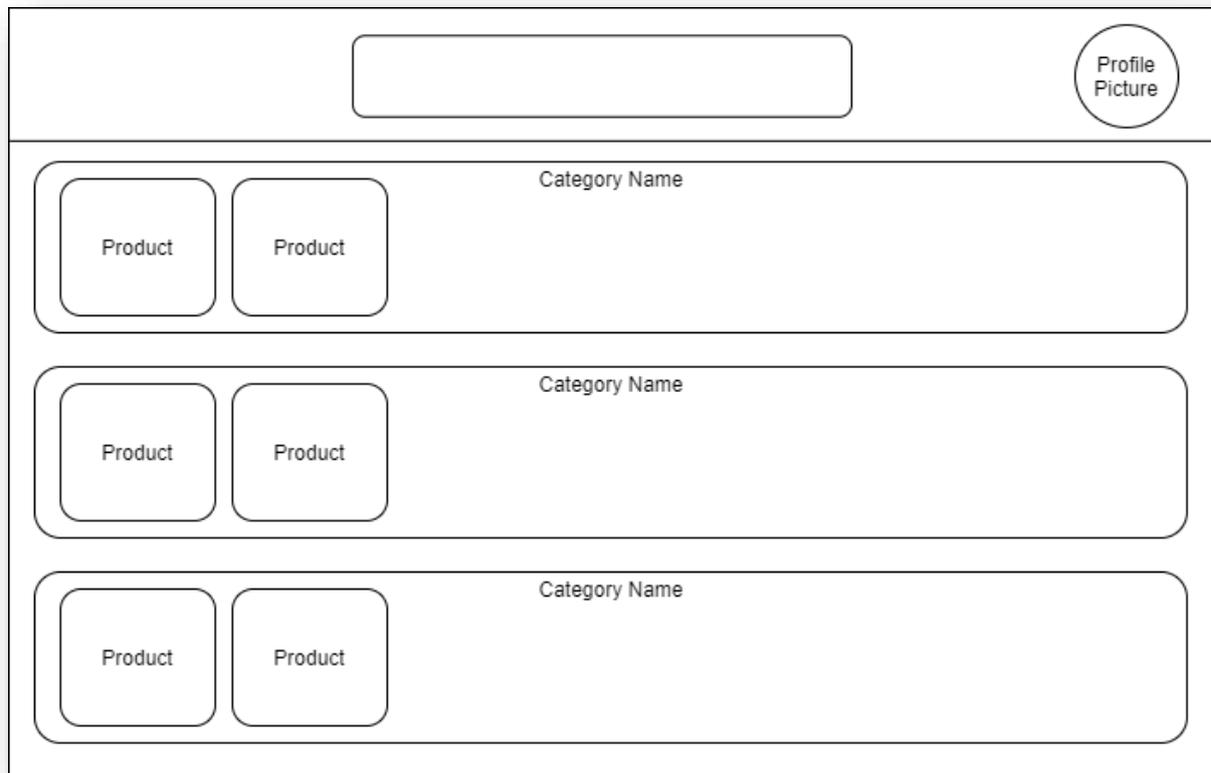


Figure 4.1.9 Design of Product Listing Page (Discover)

Most importantly, the shopping cart was next so that they could add items to the cart after viewing products.

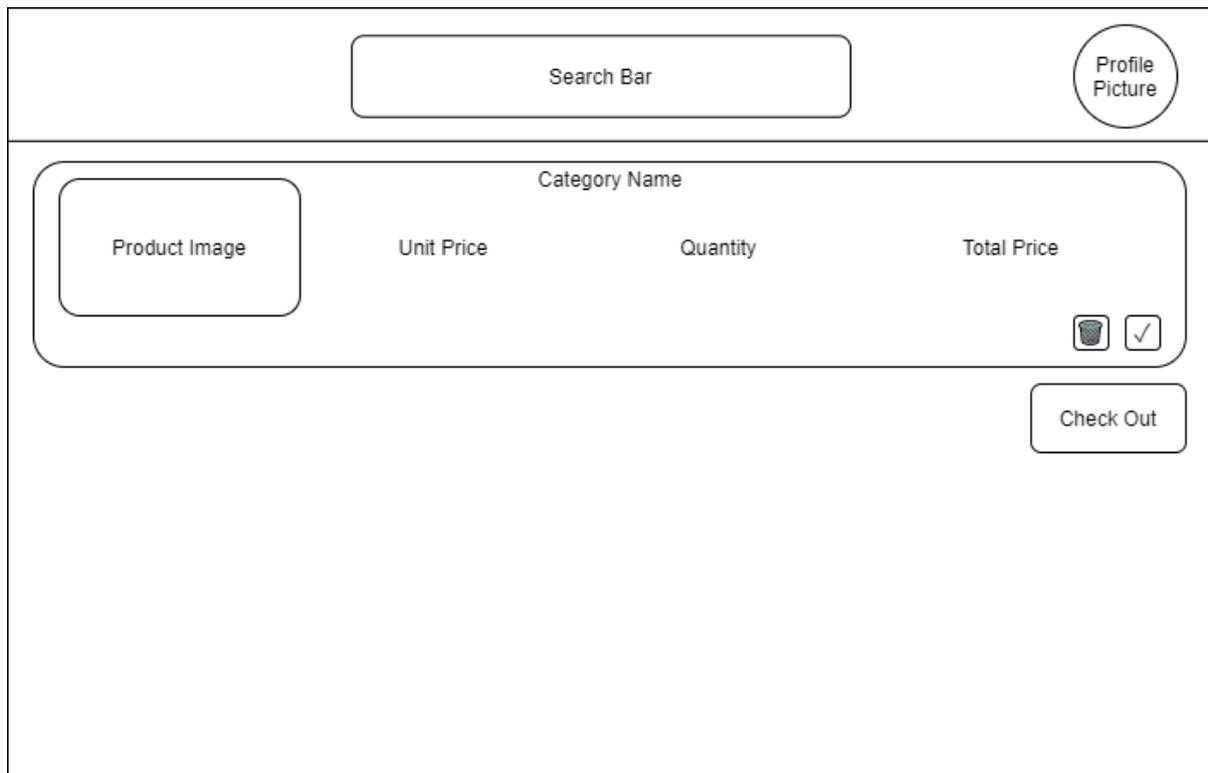


Figure 4.1.10 Design of Shopping Cart Page

Chat Box and 2-D Game was planned to be implemented last.

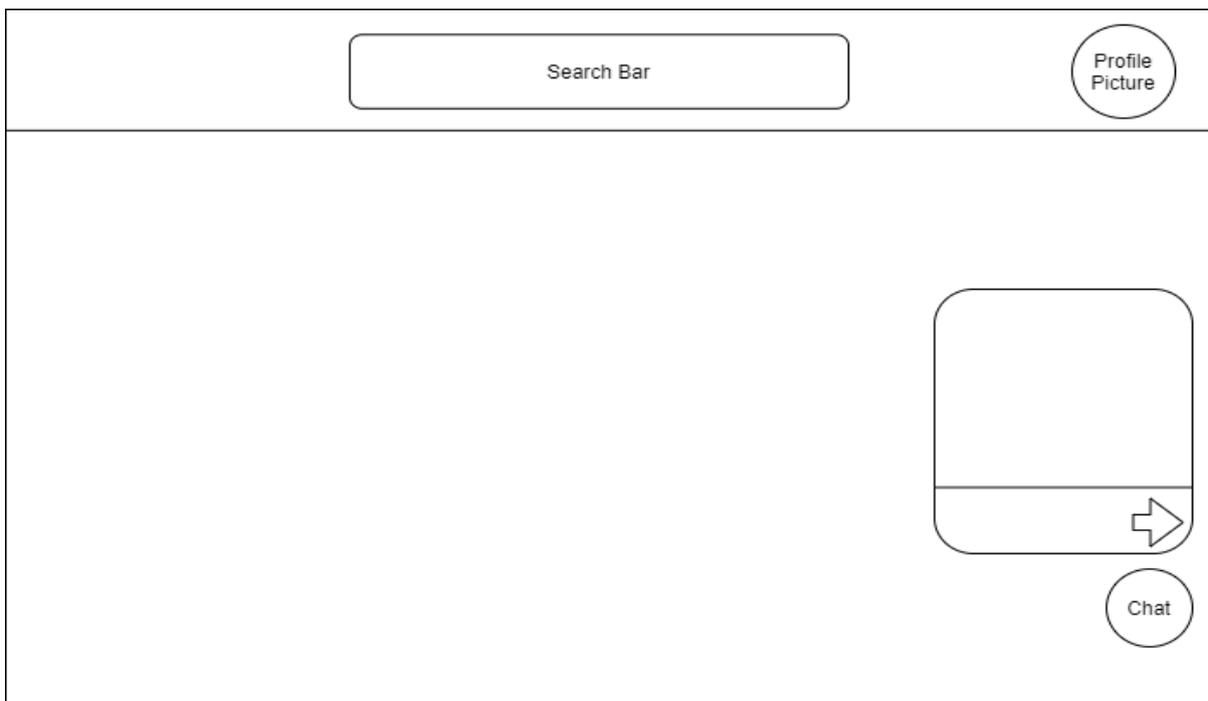


Figure 4.1.11 Design of Chat Box

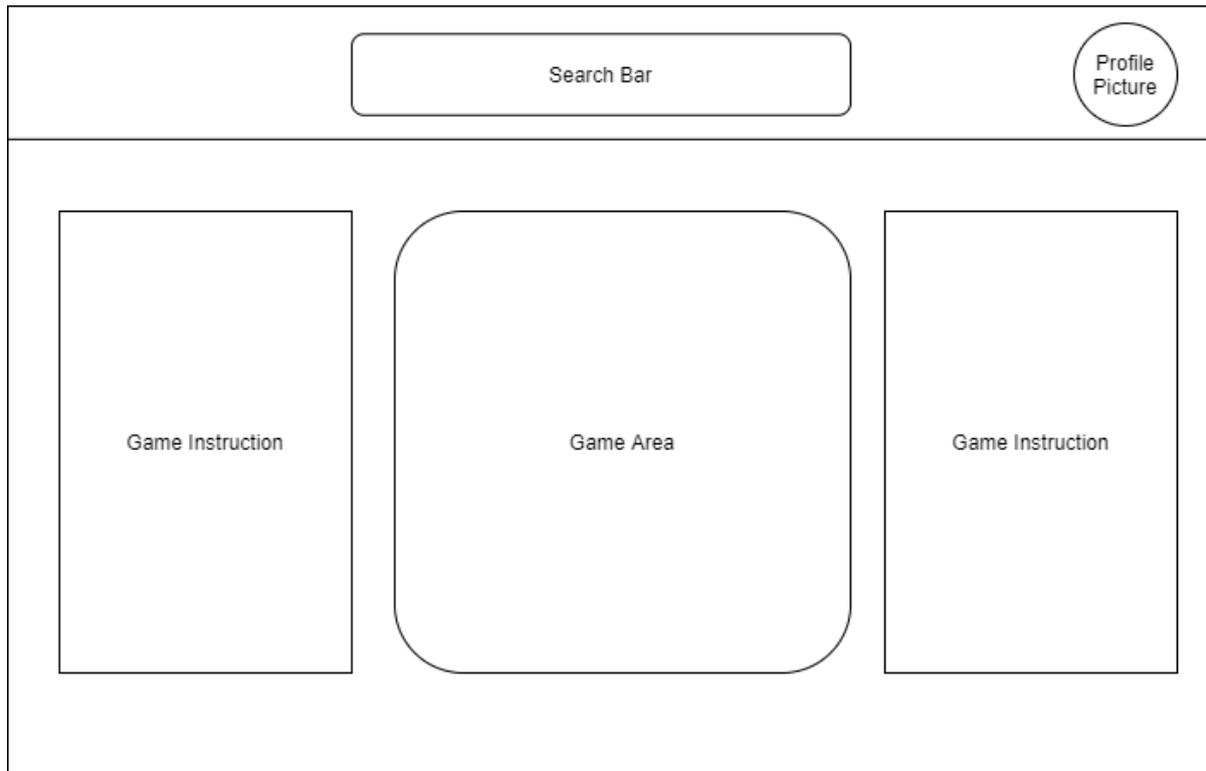


Figure 4.1.12 Design of 2-D Game

Phase 4 – Design by Feature

After the plan had finalized during the previous phase, deeper insights of each feature had been done here. Requirements of each feature were being discovered and enhanced during this phase. For example, to-do and not-to-do of each feature was thought thoroughly so that the feature could function as intended. To illustrate the logic for each feature, flow diagrams were drawn during the thought process. All the flow diagrams were shown earlier in Chapter 3 System Design / Overview.

Phase 5 – Build by Feature

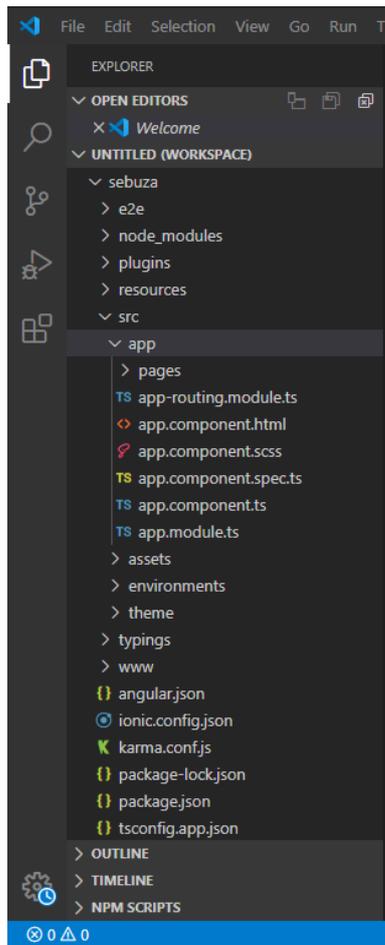


Figure 4.1.13 Newly Created Project

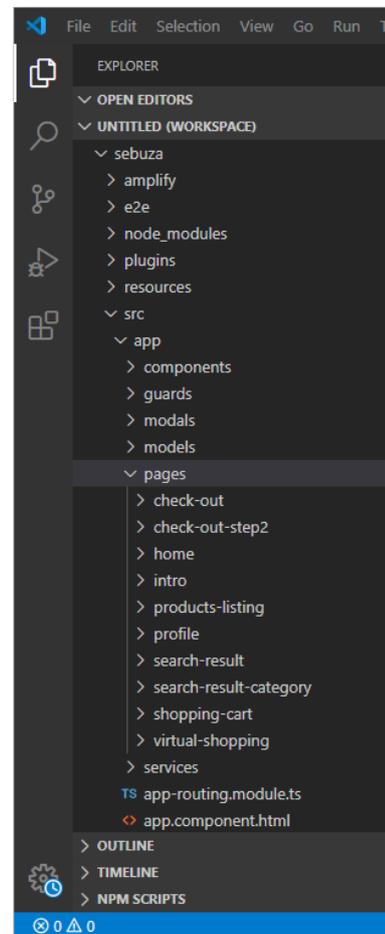


Figure 4.1.14 After Designing Features

During this phase, the code designing phase had started. Each feature was gradually designed and implemented. It started with a new and default project as shown in Figure 4.1.13. The design and implementation of code were iterated for each feature and lastly the codes became more and more as shown in Figure 4.1.14.

After related features had been done, testing phases were done. The testing phases were done through observation, so it was not recorded. Some target users were asked to test the features before moving on to design the next one. Whenever bugs were found during testing, a fix would be done as soon as possible to prevent any future defects.

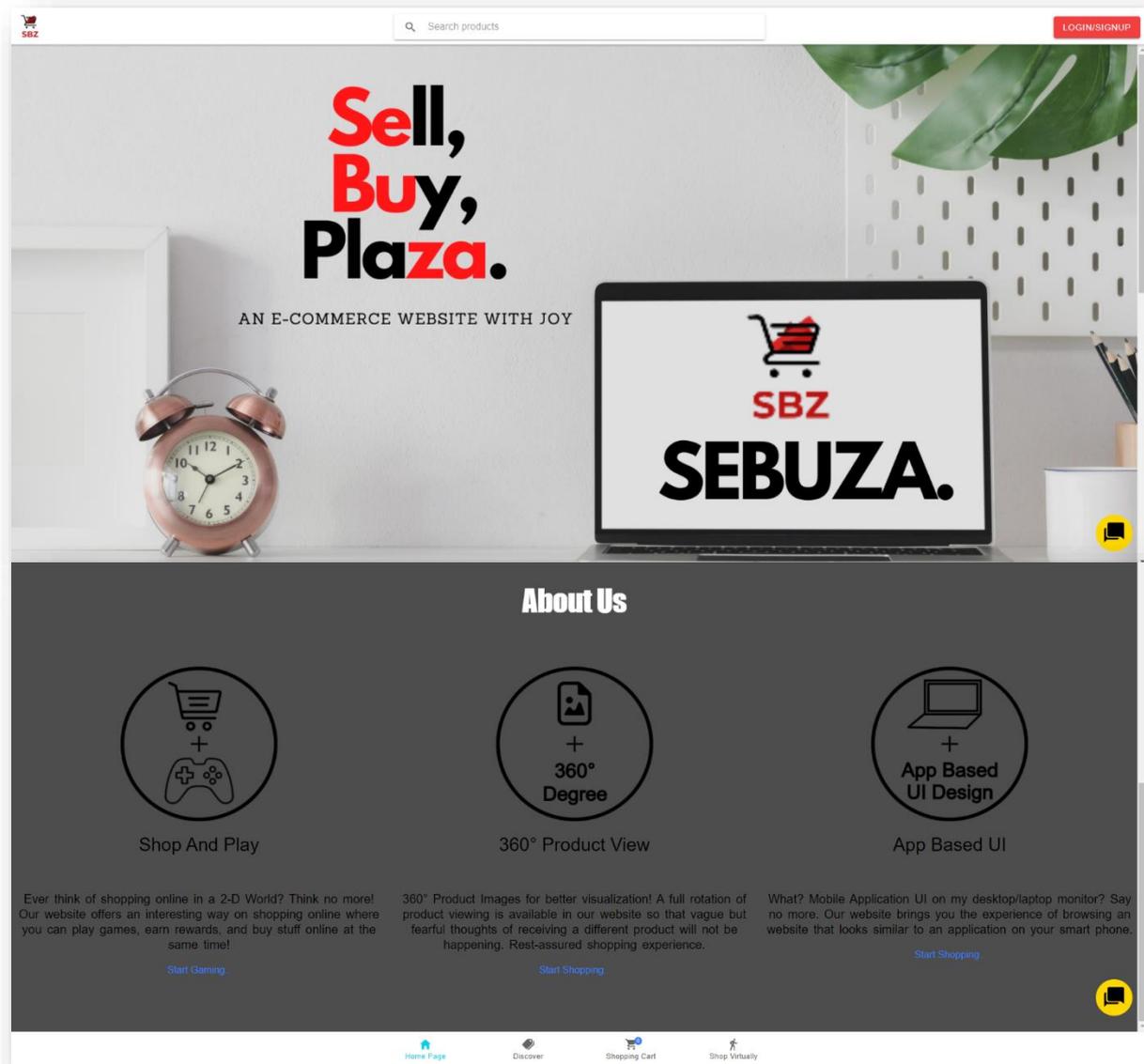


Figure 4.1.15 Main Page

The figure above showed the main page of this project. It was an introduction page to the website whereby it consisted of few brief explanations to tell users about this website. The top and bottom toolbars were in a fixed position and only the centre part allowed to scroll. The top toolbar consisted of a clickable website logo that will link to the Home Page, a search bar that allowed users to search for desire products and a login/sign up button. On the other hand, the bottom toolbar was mainly for navigation purposes. It consisted of 4 tabs, Home Page, Discover, Shopping Cart, and Shop Virtually.

Besides, most of the compulsory components of an E-Commerce website such as search bar, shopping cart, product page, profile page, shipping addresses, etc were included. These were all the results obtained according to the proposed method.

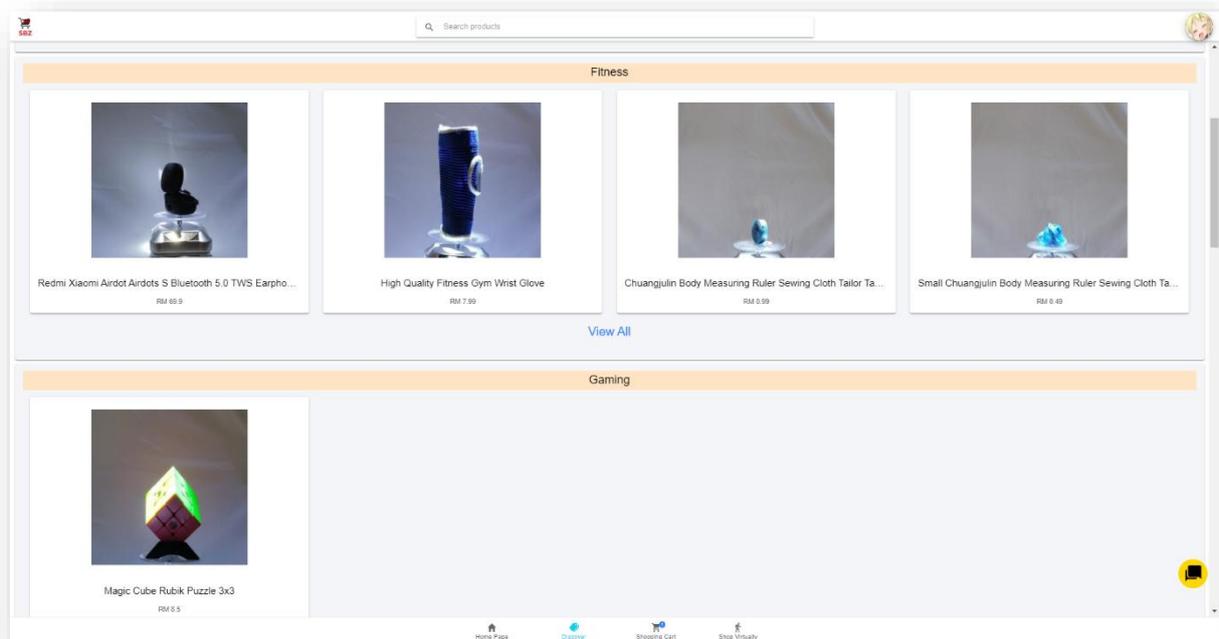


Figure 4.1.16 Product Listing Page

The figure above showed the product listing page of this website. The products were listed based on their categories which in this case had 8 different categories. There was a 'view all' link below every category to show all the products in another page. All the product images are 360° images whereby users could spin it using their cursors.

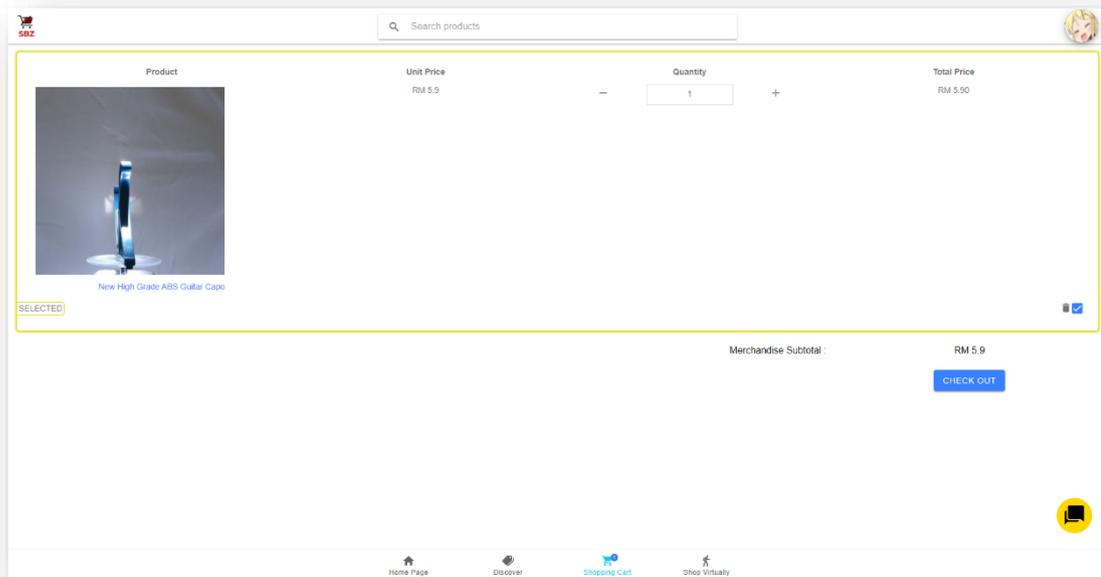


Figure 4.1.17 Shopping Cart Page

The figure above showed the shopping cart page of this website. After users had any wanted items, they could press the ‘Add to Cart’ button and it would be stored into the database. This Shopping Cart Page would then retrieve and display what they had added in the cart before.

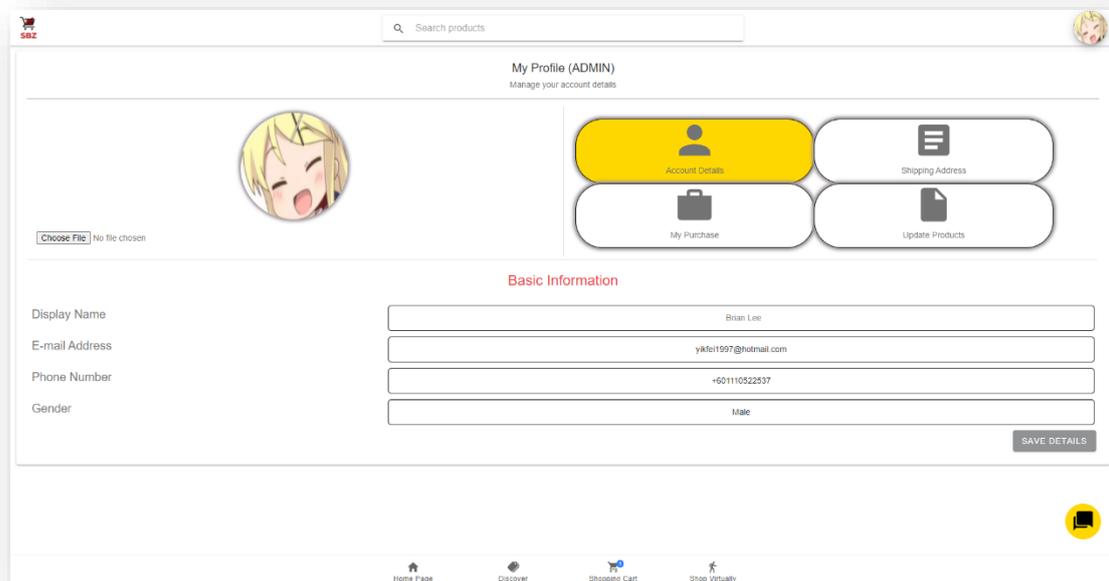


Figure 4.1.18 Profile Page (Part 1)

The first part of the profile page allowed users to update their profile picture and display name. The display name would be used to display on this website such as chatting name in the chatbox.

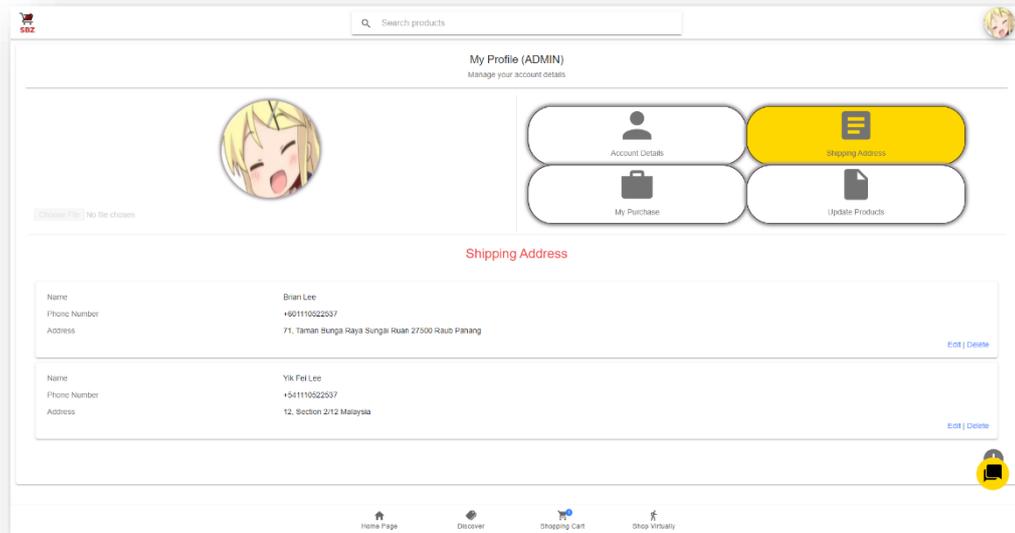


Figure 4.1.19 Profile Page (Part 2)

The second part of the profile page allowed users to add, delete or edit their shipping addresses. Users could add multiple addresses depends on their demand. These addresses would further be shown and selected by users during the checkout process.

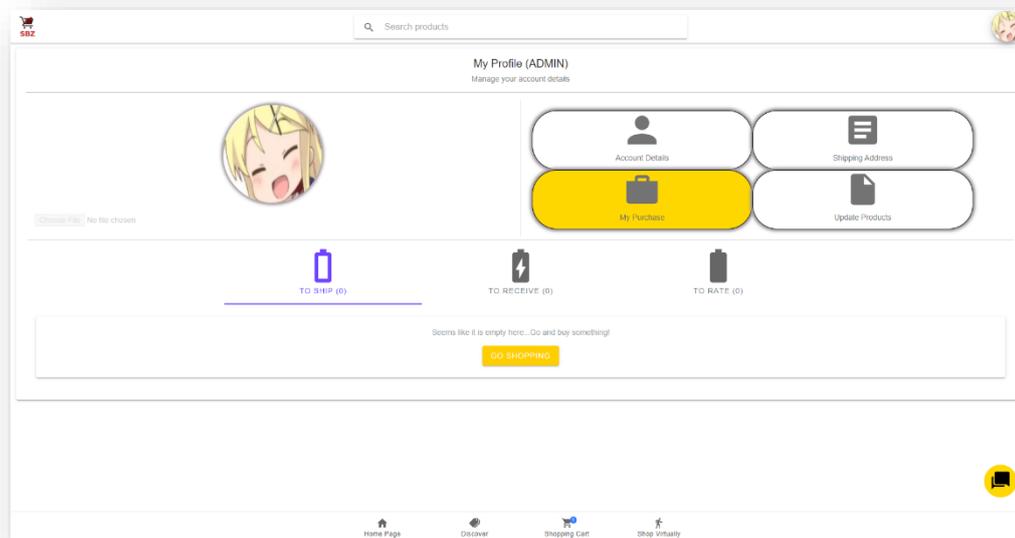


Figure 4.1.20 Profile Page (Part 3)

The figure above showed the order details of users in their profile page. It was a feature to allow users to check on the status of their orders. After users had successfully made the payment for any cart items, it will be stored in the database and then retrieved and displayed on this page. Users' purchases were divided into 3 categories (to ship, to receive, to rate).

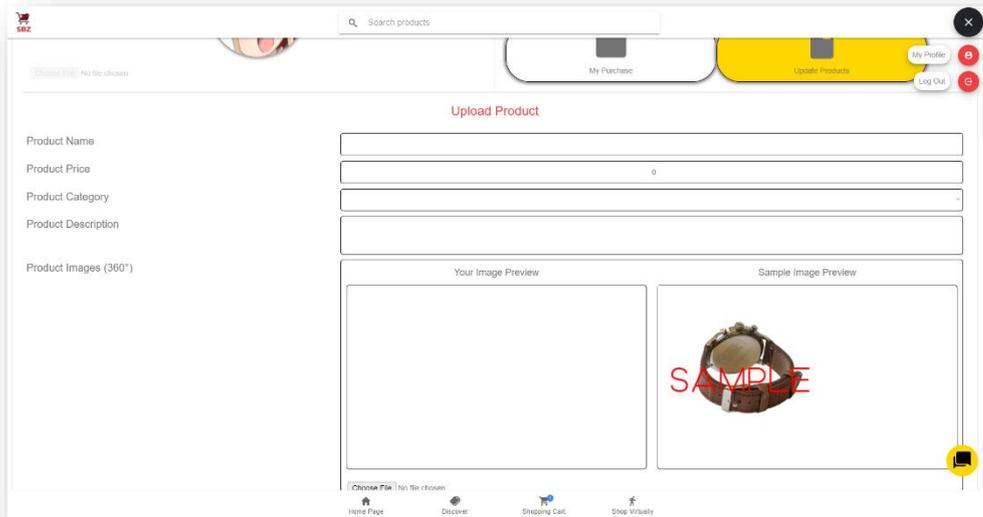


Figure 4.1.21 Profile Page (Part 4)

The last part of the profile page would be only visible if an admin account had been logged in. This part of the profile page allowed admin to upload new products to the website. The required attributes were product name, product price, product category, product description and product image (360°).

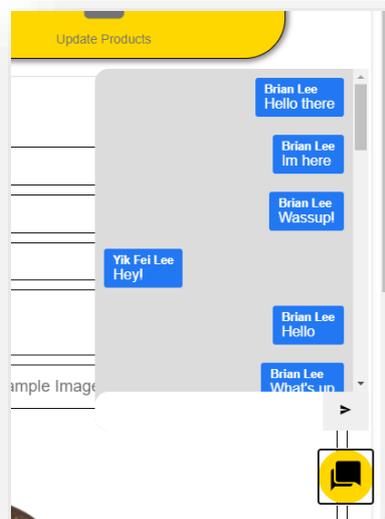


Figure 4.1.22 Chat Box

The figure above depicted floating chat box where any users could join the chat box to have a discussion with the customer service of the website about any issues. After users clicking into the chat button, a simple chat box will be shown, would be rendered and any history messages would be retrieved and displayed.

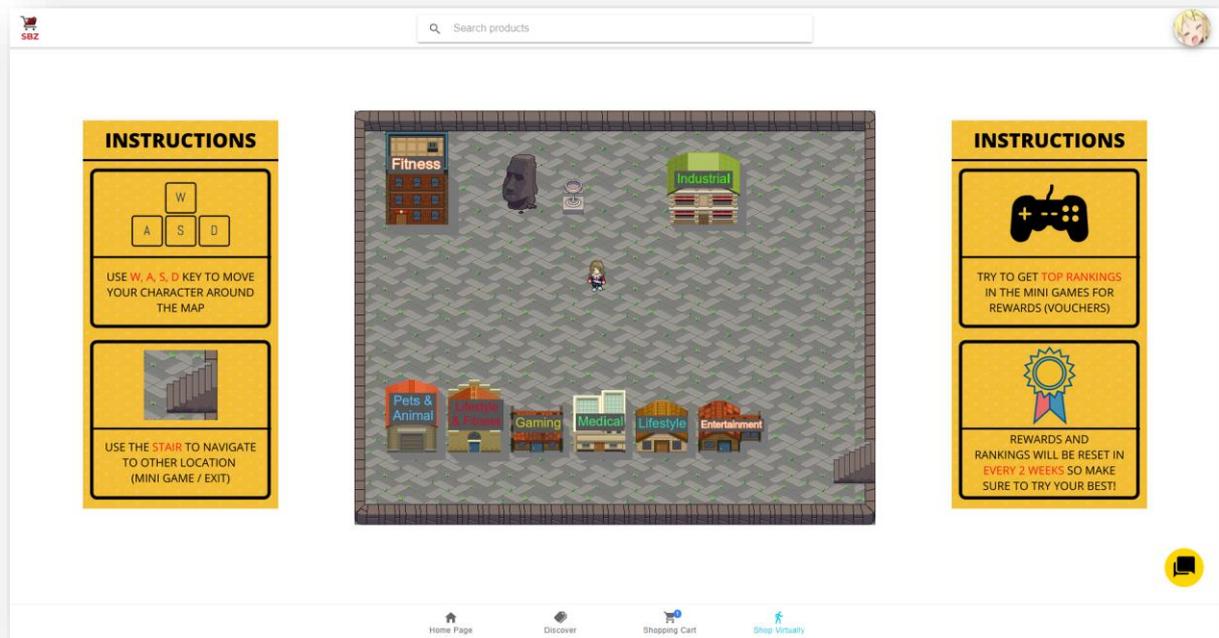


Figure 4.1.23 2-D Shopping Area

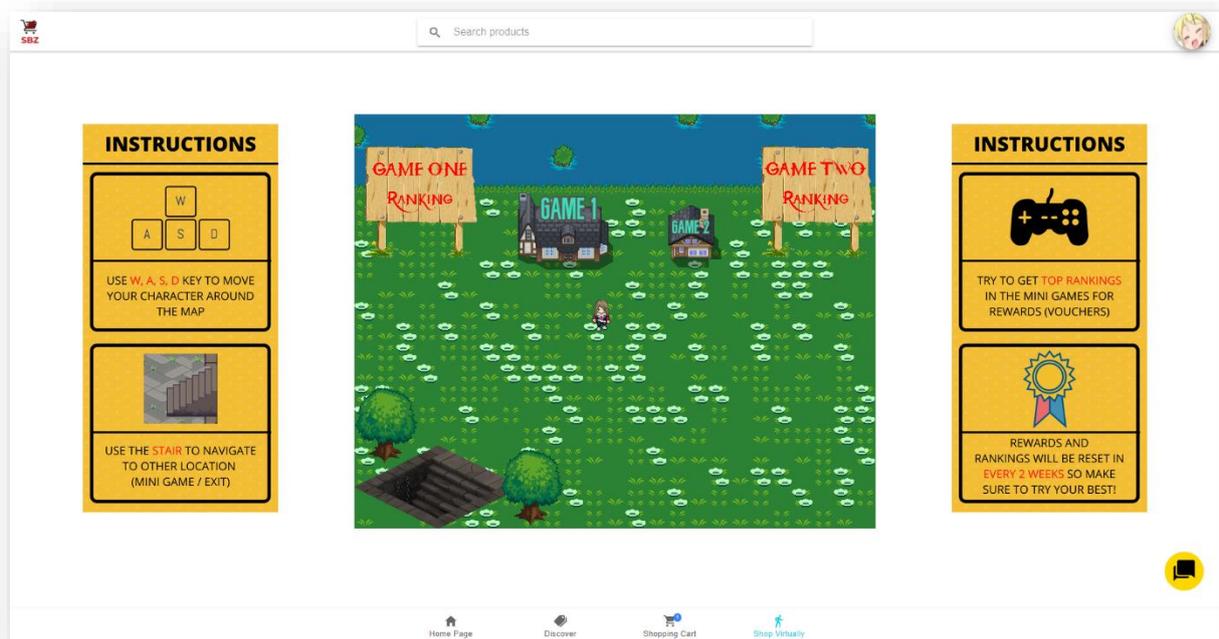


Figure 4.1.24 2-D Mini Game Area

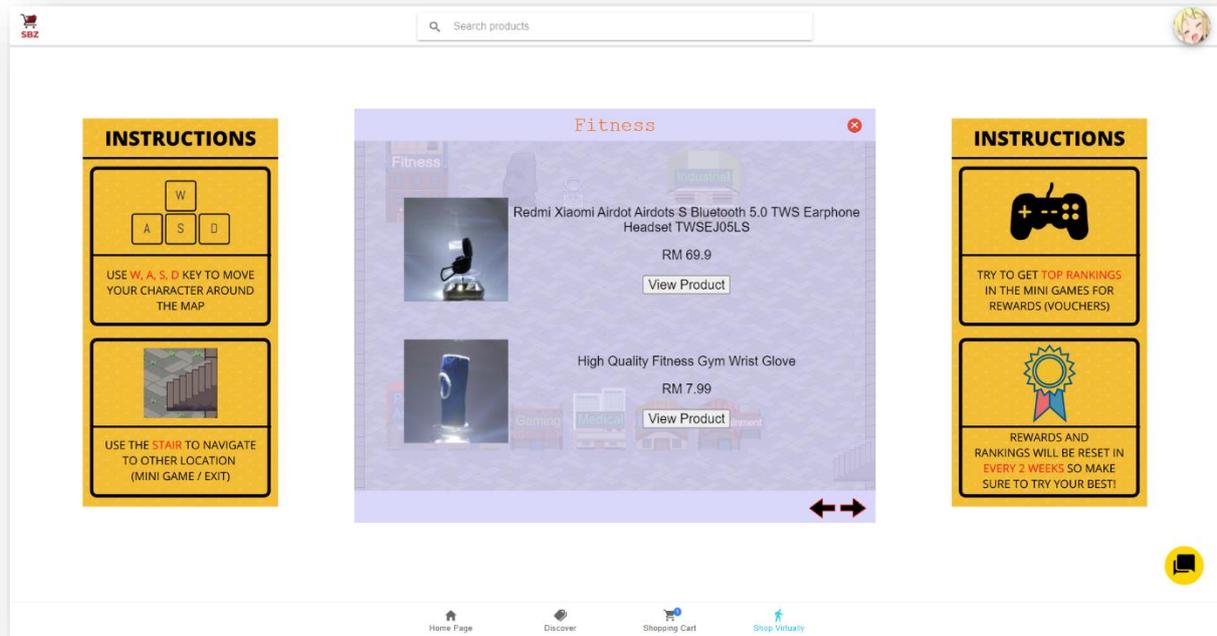


Figure 4.1.25 2-D Shopping Interface

The figures above showed the other results obtained according to Feature Driven Development. The thought process of this feature was driven by the fact that it was hard to maintain a decent web traffic of an E-Commerce website. This feature of providing a somewhat virtual shopping 2D game could provide a good impression for users so they would come back to the website to shop again. Indirectly, the possibilities of them buying products would be increased. In figure 4.1.23, each building represented one type of category of product. Users were given the ability to move the character to enter any caves to shop. In figure 4.1.24, it depicted the mini games scene for users to play and get rewards from it. Figure 4.1.25 showed the shopping interface rendered after they controlled their character and walked into one of the buildings.

4.2 Tools and Technologies Used

4.2.1 Platforms

Ionic 4.0 (Front-end Development)



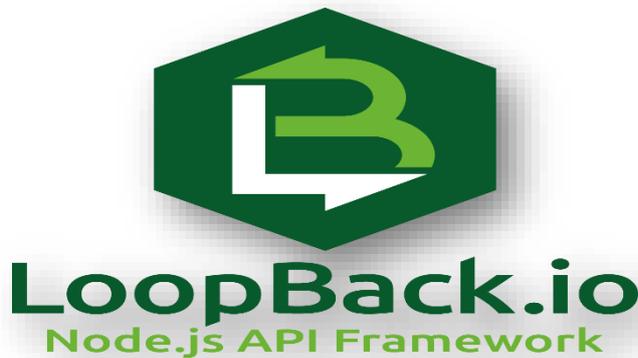
The Ionic platform was created by Max Lynch, Ben Sperry, and Adam Bradley of Drifty Co. in 2013. Ionic was one of the free open-source app development platforms on the Internet for web

developers. It was used for this project for front-end development because of ease of use and it supported hybrid mobile app development. With that being said, the Ionic platform allowed developers to design and build a project cross-platform such as mobile and desktop apps with one shared codebase. Ionic focused a lot on the main look and feel as it had so many built-in components for developers to use.

Minimum requirements for hardware:

- 4GB RAM, Intel Core i3

LoopBack 3.0 (Back-end Development)



LoopBack was a free open-source framework for developing the Application Program Interface (API) to connect the front-end application with back-end data sources. It consisted of its Command-Line Interface that allowed developers to define data model to generate a fully

functional end-to-end REST APIs. These APIs could be triggered in the front-end application easily. LoopBack ran on Node.js which was a JavaScript runtime environment that acted as a server-side. To simplify, LoopBack was used to develop an application that acted as a middleware between Ionic and online databases, which in this case was MongoDB.

Minimum requirements for hardware:

- 4GB RAM, Intel Core i3

4.2.2 Languages

HTML5, CSS, JavaScript, TypeScript, Angular, NodeJs

HTML5, CSS, JavaScript were the essential languages to develop a web application. However, it was better to mainly use TypeScript considering Ionic 4.0 was the main platform to build this project. TypeScript was developed by Microsoft and it was similar to JavaScript. The reason why TypeScript was used because it allowed Ionic to compile it to JavaScript so that it could be used to build the application on multiple platforms such as Android, IOS or Web applications. With that being said, Angular was also integrated into this project because it was a TypeScript-based open-source web application. Finally, NodeJs was used in this project to act as a JavaScript run-time environment that provides back-end server during development.

Minimum requirements for hardware and software:

- 2GHz Multi-Core Processor
- 4GB RAM
- 10GB Hard disk space
- Window 95
- Microsoft .Net Framework v4.6.1

4.2.3 Web Services

Amazon Web Services (AWS)



Amazon Web Services was introduced by Amazon and it offered plenty of reliable, scalable, and inexpensive cloud computing services. With AWS, the resources required of this project had become very low since cloud computing services could do it all over the Internet. In this case, an AWS Educate account was registered to use some of the services for free since not every service provided by AWS was free. Specifically, AWS Cognito Service was used to act as an authenticator for user sign in, sign up, login and logout.

Hardware requirements of AWS:

- Two Intel Xeon E5-2686 v4 processor
- 512 GB Memory
- 15.2 terabytes of local, SSD-Based NVMe Storage

In order to use AWS, you need

- an AWS account
- Internet Access

Firestore Google



Firestore was the product of Google. It was a mobile platform that offered services to develop high-quality apps. Those services included Firestore Cloud Messaging, Firestore Realtime Database, etc. However, Firestore Hosting was the only service used in this project. It was used to host

the front-end application online so that it could be accessed on the Internet.

In order to use Firestore Google, you need

- a Google Account
- Internet Access

Heroku



Heroku was a cloud application platform that had been online since 2007. Heroku went from supporting only Ruby programming language to Java, NodeJS, Scala, etc now. It was used to build, run and operate back-end applications since the back end for this project was built

using NodeJS. The back-end application was hosted online with Heroku and could be accessed by the front-end application of this project.

To use Heroku, you need

- a Heroku Account
- Internet Access

4.2.4 Software

Kickstarting a project with proper development tools is very important. It provides developers effective features to create, debug, maintain and support during the development process. In this project, the software used was Visual Studio Code 2019 and it was used to edit and manage codes written in different languages. Besides, the built-in terminal of Visual Studio code was also used to test and debug the project.



Minimum requirements for hardware:

- Window 7 SP1 (with latest Windows Update)
- 1.8 GHz Processor
- 2GB RAM
- 800 MB up to 210 GB of memory

4.3 Specification: Analysis, Design and Verification Plan

4.3.1 Analysis

The potential objectives of this project website had been analysed for multiple times with and without outsiders. It was to make sure that the final product of this project could maximize the usefulness to help potential users. Firstly, it started with doing researches on the Internet about current trends of existing E-Commerce websites and what have not been done. By doing so, it led to many discoveries of new ideas and improvements on existing features. Then, the main impact audience of this project were set, which were all the E-Commerce users (buyers and sellers). After objectives had been set, literature reviews were done to study the background of related field which was E-Commerce website. It resulted in deeper understanding.

4.3.2 Design

The design of the website was started from scratch, from creating an empty project to a fully designed website. Every page of the design needed to be designed and arranged accordingly so that a good user experience (UX) would be accomplished. Besides, one of the main highlights of the website was a 2-D game. It was designed in a way that user to control a character to shop in a 2-D map terrain. This was one of the main features that could show the uniqueness of the website and drag more attentions from users.

4.3.3 Verification Plan

Verification plan was a repetitive step where the testing on newly built features were tested and verified for its expected output or usage. All the features would be tested after done coding to make sure the functionality. The testing was done by the developer himself and some college mates.

4.4 Implementation and Testing

4.4.1 Implementation

After finishing the coding design phases, all the excess files and codes had been removed to ensure a well-organized website. During the design phases, the website was host on localhost for testing and debugging purposes until all the bugs had been fixed. The next step was to build the whole project as a web application so that it could be hosted online. Then, the front-end and back-end of the website were hosted on Firebase and Heroku respectively.

4.4.2 Alpha Testing – Application Testing

Alpha testing was done mainly by me, the developer. The expected and actual results were recorded as below.

Actions	Expected Result	Actual Result
Sign Up	User signed up successfully. <u>Exception:</u> Invalid format of sign up information or verification code entered.	User signed up successfully. <u>Exception:</u> Invalid format of sign up information or verification code entered.
Login	User logged in successfully. <u>Exception:</u> Invalid login information entered.	User logged in successfully. <u>Exception:</u> Invalid login information entered.
Update Profile Details	User updated details successfully. <u>Exception:</u> Invalid details information entered.	User updated details successfully. <u>Exception:</u> Invalid details information entered.

Upload New Products (Admin)	User uploaded successfully <u>Exception:</u> Invalid product details entered.	User upload successfully <u>Exception:</u> Invalid product details entered.
Add Product to Shopping Cart	User added products to shopping cart successfully. <u>Exception:</u> -	User add products to shopping cart successfully. <u>Exception:</u> -
Pay with PayPal	User able to check out the shopping cart using PayPal. <u>Exception:</u> Invalid PayPal account entered.	User able to check out the shopping cart using PayPal. <u>Exception:</u> Invalid PayPal account entered.
Communicate using Floating Chat Box	User able to chat with the admin. <u>Exception:</u> -	User able to chat with the admin. <u>Exception:</u> -
Play the 2-D game	User able to shop and play in the 2-D game. <u>Exception:</u> -	User able to shop and play in the 2-D game. <u>Exception:</u> -

4.4.3 Beta Testing

Beta testing was carried out after finished developing the website. A set of google form questionnaire was distributed to 20 potential users to review the website. The purpose of this testing was to collect feedbacks and reviews towards the website in terms of usefulness, effectiveness, improvements and so on.

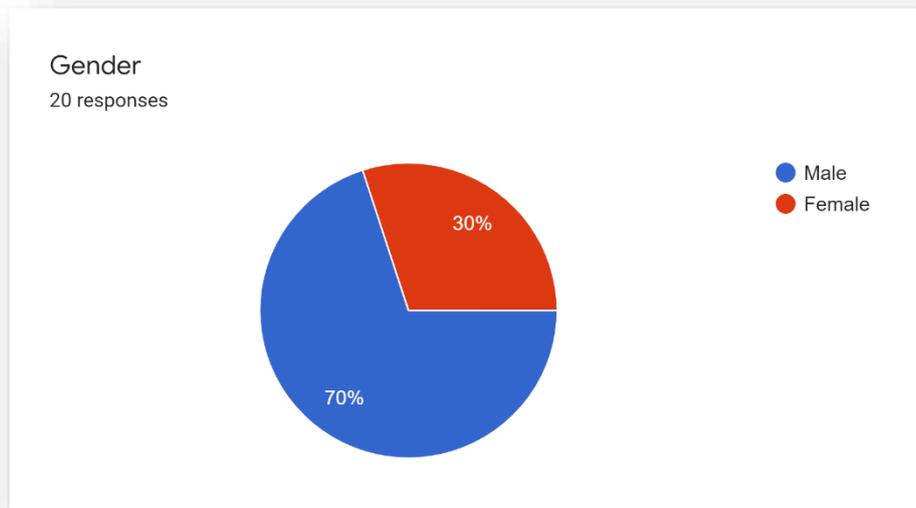


Figure 4.4.1 Pie Chart on Genders

The chart above showed that there were 20 totals of potential users responding to the questionnaire. 14 of them was male and 6 of them was female.

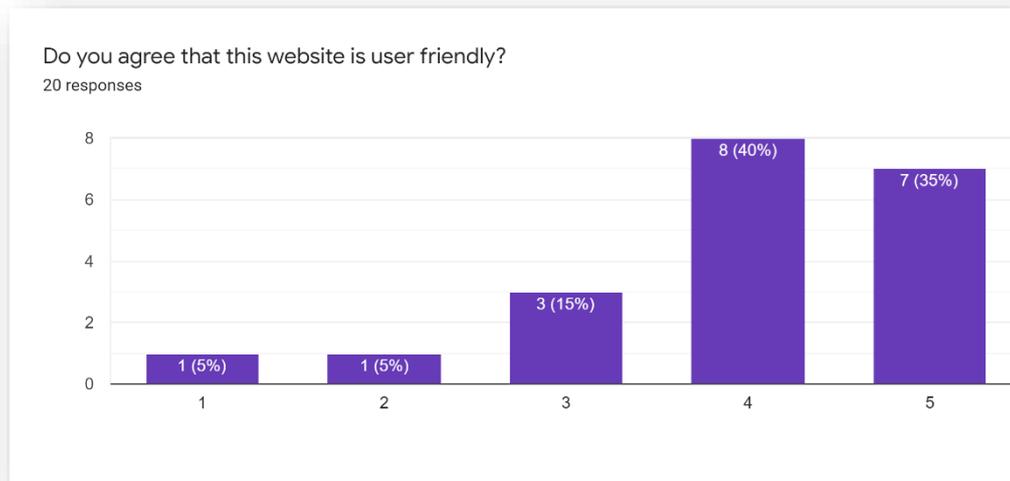


Figure 4.4.2 Bar Chart on User Friendliness of the Website

The figure above showed the responses on the question, do you agree that this website is user friendly. It was based on a linear scale from 1 (strongly disagree) to 5 (strongly agree). More than 70% of the respondents voted for scale 4 and 5. Thus, this could be assumed that the website was user friendly.

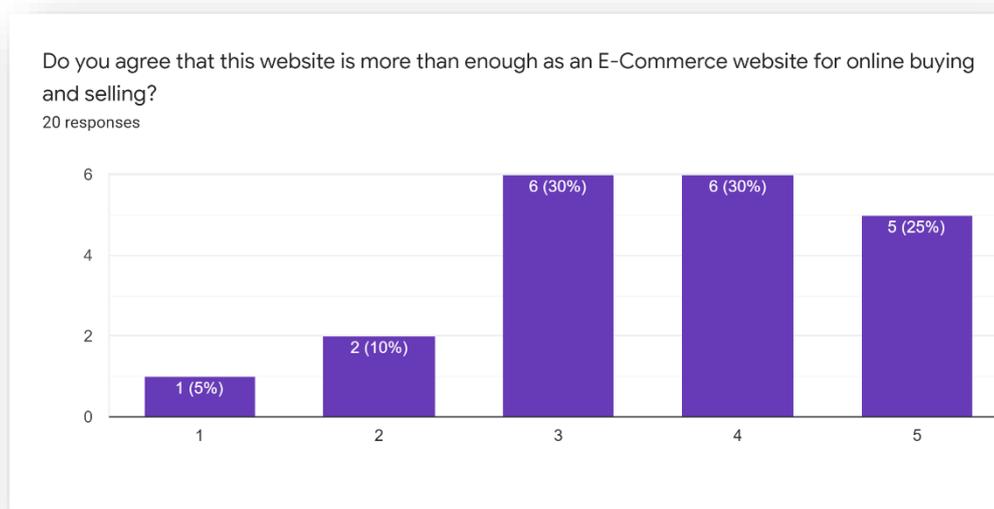


Figure 4.4.3 Bar Chart on whether it is qualified as E-Commerce Website

The figure above showed the responses on the question, do you agree that this website is more than enough as an E-Commerce website for online buying and selling. It was based on a linear scale from 1 (strongly disagree) to 5 (strongly agree). There were only 55% of the respondents voted for scale 4 and 5. Thus, it could be assumed that this website could be improved in many ways.

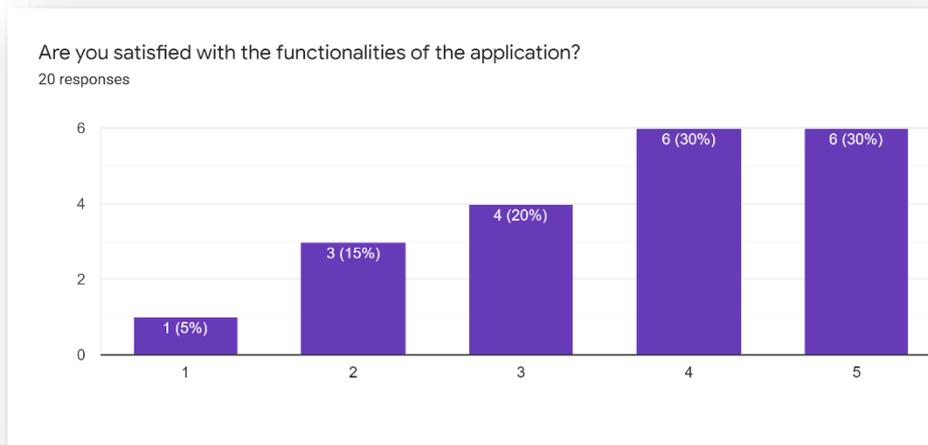


Figure 4.4.4 Bar Chart on Satisfaction of Functionalities

The figure above showed the responses on the question, are you satisfied with the functionalities of the application. It was based on a linear scale from 1 (strongly dissatisfied) to 5 (strongly satisfied). 12 of the respondents voted for scale 4 and 5 whereby 4 of them voted for scale 1 and 2. The last 4 of respondents voted for scale 3 which is neutral. This proved that the functionalities of this website were quite satisfied by the potential users.

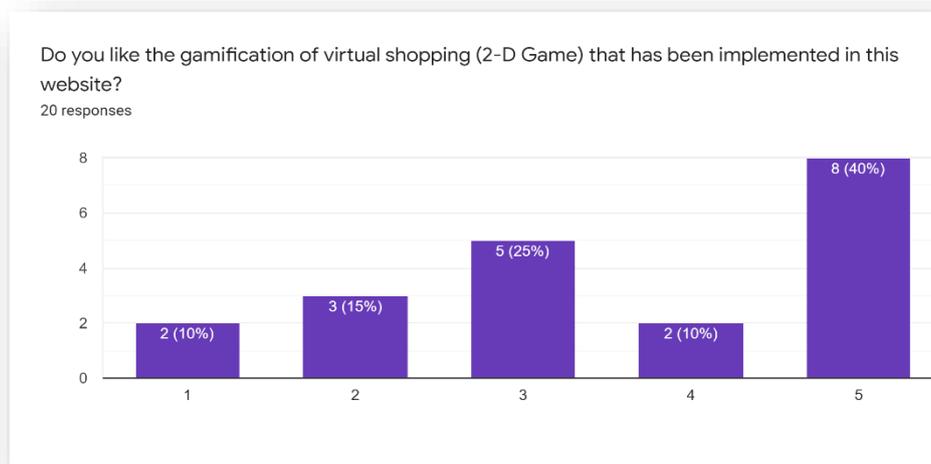


Figure 4.4.5 Bar Chart on Satisfaction of Gamification

The figure above showed the satisfaction of gamification in this website. It was based on a linear scale from 1 (strongly dislike) to 5 (strongly like). There were 50% of the respondents voted for scale 4 and 5. This could be assumed that not everyone was impressed by this feature and it could be improved more.

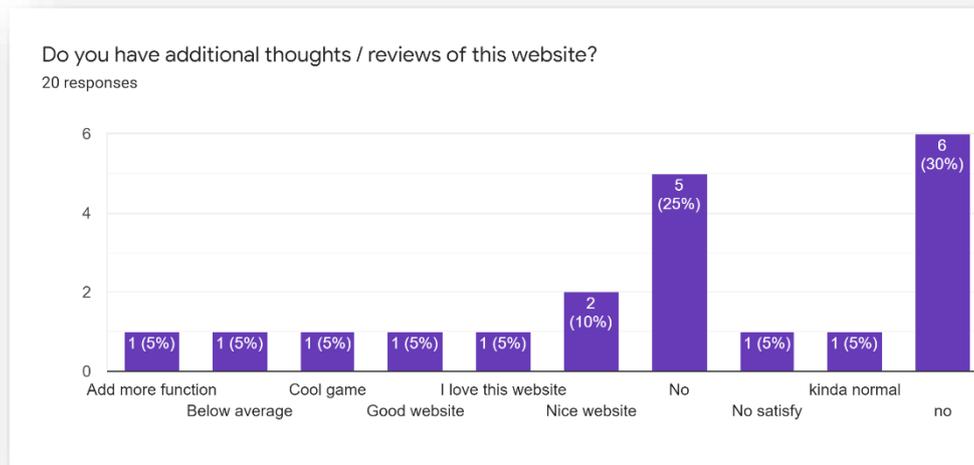


Figure 4.4.7 Bar Chart on Additional Reviews of Users

The figure above showed the additional feedbacks of respondents after using this website. From the responses, it could be seen that many respondents had no additional thoughts on this website. However, there were several of them liked and praised this website. One of the respondents suggested to add more functions to the website.

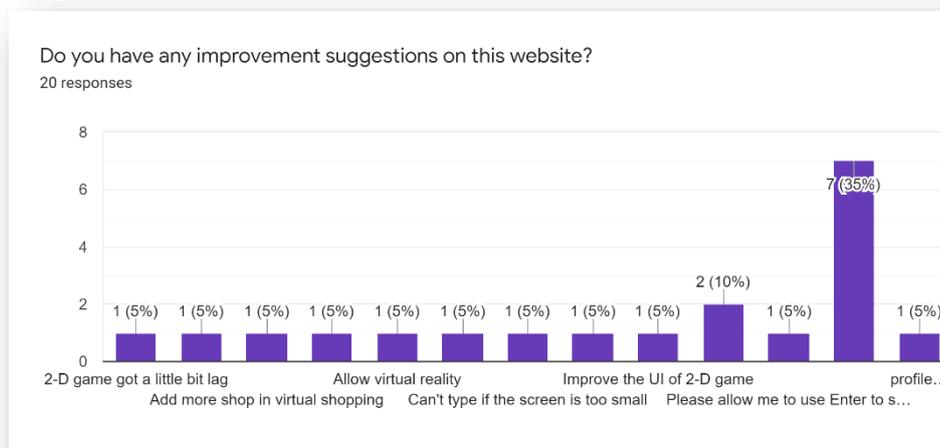


Figure 4.4.8 Bar Chart on Improvement Suggestions

The figure above showed the improvement suggestions from respondents on this website. Many of them suggested on the improvements of 2-D game. Besides, the profile page design also needed to be improved. In short, they believed that there were still many improvements could be made to make a better website.

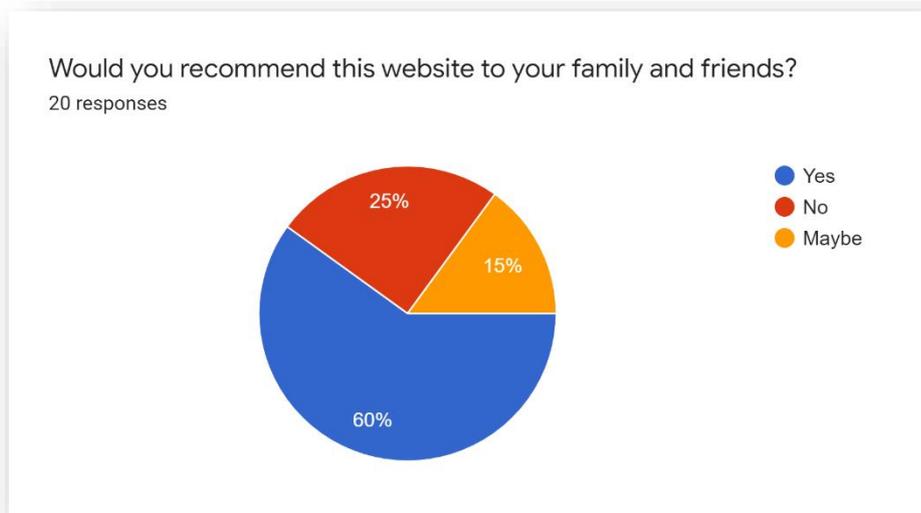


Figure 4.4.6 Pie Chart on Feedback of Website

From the pie chart above, it should that majority of the respondents would recommend this website to their family and friends. It occupied 12 respondents (60%). However, there were 15% of the respondents would only consider and 25% of them would not recommend to their family and friends.

4.5 Result

4.5.1 Before Improvements

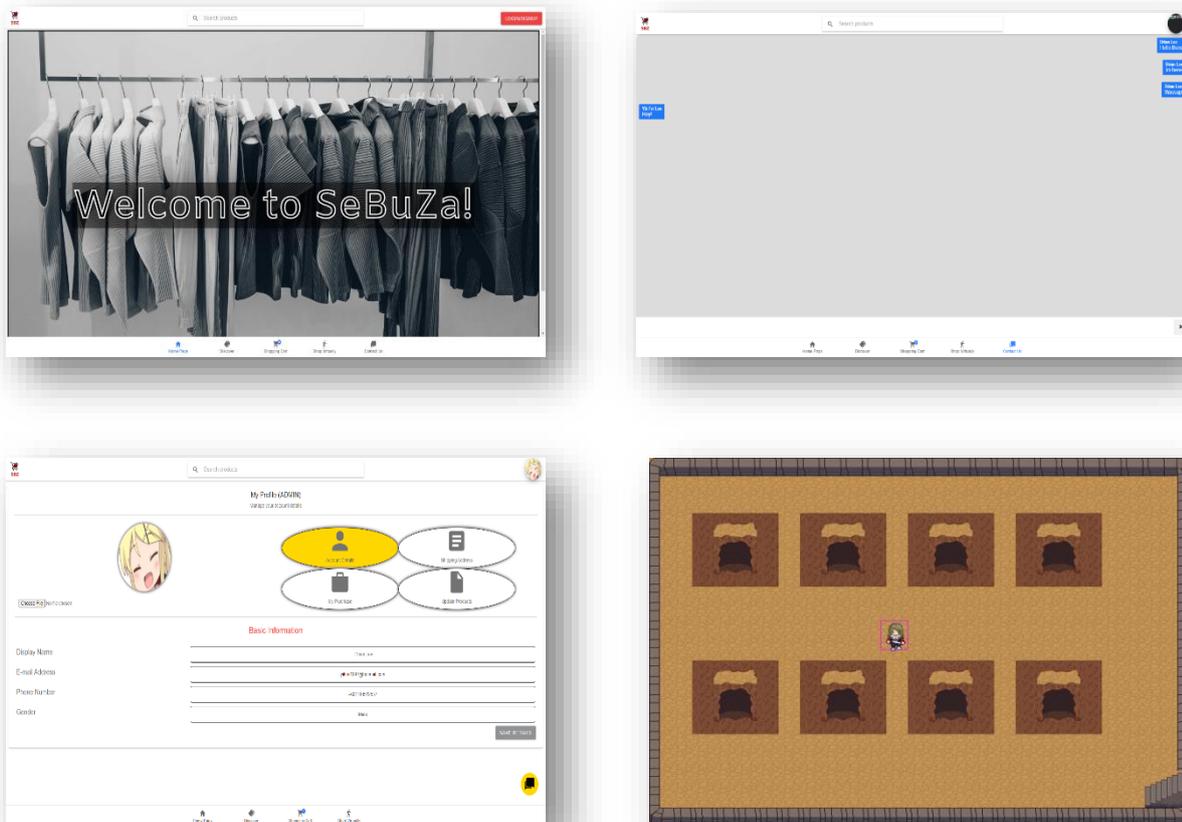


Figure 4.5.1 Screenshot of Project Website (Before Improvements)

After all the user interface had been pre finalized, a testing was needed to discover any potential bugs and future improvements. As a developer, it was much needed to understand the functionalities and the flow design of the website to make sure that it could start improving from a better stage.

Before the testing and improvements were done, the pre finalized version of the website were very plain and simple. The introduction page was just a normal slide show of multiple pictures describing the website and it lowered the quality of design. Besides, the contact us page was a badly designed full screen chat box with large amount of blank space. It gave a bad visualization quality to the user.

In short, testing phases were a crucial step while developing an application. It could provide much better idea after getting feedbacks from potential users. Without it, the quality would not meet users' expectations.

4.5.2 After Improvements

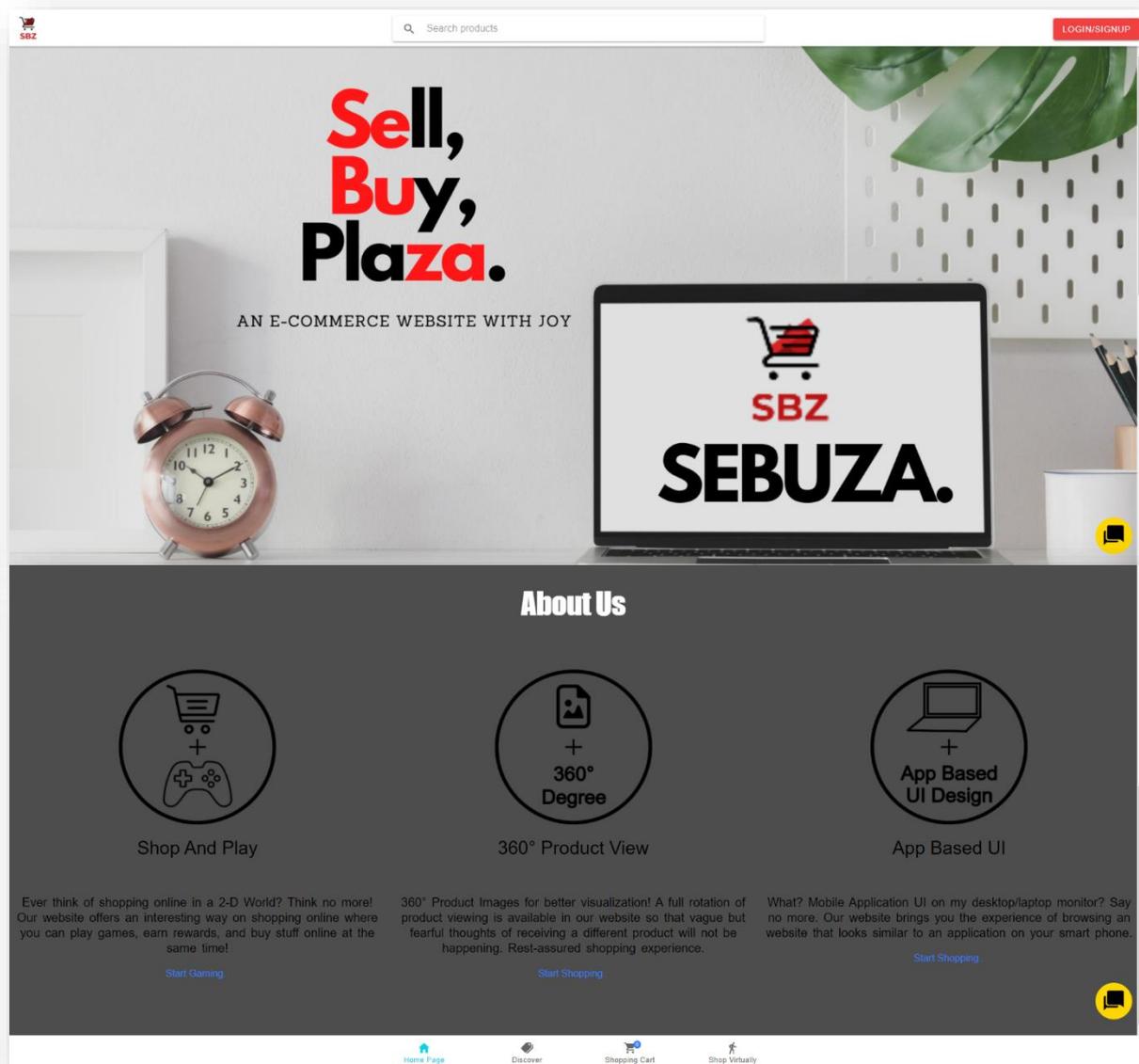


Figure 4.5.2 Screenshot of Finalized Introduction Page

The figure above showed the finalized design of the introduction page. Instead of the slideshow in the old version, it has a website banner and a 'about us' section below it. It provided a brief highlight explanation of this website. Besides, the 'contact-us' page in the old version had been removed. The chat box is now a chat button at a fixed position on every page of this website.

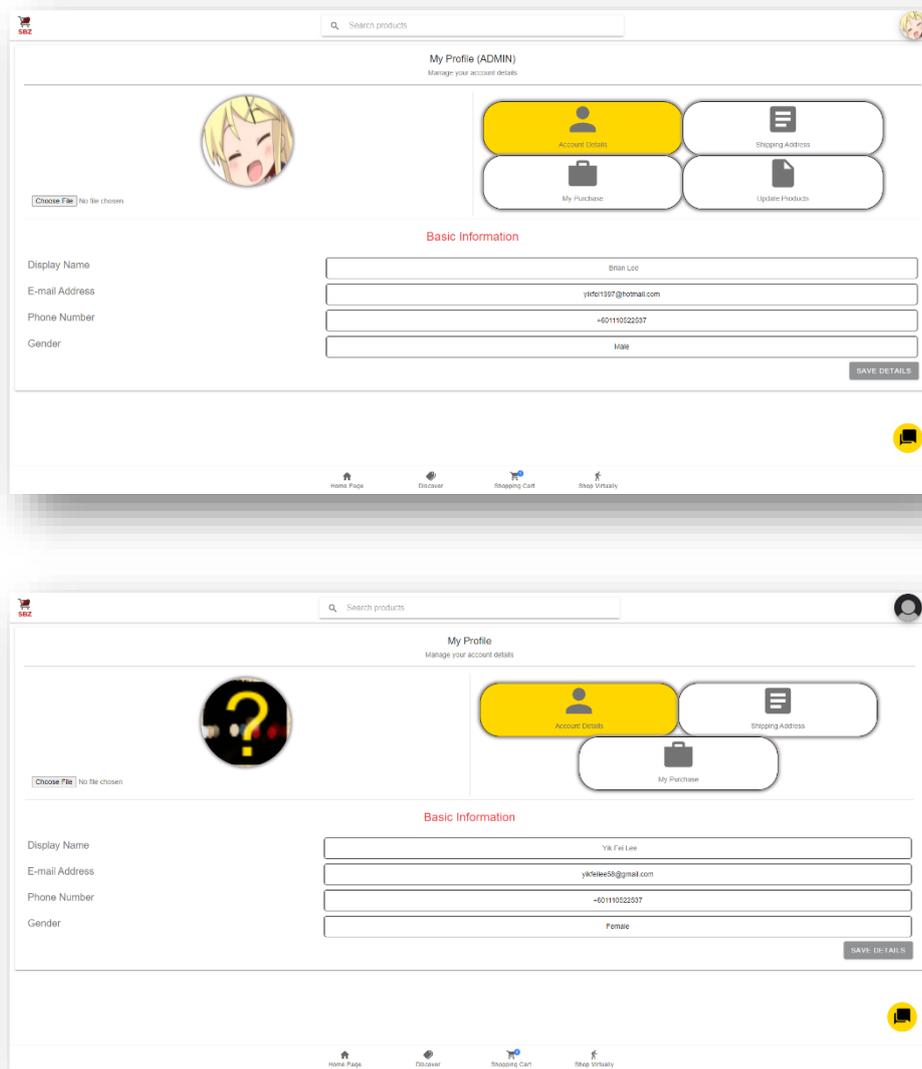


Figure 4.5.3 Screenshot of Finalized Profile Page

The figures above showed the finalized design of the profile page after getting design feedbacks from beta testing. Before improvements, the 4 boxes were in oval shape which seemed to annoy some potential users. Hence, the finalized design was done in 2 parts. If the account is an admin, there will be 1 extra box for uploading new products.

4.5.3 Brief Explanations: After Improvements

As a summary, this website was improved after performing both alpha and beta testing in terms of functionalities and user interface designs. Functionalities such as uploading products, spinning a 360-product image, and so on were added. Some interface designs were also changed according to users' feedback so that it could meet their expectations.

The upload products function was designed for admin user only. This part of the profile page allowed admin to upload new products to the website. The required attributes were product name, product price, product category, product description and product image (360°). Next, all the users could view an automatically spinning 360° product images. Besides, they could also spin the images using their mouse.

According to the feedbacks, the previous design of contact page was not necessary. Hence, the chatting area was redesigned and moved to a fixed position in every page of this website. Users could click the button and start chatting. Moreover, the game area page was also quite plain and simple according to the reviews. That was why instructions of playing the game added beside the 2-D game area.

Finally, the finalized version of the website was higher in quality and more favoured by the potential users.

Chapter 5: Conclusion

5.1 Conclusion

In conclusion, most of the objectives of this project were achieved. Objectives such as *providing more resources to solve users' questions and confusion* and *enhancing user experience (UX) when users are using the websites* were achieved. Firstly, a Chat Box feature was implemented so that the user could interact with the seller to solve their questions. Next, a mobile application look-alike website was designed as research done stated that users tended to shop online on mobile devices.

More importantly, putting products online had its difficulties and challenges too. One of them was to maintain the web traffic on the website. Until now, there were countless number of E-Commerce websites all over the Internet. This project was developed to overcome those challenges as it consisted of interesting features. One of them was the 2-D game for users to shop virtually by controlling a virtual character. It could provide joy as they were shopping while playing games. Human-Computer Interaction studies stated that emotions played a big part in keeping users to use on a product continuously. By making the users happy while using this project, they would become returning visitors. This resulted in the achievement of the objective as to *implement gamification to get more users' attention and interests*.

5.2 Novelties and Contribution

The main contribution that this project has achieved, were the implementations of both 360-degree product photos and gamification. For gamification, I believe it is still a brand-new idea that no existing e-commerce websites are doing it. The current gamifications are different, many of them are just providing mini games features to earn discounts whilst users of this project website can shop in the game.

5.3 Future Plan

In the future, the existed features will be enhanced, and this project might implement with more unique features. Existing features such as chat box, 2-D game will be improved. For example, an interesting time-based reward system might be included in the 2-D game so that users' engagement on the website will be increased by logging in every day.

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Appendix

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: Semester 3, Year 3	Study week no.: 4
Student Name & ID: Lee Yik Fei, 17ACB05787	
Supervisor: Mr. Lim Jit Theam	
Project Title: Developing An E-Commerce Website For Enhancing Customer Sales	

1. WORK DONE

The project website has a lot of improvements from FYP 1 progress.

2. WORK TO BE DONE

Improve on website UI and functions.

3. PROBLEMS ENCOUNTERED

Errors and bugs found on project website.

4. SELF EVALUATION OF THE PROGRESS

Need to consider error-handling cases while designing website.



Supervisor's signature



Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: Semester 3, Year 3	Study week no.: 10
Student Name & ID: Lee Yik Fei, 17ACB05787	
Supervisor: Mr. Lim Jit Theam	
Project Title: Developing An E-Commerce Website For Enhancing Customer Sales	

1. WORK DONE

Draft of project report.

Modified the design of website.

2. WORK TO BE DONE

Report chapter 3 (System Design) need to add more details on each phase.

Report chapter 4 (Implementation and Testing) need to include alpha and beta testing, surveys, and result (before & after).

3. PROBLEMS ENCOUNTERED

Some missing functionalities on the website.

4. SELF EVALUATION OF THE PROGRESS

Need to be more careful with selecting terms in report writing.



Supervisor's signature



Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: Semester 3, Year 3	Study week no.: 12
Student Name & ID: Lee Yik Fei, 17ACB05787	
Supervisor: Mr. Lim Jit Theam	
Project Title: Developing An E-Commerce Website For Enhancing Customer Sales	

1. WORK DONE

Format checking on final draft of project report.

2. WORK TO BE DONE

Some sub-chapters need to be modified.

3. PROBLEMS ENCOUNTERED

List of pages in table of content is confusing.

4. SELF EVALUATION OF THE PROGRESS

Have faith.



Supervisor's signature



Student's signature

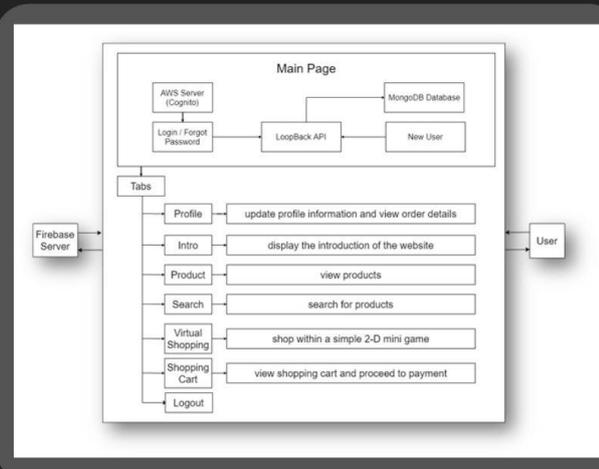
Developing An E-Commerce Website For Enhancing Customer Sales



INTRODUCTION

This project will develop an online shopping website that benefits sellers and eases buyers with the help of creativity in technology.

BLOCK DIAGRAM



DISCUSSION & CONCLUSION

After going through many researches, there are still many ways to improve an E-Commerce website that may eventually benefit the community in E-Commerce. As online shopping is growing rapidly, more and more unique and interesting features should be developed and highlighted.

Until now, there are countless number of E-Commerce websites developed all over the Internet. It is hard to capture users' attention on one particular website. Thus, this project was developed to overcome the challenges. Indirectly, both sellers and buyers will be benefited as it provide beneficiary in physical and mental aspects.



Supervisor: Mr. Lim Jit Theam
By: Lee Yik Fei
Bachelor of Computer Science (HONS)

16-4-2020

SURVEY QUESTIONS

A Survey about Online Shopping Websites ☆

Questions Responses 30

A Survey about Online Shopping Websites
Form description

How old are you ? *

- 12 - 15
- 16 - 19
- 20 - 23
- 24 - 27
- Other...

How often do you shop online ? (e.g. buying stuff from shopee, taobao, lazada, etc) *

- Once a week
- Once a month
- Once a couple of months
- Other...

When you look at a product in online shopping websites, is the information given by sellers enough for you to understand? (Please state your reason.) *

Short-answer text

If you're given the chance to enhance the design of a product page, which part of the page would you choose? *

- Product Visualization (Images, Videos, etc)
- Product Details
- Product Review
- Product Rating
- Other...

Have you ever been confused before while shopping online due to insufficient information on the website? *

- Yes
- No

Which do you prefer for customer service ? *

- Text Chatting
- Email
- Voice Call
- Video Call
- Frequently Asked Questions (FAQ) section

What do you think of implementing 2-D game for online shopping? (e.g. control a character to walk in a virtual market) For example, 2-D games like Pokemon or Maple Story if you've played before. *

Short-answer text

Which platform do you prefer to shop online ?

- Smart Phones
- Computers
- Tablets
- Other...

Send

FYP 2 Project Website Review Survey

Questions Responses 20

FYP 2 Project Website Review Survey

Form description

Gender *

Male

Female

Do you agree that this website is user friendly? *

1 2 3 4 5

Strongly Disagree Strongly Agree

Do you agree that this website is more than enough as an E-Commerce website for online buying and selling? *

1 2 3 4 5

Strongly Disagree Strongly Agree

Are you satisfied with the functionalities of the application? *

1 2 3 4 5

Strongly Dissatisfied Strongly Satisfied

Do you agree that the User Interface (UI) design is user friendly and fresh? *

1 2 3 4 5

Strongly Disagree Strongly Agree

Do you like the gamification of virtual shopping (2-D Game) that has been implemented in this website? *

1 2 3 4 5

Strongly Dislike Strongly Like

Would you recommend this website to your family and friends? *

Yes

No

Maybe

Do you have additional thoughts / reviews of this website? *

Short-answer text

Do you have any improvement suggestions on this website? *

Short-answer text

TURNITIN REPORT

FYP 2 Report

ORIGINALITY REPORT

6%

SIMILARITY INDEX

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Full Name(s) of Candidate(s)	LEE YIK FEI
ID Number(s)	17ACB05787
Programme / Course	CS
Title of Final Year Project	DEVELOPING AN E-COMMERCE WEBSITE FOR ENHANCING CUSTOMER SALES

Similarity	Supervisor's Comments (Compulsory if parameters of originality exceed the limits approved by UTAR)
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Based on the above results, I hereby declare that I am satisfied with the originality of the Final Year Project Report submitted by my student(s) as named above.



 Signature of Supervisor

Name: Mr Lim Jit Theam

Date: 11th September 2020

 Signature of Co-Supervisor

Name:

Date:



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FACULTY OF INFORMATION & COMMUNICATION TECHNOLOGY (KAMPAR CAMPUS)

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TICK (√)	DOCUMENT ITEMS
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