

Designing an Android-based mobile app to address issues with online shopping

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Abstract

Recently, most companies have develop mobile applications since phones are the main way to use the Internet rather than computers. Based on the evidence, the year 2021 witnessed a huge increase in the number of online purchases, especially during the corona pandemic and other diseases that emerged after it. This research, therefore, aimed to develop a mobile application that can provide ease of shopping and help its users to take advantage of discount prices across their region, especially during the COVID-19 lockdown. 'Discount Guide' was a great solution during this time and forever. This application is designed to allow the seller and the buyer as well to sell or buy discounted items. This app was built using the Java language, Android studio, Gradle and JUI to design the app effectively and more easily. As a result, the customer gets the benefit from using the app for online shopping on their Android devices.

Keywords: Android, application, mobile, MySQL, online shopping, smartphone;

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Introduction

It has been identified by analysts that phones are the main way to use the Internet rather than computers [1]–[4]. This revolution can be witnessed in the mobile consumer space. All of the channels of accessing information have been replaced by mobile devices. To catch up with this trend in the world, companies are also designing digital applications so that they can cater to a large variety of platforms and mobile devices. The development of mobile applications includes the process of application development for mobile devices like tablets, smartphones, personal digital assistants and other such devices. The mobile apps that are native are designed in such a way to run on a certain mobile platform which can be sometimes supported by hardware on a mobile and a certain mobile operating system.

In the strategy for the mainstream digital part for the BRC enterprises (business to consumer), mobile applications are included. Many companies are now focusing more on the mobile-first strategy where the development, testing and design of digital applications are for phones. This means phone users have become the main focus of the digital strategy of companies. If there is any sort of disruption in the mobility space, it proves to have a big impact on a company's enterprises. User experiences are being shaped by mobile apps and they are also providing information that is real time as well as offering more experience for users that keep them engaged. The digital strategy which is based on mobility includes many different aspects such as interactivity, device limitations, locations need, user experience, personalisation, device form factors and performance [2], [5]–[8].

And, it appears, the world cannot function without them! The year 2021 saw a big shift in online purchasing. As their reliance on the digital world grows, businesses are turning to mobile applications to gain access to a bigger client base. As a result, businesses must take advantage of the benefits of mobile application development. Mobile application development may help all organisations, regardless of size.

Literature review

Mobile application (app)

This is an application software type that is designed in a way to run on a mobile device, such as tablet computer or a smartphone, and is also often known as an 'app'. Mobile applications give the users the same service as that which can be accessed on personal computers [10]–[12]. Generally, apps are software units that are individual and small that have limited functionality in them. The use of the app software was made popular by Apple Inc. and its App Store which provides a wide range of applications for iPod Touch, iPhone and iPad. Several other names to recognise or define mobile applications include an online app, smartphone app, iPhone apps, web apps or just generally an app.

Mobile shopping

The definition of shopping apps includes an app that allows the user to make transactions (do shopping) with the use of their smartphones and other mobile devices meaning their purchase products from whatever mobile device they are using.

This is usually performed by using a secure, customised app [12]–[15]. The purchase of goods and services from within an application on a mobile device, such as a smartphone or tablet, is known as mobile shopping. Developers may make their applications available for free through a mobile shopping app. The developer then pushes upgrades to the paid version, unlocks new features, exclusive things for sale or even advertises for other programmes and services to everyone who downloads the free version. This allows the developer to make money while giving away the main product for free.

History of mobile applications and shopping

The mobile commerce services started in 1997 with the launch of the Coca-Cola candy machines which were powered through two cell phones in the Helsinki region of Finland. Installments were acknowledged by the machine through instant messages and SMS. Further development through this work was in some mobile applications. For example, they include the main cell phone-based assistance for finance which was launched in 1997 by the Marita Bank present in Finland, which just like the prior machine, utilised the use of SMS. The mobile registration of Finnair was a very important achievement that was shown first in the year 2001 [13].

Andrew Tobin and Kevin Duffy created the m-commerce server in 1997 and it won the Financial Times grant in 1998 for being the most inventive item that is mobile. This achievement of theirs was complemented by the *Financial Times* for making the mobile business become a reality in the world. The period of mobile application planning and advancement shows that mostly, the main mobile applications that were used included adding machines, adding games or making month-to-month schedules that were a creation put into the Java system [12]. In the year 1993, IBM launched the first speaking cell phone known in history. Simultaneously, it also launched its features that included a world clock, a contact book, a minicomputer and a schedule.

In the year 2002, some years after the IBM phone, the Blackberry cell phone was launched. The launch of this can be considered being one of the most important achievements in the mobile application field. This also made the importance of Blackberry Limited being in a place that was called Research in Motion Limited before. Due to this, the idea of having a remote email was generated. Apple App store began its services in 2008 where at the time there were only 800 applications that were accessible for downloading. Before the apps became accessible, the cell phones that were used had different programming such as MP3/MP4 player, voice notes, email capacities, Pocket Office, PPT and PDF watcher and also SMS. Solitaire and Snake were the only games on that phone and mobile Internet browsers were the main areas through which the Internet could be accessed or used [6].

When cell phones had become proper cell phones, then the mobile applications were also launched and ascended in use and popularity whereby the programming was devoted to a specific capacity. The applications have various purposes such as some being used for customisation of

gadgets, some used for purposes of diversion and others that are related to business-related or instructive tasks [6]. Applications also got their applications to make their services and items available to users with only a couple of taps on a mobile device. Moreover, more than a thousand applications were submitted each day to the Apple Store. This era can be considered the time of mobile applications. Even though there are mobile sites still available to access on the Internet, it is easier to use mobile applications for users.

Recently, entrepreneurs who have been operating physically as well as retailers operating large box businesses have also tried to exploit the mobile business for their advantage through the use of different abilities of the mobile such as area-based services, pop-up messages and checking identity to improve the customer shopping experience in their physical stores located. By developing a condition of blocks and snaps, the retailers operating physically can allow clients to have the same sort of regular advantages as they would when they are shopping in the physical stores of that company [8]. Physical retailers are using this method to fill in the gap made by the Internet business to make in-store shopping more accessible while contending those retailers that operate online. Omni channel retailers by the time of midsummer in the year 2013 had witnessed 25%–30% traffic present towards their online properties which started from cell phones before. Other types of stores such as online just retail stores or unaltered retail were also seeing an increase in their traffic of 40% where half of this was from cell phones people used [12], [13].

In September 2011, Google Wallet Mobile App had been launched and the joint endeavour they had with m-Commerce was shaped in 2011 June among O2, T-Mobile, Vodafone and Orange. Showing how important m-Commerce was, the Competition Commissioner of the European Commission in April 2012 instructed a proper examination to take place of the joint m-commerce endeavour between Orange, T-Mobile, O2 and Videophone. Moreover, there is a currently happening overview that shows that in the year 2012 about 41% of the clients of cell phones had purchased retail items through their cell phones. App usage changed from amusing games and social media to entire lifestyles in 2014. Every day, 700 million images are posted on Snapchat. Smartphones continue to sell, and with them, applications. Wearables, smart devices and smart clothes have eliminated the need for a phone to use applications (okay, maybe not the last ... yet). Apps have become such an important part of everyday life that few individuals do not use them regularly.

Advantages of shopping from a mobile app

There are many advantages of online shopping, which are as follows [15]–[23]:

- Increases conversion and sales (one-click touch, the concentration of useful information, the app increases your chances of getting customers through it since the main thing is to stimulate the user to download it).
- Increases brand recognition (one of the key reasons for choosing mobile e-commerce app development is to increase brand visibility. It is also the finest element of mobile commerce, as most consumers spend a lot of time on their phones).

- Enhances marketing communication (with mobile tools, today's customers may communicate with businesses 24 hours a day, 7 days a week; these mobile devices have revolutionised the way users engage with businesses, receive information and buy; and an increasing number of customers choose to use mobile online shopping).
- Increases customer retention (the application increases customer retention by implementing exclusive content that they can only benefit from through the mobile application without suffering, and also because once the consumer downloads an application on his mobile phone, he is more likely to use it to buy something instead of going to a website. According to research, 38% of the users visited the e-commerce app 11 or more times after downloading it).
- Convenience (nowadays, almost everyone owns a mobile device with an online connection. They used to buy on their phones, but because of the pandemic we are presently witnessing, it has now become a need. They like doing it from wherever they are – at home, on the train or in a cab on their way to work. Having a dedicated mobile app allows customers to find what they are looking for faster. This results in increased consumer satisfaction. The vast majority of clients prefer to make purchases using a mobile app rather than a website).
- Conversion rate (data show that customers see more goods on a mobile app than on a web browser. People use the smartphone app to add extra items to their baskets and end up spending more than they came for. This is typically beneficial to the organisation).

Pros and cons of online shopping

1) Pros:

- You can do shopping 24/7 at any time.
- You can sit in the comfort of your home.
- Many stores are within a click away.
- Doing the comparison for shopping is easier.
- You can get the discount coupons online.
- Do not have to drag or keep an eye on kids out/in the shop.
- No waiting lines on the cash counter.
- You get maximum privacy.
- You save on fuel for vehicle.

2) Cons:

- You can only view items on one page at a time.
- It may take a long time with a slow Internet connection.
- You are not able to touch or feel the products.
- You are charged for shipping and handling cost.
- There may be online transaction insecurity.
- You may lack personal supervision of the item [24], [25].

Problem statement

During COVID-19 and permanent self-isolation or even the disease that are always showing up people cannot go or shop by themselves and even if they can go out to do shopping, they have to look for the discounted products, items and that will take a lot of time which will be considering as a wasting of time for them even though that they will still miss some of the discounts and not finding them all over the region. Furthermore, if they have to go by themselves, they have to look for the items in their car they also still have to look for transportation if they do not have one, which makes them manage the cost, time and effort of that.

Based on previous studies, this study proposes the following as the solution:

1. Allow owners and customers to sell or buy discounted products online without going into the shops/market.
2. The app can be downloaded for free from any Android device.
3. When shopping, many users feel more secure if they register through the app. Also among the reasons are convenience, speed, the ability to save the data, find the best deal available and get personalised offers.

Purpose of the study

A discount guide is an app that is designed to allow owners and customers to sell or buy discounted products online without going into the shops/market's websites. The app can be downloaded for free from any phone. The app gives the same feeling as buying something online by visiting the website or going to the market itself. When shopping, many users feel more secure if they register through the app. Also, among the reasons are convenience, speed, the ability to save the data, to find the best deal available and to get personalised offers. During COVID-19 and permanent self-isolation, you need to take advantage of the situation when people move almost their entire lives online. Online lifestyle was generally the only choice for people living alone during times of the most severe restrictions, not giving people a chance to be in the privacy of their minds. And for that, the main purpose of this project is to benefit people to get the best discounts available in all regions of the country, even if they are unable to move between cities and there is a ban or lack of capabilities.

Materials and methods

Tools used for the development

Android Studio: This is the official integrated development environment for Google's Android operating system.

Firebase: Provides hosted backend services such as a real-time database, cloud storage, authentication etc.

Java: Java is a high-level, class-based, object-oriented programming language.

Cradle: It is a build automation tool for multi-language software development.

GUI: It allows users to interact with electronic devices through graphical icons and audio indicator.

Figure 1 presents the data flow diagram.

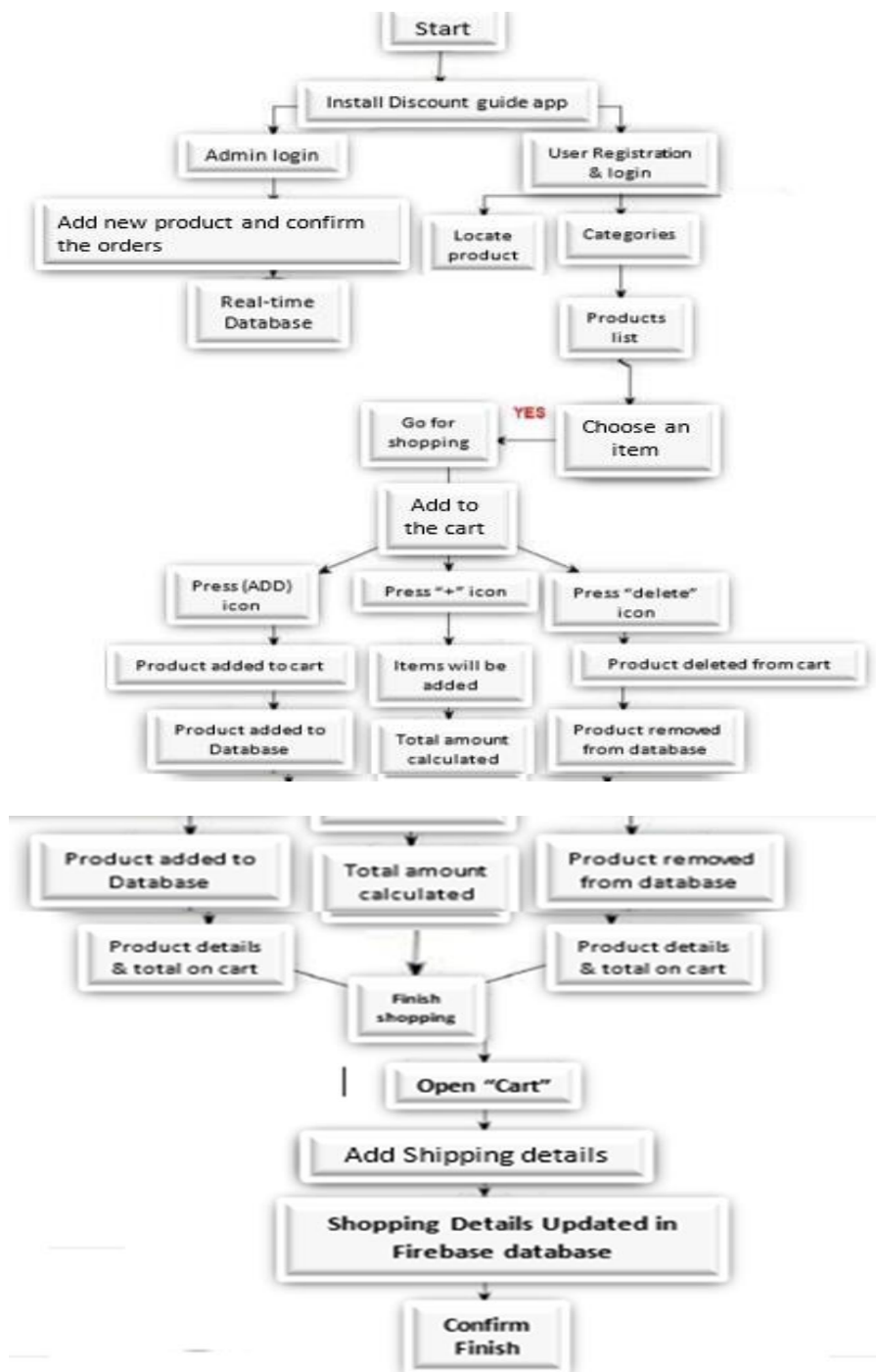


Figure 1. Data Flow Diagram

Procedure

- We run tests on an Android device (Samsung galaxy S21+) and on Android studio.
- Instrumented test run on Android devices, either physical or emulated. The app is developed, built and installed beside the test app that injects command and read the state. Instrumented tests are usually containing UI tests, launch the app and then interact with it.
- Local tests execute on a development machine or a server, so they are also called host-side tests.
- Tests also can vary depending on the size or degree of isolation:
- Unit tests or small tests can only verify a small portion of the app, For example, a method or class.
- End-to-end test or big test which verifies the larger parts of my app at the same time, For example, a whole screen or user flow.
- Medium tests are in between and check the integrations between two or more units.

Results

The programme has two interfaces: administrator features and user features. Figures 2 and 3 show the App Homepage and Signup page, respectively.



Figure 2. App homepage



Figure 3. Signup page



Figure 4. Login for users



Figure 5. Login for admins

Figures 4 and 5 show the login page for users and administrators, respectively.

Users' features

Figure 6 show the users' features for the discount guide mobile app. Figures 6 and 7 show the admin homepage.

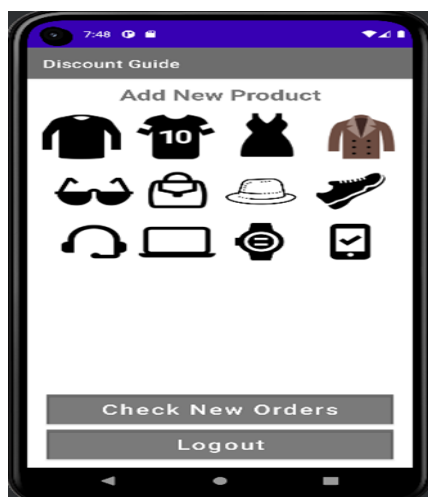


Figure 6. Admin homepage



Figure 7. Admin homepage

Figures 8 and 9 are the displays for order lists and ship and confirm order commands.



Figure 8. Orders list

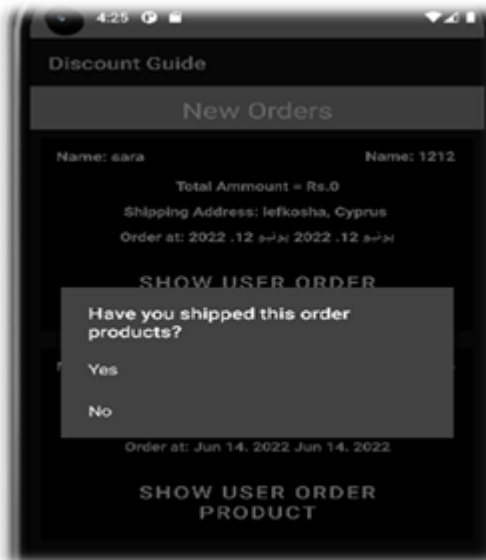


Figure 9. Ship and confirm the orders

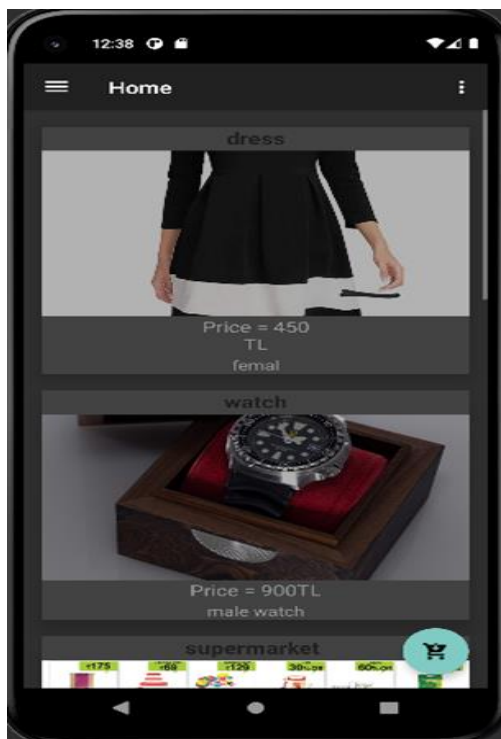


Figure 10. Products list page

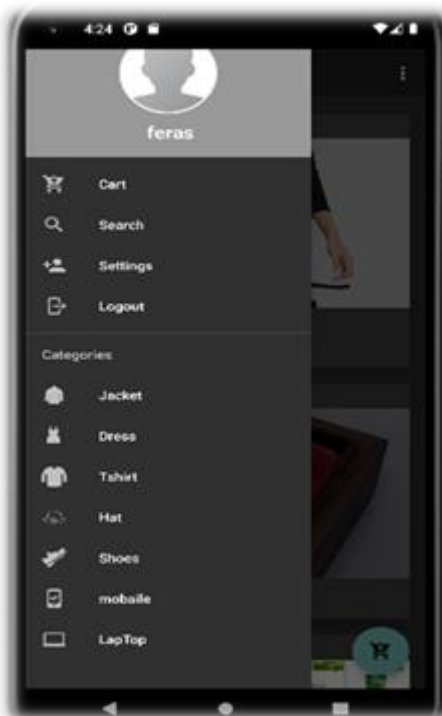


Figure 11. Options page

The options page and product list page are shown in Figures 10 and 11, respectively.

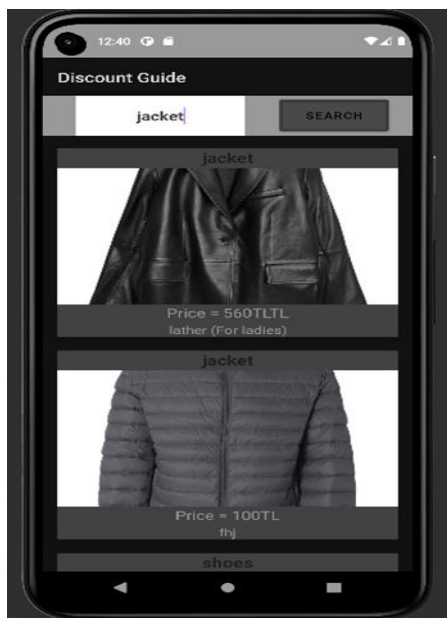


Figure 12. Search list page

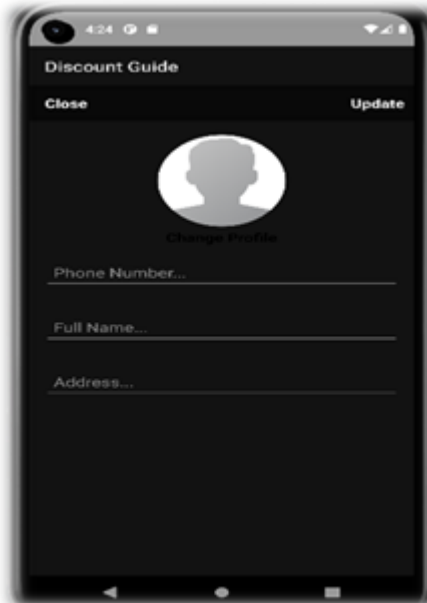


Figure 13. Settings page

Figure 12 shows the search list page and Figure 13 shows the setting page. In Figure 14, the display page for Cart is displayed, whereas Figure 15 displays the cart options page. Figure 16 shows the shipment details for the user page.



Figure 14. Cart page

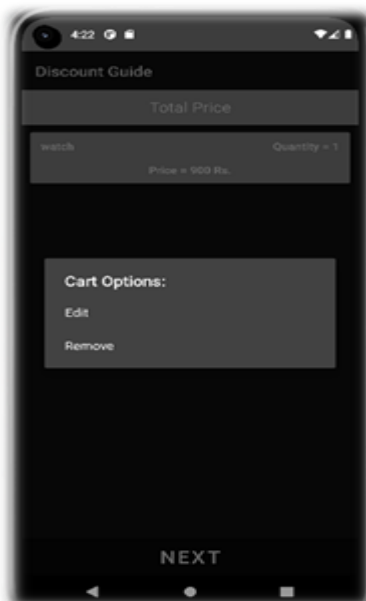


Figure 15. Cart options page



Figure 16. Shipment details page

Conclusion

The device and the app are linked, and the user may select discounted items from the app and manually add them to the app. The shopping experience has been safer, easier, quicker and more convenient as a result of the goods. Compared to many current technologies and applications on the market, the overall cost of putting this notion into action is far cheaper. As a consequence, this software is easy to use at supermarkets, food stores, clothes stores and electronics stores.

The app is intended to be a useful tool for owners and customers all together. Created for the benefit of the customers from finding the discounted products in the region, the attention might seem concentrated on the customers, but in fact, owners play a big role in the application, as they are the ones that populate the app with discounted products that users can buy them. The advantages of the system are that it provides security; it is time efficient; it is easily accessible; and it provides data privacy.

Recommendation for future work

It may be expanded in the future for work, updates and development to incorporate other features (such as message can be sent from user to seller, star ratings and feedback can be done by users to be able to get the store, seller and product feedback, wish list button, any product can be saved in Favourites for later). When a new product is produced or a new promotion is provided, instant alerts

serve as a constant reminder to customers. It boosts sales by updating clients about various deals and discounts.

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