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USER INTERFACE DESIGN FOR MOBILE BANKING APPLICATION

–Case study in Techcombank

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The modern mobile phone (i.e., the smartphone) is becoming a principal part of human daily life. One of the fundamental advantages of a smartphone is that users could conveniently use a wide range of applications on their device to perform their desired actions. Therefore, the development of mobile applications has become an essential target for the different types of enterprises and services in the market.

The elemental part of smartphone's application is the user interface (UI). On behalf of the logical system, the UI is the main channel to perform a communication between the users and devices by displaying in terms of image, colors, text and even sounds. The User Interface, therefore, can affect the choice between continuing using or dropping a certain application. This thesis will provide the theory as well as practical work on designing and implementing the new User Interface for a mobile application, especially in the area of banking and finance.

The thesis presents a design process along with users testing case. At the end, the design concept is presented as a high fidelity and interactive prototype.

KEYWORDS:

Mobile Application, User Interface, Usability, User Interface Design, Mobile Banking, Mobile Finance.

CONTENTS

1 INTRODUCTION	6
2 RATIONALE	10
2.1 Background	10
2.2 Company Profile	10
2.2.1 Techcombank	10
2.2.2 Techcombank F@st Mobile App	11
3 THEORY	12
3.1 Interaction design	12
3.2 User Interface design	13
3.3 Usability	14
3.4 Prototyping	15
3.5 Designing for Mobile	16
3.5.1 Mobile first	17
3.5.2 User behavior	18
3.5.3 Context	20
4 METHODOLOGY	20
4.1 Heuristic Evaluation	20
4.2 User Analysis	20
4.3 Users Interview	21
4.4 Affinity Diagram	21
4.5 Personas and Scenarios	21
4.6 Brainstorming	22
4.7 Wireframes	22
4.8 Paper Prototyping	22
4.9 Cognitive Walkthrough	23
5 DESIGN PROCESS	24
5.1 Existing Analysis	24
5.1.1 Heuristic Evaluation	24

5.1.2 Competitor analysis	26
5.2 User Analysis	28
5.2.1 Affinity Mapping	28
5.2.2 User Personas	30
5.3 Prototyping	31
5.3.1 Features Prioritisation	31
5.3.2 Information structure:	31
5.3.3 Paper prototyping	33
5.3.4 Graphical Prototype	34
6 RESULTS	36
6.1 The choice of color, typeface and icon	36
6.2 Login Page	38
6.3 Navigation	40
6.4 Main Screen	40
6.5 My Wallet	40
6.5.1 Account Overview	41
6.5.2 Transaction Details	42
6.5.3 Card Overview	43
6.6 Payments	43
6.6.1 Payment Flow	44
6.7 Others Screen	45
7 CONCLUSION AND RECOMMENDATION	46
7.1 Existing Application vs. Future Application	46
7.2 Reflection	47
7.2.1 Techcombank at large	47
7.2.2 Learning Points	48
7.3 Recommendations for further development	48
REFERENCES	50

APPENDICES

Appendix 1. Other Users Personas

LIST OF ABBREVIATIONS (OR) SYMBOLS

OS	Operating System
Techcombank	Vietnam Technological and Commercial Joint Stock Bank
UI	User Interface
Vietcombank	Joint Stock Commercial Bank for Foreign Trade of Vietnam
VietinBank	Vietnam Joint Stock Commercial Bank for Industry and Trade
VPBank	Vietnam Prosperity Joint-Stock Commercial Bank

1 INTRODUCTION

The essential part of every computer and pocket device application is the user interface (UI). On behalf of the logical system, the UI is the main channel to perform a communication between the users and computer by displaying in terms of image, colors, text and even sounds. Therefore, every aspect of UI could produce a massive impact on the entire system to the end users. However, not many people understand an importance of the user interface. The choice between continuing using or dropping a certain application greatly depends on the first impression of UI.

As an advancement of technology, the smartphone is becoming a fundamental part of human essences. A personal device in person's pocket could be regarded as a means for serving numerous purposes rather than making a phone call or sending a text message. Furthermore, one of the fundamental advantages of a smartphone is that users could conveniently use a wide range of applications on their device to perform their desired actions. Thus, the development of mobile applications has become an essential target for the different types of enterprises and services in the market.

The financial sector is not immune to these trends. Every kind of business in finance is offering users a wide range of applications for managing money, sticking to a budget and even handling investment decisions. The contributions of banking and digital wallet applications are not only providing flexibilities and conveniences for customers but also aiming to change consumer behaviours.

The growth of E-commerce in the online payment field has been spectacular (Association, 2018). In order to compete with other opponents under the fierce competition in a market, the bank service needs to be focused, adapting to the trend of the market and meeting customer expectations. The second largest bank of Viet Nam – Techcombank has proven its position among top 5 leading banks on financial and banking services (Association, 2018). Unfortunately, the top 5 of best banking applications did not include the name of Techcombank F@st Mobile App (Nguyen, 2018).

Techcombank has always had great ambitions and a very progressive attitude towards technology, mobile banking, and application. According to bank's private research, Techcombank F@st Mobile App is facing the challenges of user interface design,

performance issues, and irrespective degree of functional requirements. Because the number of Techcombank app users has been increasing significantly, the necessity and significance of redesigning the Techcombank F@st Mobile App are needed to deliver excellent customer service and satisfaction. The new design must integrate functionality, usability, reliability, and efficiency factors. The goal of new user interface design is to make it a simpler, more friendly, and easy-to-navigate user interface which provides customers with a unique experience of performing their financial operations on the Techcombank mobile banking application.

The author started an internship in Techcombank as a database maintenance intern. After one month of working with the database, the new team was formed to rebuild the mobile application based on the negative feedback from customers. With recognized experience in design, the author joined the team as a UI designer. During the first period, the customer feedback was revealed when using previous application. Thus, the new revolution for a Techcombank F@st Mobile Application was needed to strengthen the position of Techcombank in the financial market as well as to improve the bank's service in the long run.

The project aims to redesign the new User Interface for Techcombank F@st Mobile Application. Accordingly, the thesis objectives are:

- To redesign a new functioning, reliable, easy-to-use User Interface for the new mobile application.
- To produce one and only completed design of User Interface for both operating systems iOS and Android.
- To provide a unique experience for the users when using the User Interface.
- To deliver a product that meets the abilities of the development team as well as expectations of the customer.

In this study, the process to design a new User Interface for Techcombank F@st Mobile App will be examine. Moreover, the final product with user testing case will present the result of the project. In order to achieve the objectives and provide the readers with intuitive result, the thesis will be divided into six main chapters.

Chapter 1: Introduction

In order to introduce the overview of the thesis, the first chapter mainly introduces basic concepts and the importance of User Interface for digital system and mobile applications. The research objectives are also clearly presented.

Chapter 2: Rationale

The chapter covers the research background which is the rise of banking application and current situation of e-commerce in Vietnam, followed by the company overview and the introduction of the F@st Mobile App.

Chapter 3: Theory

Several theories are discussed in this chapter to highlight the rationale of this study. Furthermore, the chapter presents the main factor for mobile design which covers the most important considerations for this study.

Chapter 4: Methodology

The methodologies applied for this study are explained. The chapter highlights the practical aspects of these methods that are applied in the next chapters of thesis.

Chapter 5: Design Process

Chapter 5 covers all the process of design from Existing analysis to Final Prototype. The process displays every kind of work that was conducted to complete the product.

Chapter 6: Result

The full completed set of User Interface is presented in this chapter along with the changes during the development time by receiving feedback from testers.

Chapter 7: Conclusion and Recommendation

The final chapter summarizes the key of product and provides a conclusion in terms of successful UI design towards testing phase. Therefore, the author will provide recommendations to developer team so as to develop and further enhance the new Techcombank F@st Mobile App.

2 RATIONALE

A well-designed UI can help an application maintain a top position on a most used application chart. This chapter will provide the background of the application market and the finance application market, following by the reason why the study on Vietnam should be conducted. In conclusion, the chapter clearly presents the objectives and structure of thesis.

2.1 Background

According to Statista, in the decade from 2007 to 2017, the number of smartphones sold to end users worldwide dramatically increased to nearly 1122 billion devices (Statista, 2018). The more powerful smartphone is, the more benefits that users can obtain by using a big touch screen, faster CPU and high-speed connectivity.

Since the introduction of Apple App Store and Google Play Store in 2008 and 2009, the number of applications available for download in 2017 on App Store was 2 million, while Google play store offers users to choose between 2.1 million apps (Statista, 2018). This introduces one of the fundamental advantages of a smartphone that users could conveniently use a wide range of applications on their device to perform their desired actions. Thus, the development of mobile applications has become an essential target for the different types of enterprises and services in the market.

The financial sector is not exempt from this target. Every kind of business in finance is offering users a wide range of applications for managing money, sticking to a budget and even handling investment decisions (Hong, 2019). According to Forbes, Acorns is the fastest growing investing app with 2 million users in the U.S market. Besides, 450.000 users are currently using Clarity Money as their personal finance management (Salz, 2018). These two examples represent the fact that the wave of banking and fintech apps will redefine personal finance.

Meanwhile, the financial sector in Vietnam, especially e-commerce has been developing and improving in both quantities and qualities. According to the Viet Nam E-business index, by the end of 2017, there were 89 percent of enterprises in the market that participated in the e-marketplace, followed by the noticeable rising of online

payment. (Association, 2018) The contributions of banking and digital wallet applications are not only providing flexibilities and conveniences for customers but also aiming to change consumers' behaviours.

2.2 Company Profile

2.2.1 Techcombank



Figure 1. Techcombank's Official Logo.

Official name: Vietnam Technological and Commercial Joint Stock Bank

Abbreviation: TECHCOMBANK

Head Office: 70-72 Ba Trieu Street, Hoan Kiem District, Ha Noi Capital City, Vietnam

Tel: +84 4 3944 6368

Fax: +84 4 3933 6362

Website: <https://www.techcombank.com.vn>

Email: techcombank@techcombank.com.vn

TECHCOMBANK is a Vietnamese Technological and Commercial Joint Stock Bank with branches across Vietnam. The bank was found in 1993 with the capital of VND 20 billion. The bank offers efficient financial services and banking for investors, who are in the need of capital for business and economic development (Techcombank, 2019a)

Through a network of 315 branches and 1,229 ATMs in Vietnam, combining with the most high-end and modern banking technology, Techcombank is organized into these

core services: Personal Finance Services, Small and Medium Enterprise Banking and Wholesale, for different and diverse groups of customers. Techcombank has been chosen as a financial companion by more than 3.3 million individual customers, and 45,368 corporate clients. (Techcombank, 2019a)

Since its first opening, Techcombank has grown strongly as well as remarked market performance over the years, thus the bank has been being recognized, multiple times, as a second leading bank in Vietnam. By 2016, Techcombank had received up to 10 international awards, highlighted by Best issuing Bank in Vietnam awarded by International Finance Corporation (IFC) – World Bank Group, Best Trade Finance bank in Vietnam 2016 awarded by Global Finance, Best Bank in Vietnam awarded by Finance Asia, ASEAN quality products/services and Most Favorite Brand ASEAN awarded by ASEAN, Best Cash Management Bank in Vietnam awarded by Alpha South East Asia, Best Customer Service Bank 2016, etc.

2.2.2 Techcombank F@st Mobile App

Published first time in 2013, Techcombank F@st mobile is a personal wireless Internet-based service which using 3G, LTE or wifi to allows safe convenient banking anytime, anywhere on the go through the smart phone device. Customers who have registered for F@st i-bank service of Techcombank only need to download and install F@st Mobile App, using the Log-in name and password of F@st i-bank to log in Mobile App. (Techcombank, 2019) The F@st mobile application allows users to experience wide range of services available for daily expenses.

3 THEORY

As introduced in previous chapter, the new UI is a must for the evolution of the banking experiences on mobile device. The customers, who are the main concentration of Techcombank, will be the main factor to develop the new UI as well as to rebuild a new application. The human factors such as the needs, wants and limitations of end users are the main specific for every designer to focus when designing a new product.

Furthermore, pursuing this main objective requires knowledge of graphical design in general and UI design. Accordingly, the basic principles of interaction design, user interface design, the usability plus prototyping play vital roles for this development. This chapter will discuss these theoretical factors and further present how efficient of the design in a satisfactory way.

3.1 Interaction design

In the modern world, the increasing development and advancement of information technology is the main factor to define various types of systems along with their complexities. Users often have problems to adapt with new software due to the poor design of the interface and overly complex function. By designing satisfied user interaction, Interaction design is essential to tackle the graphical interface for the efficient and easy way to use (Preece, et al., 2015). Since prehistoric time, people have had designed things and divided them into many areas of specialities to ensure that the products fulfill human desires completely while being understandable and usable (Norman, 2013). The interaction design is not an exception. The term defines multiple disciplines such as human-centered design, user interface design, software design and application design. The user experience requires the contribution of these fields beneficially to perform an effective practice (Preece, et al., 2015). Interaction design concentrates on developing people knowledge when using graphical interface by taking into consideration of their profile like age, culture or background. This process aims to help designers create usable and efficient digital artifacts by performing its own delighted methods and techniques. By attempting all of these benefits, stress and pressure will be deducted from the emotion of users.

3.2 User Interface design

In order to present the information and objectives of the application, the UI design is a significant part of building a bridge between a system and users. Generally, the UI design is created with relevant and essential information to allow users to reach desired actions with minimum amount of frustration or resistance. (Fernandes, 1995). The consistent UI design, furthermore, provides discoverability and understanding for users. (Norman, 2013). These factors increase user productivity and help them to achieve their goal when using applications. Therefore, the UI is the only face that people could see it visible in terms of the software. The bad user interface creates the misunderstanding and leads to the failure of transmitting information to users (Mayhew, 1992). Hence, developing a good UI design is hard and requires numerous efforts. Jacob Nielsen, however, provided a guideline on how to achieve it. The 10 heuristics for users interface designed by Nielsen will play a crucial part of this study. The following are Nielsen's 10 heuristics:

Visibility of system status

The system should always keep users informed about what is going on, through appropriate feedback within reasonable time.

Match between system and the real world

The system should speak the users' language, with words, phrases and concepts familiar to the user, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order.

User control and freedom

Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue. Support undo and redo.

Consistency and standards

Users should not have to wonder whether different words, situations, or actions mean the same thing. Follow platform conventions

Error prevention

Even better than good error messages is a careful design which prevents a problem from occurring in the first place. Either eliminate error-prone conditions or check for them and present users with a confirmation option before they commit to the action.

Recognition rather than recall

Minimize the user's memory load by making objects, actions, and options visible. The user should not have to remember information from one part of the dialogue to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate.

Flexibility and efficiency of use

Accelerators — unseen by the novice user — may often speed up the interaction for the expert user such that the system can cater to both inexperienced and experienced users. Allow users to tailor frequent actions.

Aesthetic and minimalist design

Dialogues should not contain information which is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.

Help users recognize, diagnose, and recover from errors

Error message should be expressed in plain language (no codes), precisely indicate the problem, and constructively suggest a solution.

Help and documentation

Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search, focused on the user's task, list concrete steps to be carried out, and not be too large.

3.3 Usability

Ensuring high usability is the central concentration of UI development. Usability can be seen as a term to use for interaction design to measure how easy the user interface or product is. There are several existing definitions of usability. However, the standard ISO 9241-11 declared it based on the effectiveness, efficiency and satisfaction in specified context of use. (ISO, 2018). According to Nielsen, usability includes five attributes below (Molich & Nielsen, 1990):

- **Learnability:** The system should be easy to learn.
- **Efficiency:** The system should be efficient to use.
- **Memorability:** The system should be easy to remember.
- **Errors:** The system should have a low error rate. Satisfaction The system should be pleasant to use.
- **Satisfaction:** The system should be pleasant to use.

A high usability is a standard to give users the efficient and effective of product. It also ensures the high quality product and enjoyable experience for users (Preece, et al., 2015). Furthermore, not only the users get the benefits from usability, the stackholder and development team also gain from prioritizing usability.

Numerous studies have proved that several benefits could be get from high usability. According to Sarah Blommer and Rachel Croft, the examples of reported benefits are: reducing the development costs, reducing training, enhancing ability to meet delivery deadlines, useful products and increasing of returning investments. (Blommer & Croft, 1997). Due to the fact that mobile device has a limited amount of screen play, the primary of the UI design could concentrate more on how to maximize the high usability for better user experience.

3.4 Prototyping

Development phrase is the most crucial stage of the whole process of introducing a new product. Providing a decent prototype to test before the actual application is essential to reduce a stressful debugging time frame for the whole developers. Generally, prototype is used for presenting a design idea and suitable for early test case to observing stackholders and developers. Bill Moggridge stated that a prototype is

a presentation of a design and is made before the final solution. (Moggridge, 2006). Moreover, in the paper *The Perils of Prototyping*, Alan Cooper had the same thought: “it is easier to break concrete rather than break a code” (Cooper, 2008). Thus, there is an undeniable fact that prototyping plays a key role in the whole process of UI design.

Prototype is the most effective way to test and evaluate the design. The communication between designers and other team members is strengthened by reviewing the whole design’s ideas work in practice. Testing a prototype also gives stakeholders and suppliers the general view on how the product would work in the future and declines the misunderstanding at the same time (Preece, et al., 2015). Furthermore, prototype gives development team various options to test different solutions against each other at an early stage and promote the best suitable solution for the next step of development.

There are numerous options of how to construct a prototype as long as it fulfills the purpose of design’s ideas. The design’s prototype hence can be anything on a basic white sheet or complex version of software prototypes, which allows interaction without deep functionality. A paper mockup is described as low fidelity prototypes where the simple sketches showcase the parts of application. (Commerville, 2007). This kind of prototype is the initial basis for the whole detailed idea generating. High fidelity prototypes are used to present with a lot of functionalities for showcase purpose. By using the high fidelity prototype, the designer can utilize the characteristics and reactions from the users on how the product should be used.

3.5 Designing for Mobile

Currently, designers are facing a shift in priorities when tasked with creating an initial layout for mobile view. Optimizing all of the contents, features and especially enhancing viewing experience are the main concerns. (Gilthorpe, 2016). Moreover, regarding the fact that people are usually trying to use their devices on the daily activities such as walking to the coffee shop, transporting on public commutes or going to the supermarket, etc., designers should try to reduce a distraction and increase a focus for them (Foudation, 2018). To archive that, several factors could be taken into account.

3.5.1 Mobile first

Designing the initial UI for mobile is totally different from what people do for the desktop. For the better user experience, the designers should focus on a "mobile first" approach by covering these considerations below:

Responsiveness:

A limited screen real estate on mobile device is the first fact for consideration. Unlike PCs and laptops, the contents for mobile UI could be sorted and then prioritized to create a hierarchy of primary objective (Gilthorpe, 2016).

When speaking about mobile devices, people usually prefer to smartphone only. However, there are huge amount of tablets or other personal devices with a big screen on the market. Thus, the screen size is varied and it is important to group the different types of devices based on their similar screen size for management. Furthermore, most of the devices can be used by landscape and portrait screen modes. It is so challenging to create a UI with responsiveness for all the dimensions of screens. (Gilthorpe, 2016) (McCartney, 2017).

Keep it simple:

Simplicity is the key to increase the better experience for users. Enhancing easy and unlicated user experience may contain optimizing navigation, minimizing input form, allowing short way sign-in (finger print, face recognition, etc.) and avoiding excessive scrolling and in one direction only. (Morman, 2018) Additionally, testing the graphics and image for better fit and reliable would help the UI function effectively. Various items to avoid could include complicated grahics, tiny button or rollover pictures. In this way, users are able to achieve their actions as few steps as possible and keep their attention on the application longer. (Gilthorpe, 2016) (McCartney, 2017)

Finger-Friendly design:

When using mobile devices, users are interacting the touch of fingers to navigate. Several finger gestures can be used to do specific tasks like touch, touch-and-hold, double tap, pinch and zoom or swipe to get to the next onboarding screen that allows users to operate the mobile devices. The users should be able to figure these gestures without any difficulty in a mobile application. (McCartney, 2017)

Another thing to consider is that people hold their phone in different ways. Sometimes they hold it with one hand, sometimes with two, and with one hand holding the phone. Most of the time people use their phone with one hand like when scrolling or calling someone. However, when texting users may need both hands. Thus, the designers must be able to facilitate the user's experience by keeping these in mind. (Natoli, 2015)

Feedback:

Applications may sometimes take time to load. But users may not be patient enough to keep waiting for the application to load if there is no feedback. The user may also think that application is broken and refrain from using it. Thus, it is always important to give feedback to the user not just when loading the site but after every time a particular task is completed. Bell rings when an order has been successfully placed so do the application. In some cases, other kinds of feedback could be considered like vibration or sound. The user should be getting a message that the task he or she did was completed otherwise leaving him in a state of confusion. (McCartney, 2017)

3.5.2 User behavior

The core of smartphone is a communication device to help people stay connected throughout the day. User's personality, needs and environment affect a type of phone and purpose of using this personal device. Nowadays, incredible versatile modern phone can be used in countless ways. However, mobile phones are mostly used in short bursts of goal-oriented activities and that distinguishes what mobile usage is. In daily activities, users make calls, find information, send text messages and pick up their phone for distraction and entertainment (Cerejo, 2011). Hence, in a short time frame, mobile applications should ideally be developed to do specific tasks. The mobile phone is used in a variety of contexts and mobile applications should be able to handle interruptions. (Cui & Roto, 2008).

Mobile device becomes an essential part of modern people in every day life. People assume that they carry smartphone everyday and that makes designing service for mobile become an incredibly interesting area. The instant available information on your screen is the first and foremost the advantage for the user while the downside is that mobile phones may interrupt and break harmony in our environment (Madhavan, 2018).

3.5.3 Context

Context for mobile service may include several areas when taking into consideration. The mobile and environmental contexts are always changing because of the fact that mobile users use their mobile throughout the day wherever they go, on the bus, on the street or in the store. Different environmental conditions such as weather, noise and brightness can create many design challenges for mobile devices and make some specific interaction methods impossible. The different social contexts, moreover, makes users divide their attention between the mobile world and the actual world. This makes it hard to anticipate how a particular user may use their phone in a given situation. (Garrett, 2011)

Nowadays, advanced technologies such as accelerometer, sensors or location-awareness are embedded into devices. These advantages increase the possibilities for innovative interaction design. When designing for mobile it is impossible to know all the user and environment contexts that the device may be used. Applications for mobile devices need to not crave full attention from the user at all times. But changing dynamic context also provides a great possibility for designers to design for a variety of contexts. The “context-aware” information in some cases may hopefully save the user a lot of efforts and frustrations (Häkkinen & Mäntyjärvi, 2016). Thus there are numerous possible situations that the designer cannot be prepared, one important solution when designing for mobile is to keep it simple and try to focus on the most important functions for the mobile users.

4 METHODOLOGY

In the following, all Interaction Design methods used in this project will be well-explained. The motivation for utilizing these methods is that they are all notable techniques, for both the author and the interaction design field, and have been beneficially appeared on the interaction design process by innumerable examinations and interaction design practitioners.

4.1 Heuristic Evaluation

Heuristic evaluation is a method to conduct the review of existing user interface and compare it against modeled usability principles. The engineering method, which helps designers to find the usability problems, plays a vital role as part of an interactive design process. (Molich & Nielsen, 1990) (Nielsen, 1994). As mentioned above, the 10 heuristics of User Interface Design of Jacob Nielsen was used to develop this project. These heuristics have been applied successfully for many products designed among various well-known companies in the world such as Apple, Microsoft and Adobe, etc. The heuristic evaluation will be discussed in the first part of the next chapter to evaluate the existing Techcombank F@st Mobile App as well as be used as a tool to compare the differences with the other competitors.

4.2 User Analysis

To develop an effective interface we have to understand what the users want to do with the system. User analysis should be described in such a way that it is easily understood by the users and other designers. Scenarios are one of the ways of describing the analysis. Some of the requirements from the scenario are helped in using appropriate search terms as the users may be unaware of them. Searches and request copies to the related material must be carried out by the users. (Shneiderman, 1980) (Bødker, 1989)

4.3 Users Interview

User interview is great technique that used to identify requirements from users, stakeholders and domain experts. Furthermore, the technique helps to gather information about user's needs and domain's problem. In the interview sessions, semi-structured or unstructured interview are mostly used where the interviewees are allowed to expand on their thoughts. In this way, the domain's problem is explored and well-conducted. The advantage of this method is that stakeholders and end users are involved early in the project and in the initial design decisions (Preece, et al., 2015). The users' interview was conducted by analyzing report from private questionnaires of Techcombank.

4.4 Affinity Diagram

An affinity diagram is often use to group ideas after brainstorming session. This technical tool help designers to gather and structure design ideas. Designers group functions, screens, concepts in different fields and write these on post-it notes then place related ideas together. The process helps designers discover problems and design issues by giving structure and overview over all the ideas. (Maguire, 2001). The affinity diagram for this project helped author found major problems of current application and developed the information structure for the new UI.

4.5 Personas and Scenarios

Persona is a method to create the fictional users from targeted user group to use the future application. Conducting these future users in great detail helps the designer relate to the user group. By describing their attitudes, attributes, strengths, weaknesses, goals and context in great detail, the personas are become modular to contribute the characteristics of real users in order to help designers build a proper product. (Maguire, 2001).

Scenario is a method connected to Personas. Scenarios are a useful tool to create realistic user stories of actions that persona interacts to accomplish their goals in the future application. The scenario describes the tasks, context and mindset of the user

while using an application. This storytelling technique is naturally helping designers in describing, communicating and relating to user needs. Scenarios are used to describe and clarify design decisions later in the project. (Maguire, 2001)

4.6 Brainstorming

Brainstorm is the most widely used and known approach for getting constructive ideas and collective solutions to a new problem. It's also a frequently practiced form used in interaction design for ideation to support users. The purpose of brainstorming is to leverage designers' design ideas in an open forum by engaging with each other and these ideas should not be debated or criticized. (Oulasvirta, et al., 2003) (Maguire, 2001) Brainstorming is an effective tool, especially when designing for every design process with complicated contextual areas. (Oulasvirta, et al., 2003)

4.7 Wireframes

Wireframes are mostly used to lay out content and prototypes for testing and functioning several creative ideas. The wireframes are used in the early development process to establish the basic structure and navigation of the UI to the user before contents and graphics are added. Thus, wireframe provides a visual sketch for helping stakeholders and project team review before the next phase of creative gets underway. Wireframes have a wide range of forms to choose from simple structural drawings to high-fidelity interactive mock-up, with animations, functional links and complicated interactions (Peurta, et al., 2005) (Bank, 2018).

4.8 Paper Prototyping

The basic wireframe form could be using the most useful tool such as pen and paper. The simple drawing on a paper is entirely a easiest way to demonstrate the early ideas of the project. For better demonstration, paper prototyping can be defined by sketching UI screen and elements on paper as presenting for a further digital solution. From the simplicity of the technique, the development team are allowed by quick visualizing and testing numerous ideas and concepts. The paper prototyping has been proved its extreme helpful during the beginning stage of conceptualizing (Babich, 2018). The

author chose to sketch the low fidelity prototype on paper to see the big picture of the whole application in this project. Paper prototyping was the first prototyping step of this project and will be discovered in the next chapter.

4.9 Cognitive Walkthrough

The cognitive walkthrough is an evaluation method for usability issues which requires one or more person to go through a session by hosting a session and guiding users to perform tasks. This method aims to strengthen the understanding of the product's system for new and infrequent users. Expressing idea and directing feedbacks from users during this interaction would help the host maintain the session and discuss further with users as well. (Spencer, 2000) (Sears & Hess, 1998). Moreover, the cognitive walkthrough is extremely cost-effective and fast method to take into account when compared to other usability testing forms. (Wharton, et al., 1992). By using this method, the designers and developers obtain comprehensive views about existing problems of misconceptions and misunderstandings of the prototype. The cognitive walkthrough was performed through all prototyping steps by testing users.

5 DESIGN PROCESS

Inspired by Everett N McKay and Jenifer Tidwell, the process of designing the new UI is shown in the figure below. The author's choice is mainly based on numerous beneficial characteristics of the theories. Furthermore, the success of other previous related projects has proved the usefulness of these books.



Figure 2. Design process.

The analysis of an existing application is the first conduct of this process, followed by research and comparison with the others. Secondly, the process requires the user interview to explore the user expectations, and a discussion of a affinity mapping and personas. Lastly, the final decisions on which ideas to generate and which functions to keep will be based on the prioritized list in agreement with the product owner and developers. (McKay, 2013)

5.1 Existing Analysis

5.1.1 Heuristic Evaluation

The author chose a Heuristic Evaluation as the first step of this project, which essentially is a usability application audit of the UI on the current Techcombank F@st Mobile Application. Figure 3 provides information of fragment of services.

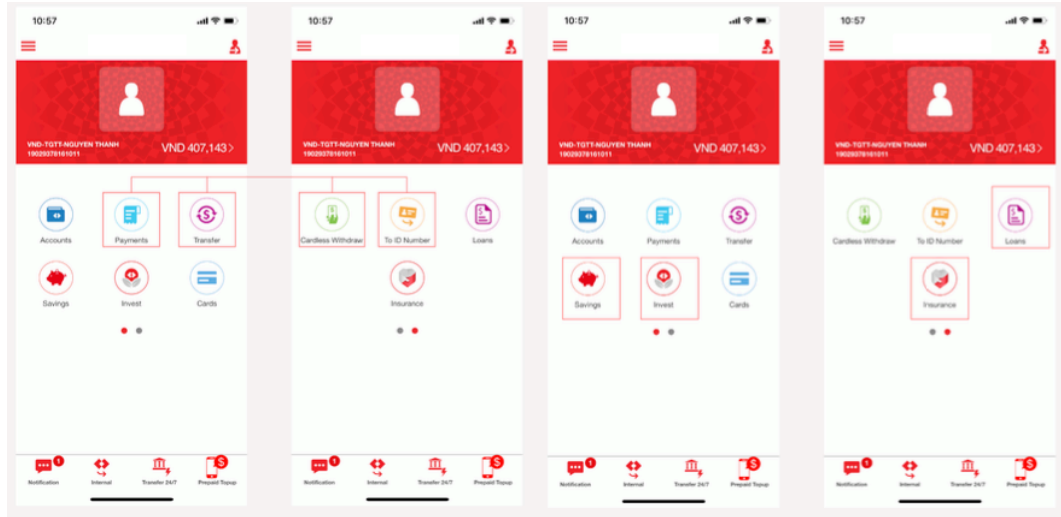


Figure 3. Fragment of Services.

There are several payments services on the home screen provided a one-touch function that is extremely fragmental. These functions should allow users to do the transaction by the categories. However, the order of icons creates a confusing for the users to comfortably pick their choice of transactions.

The same issue happens with other banking services such as Savings, Invest, Loans and Insurance. The fragment again contributes fundamental frustration for users when performing desired actions. Moreover, these features are not functional on the application because the application only takes users to the webpage where the relevant information is shown. Then these central spaces on screen should not be taken by the unnecessary features.

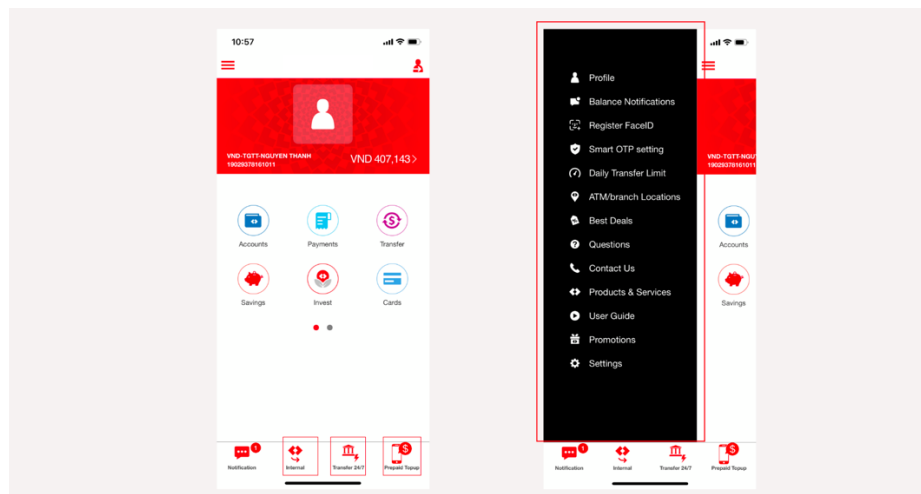


Figure 4. Problem with Toggle and Navigation.

Moving to the next usability wall, the navigation bar is where the main functional features could be placed is now covered with the redundant payments choices. Furthermore, the dimension and quality of the icon as well as the text are placed against the basic guideline of designing app UI from both Apple and Google. (Apple, 2019) (Google, 2019) These issues is creating a huge effect of frustration for users whenever they want to navigate through the app.

Lastly, the extensive list of categories in toggle would be reconstructed for better management. For example, the "Register of FaceID" and "Smart OTP Setting" could become the subcategories of settings function. The unorganized structure runs against users and making them leave the app very quickly.

5.1.2 Competitor analysis

According to Vietnam E-commerce Association report, the mobile banking applications from Vietcombank, Viettinbank and VP-bank are on the top of customers' satisfaction beyond the others in 2017 and 2018 (Association, 2018) (Nguyen, 2018). Then, taking into account of these applications used on the go, the comparison between Techcombank F@st Mobile Application with these competitors is worth conducting.

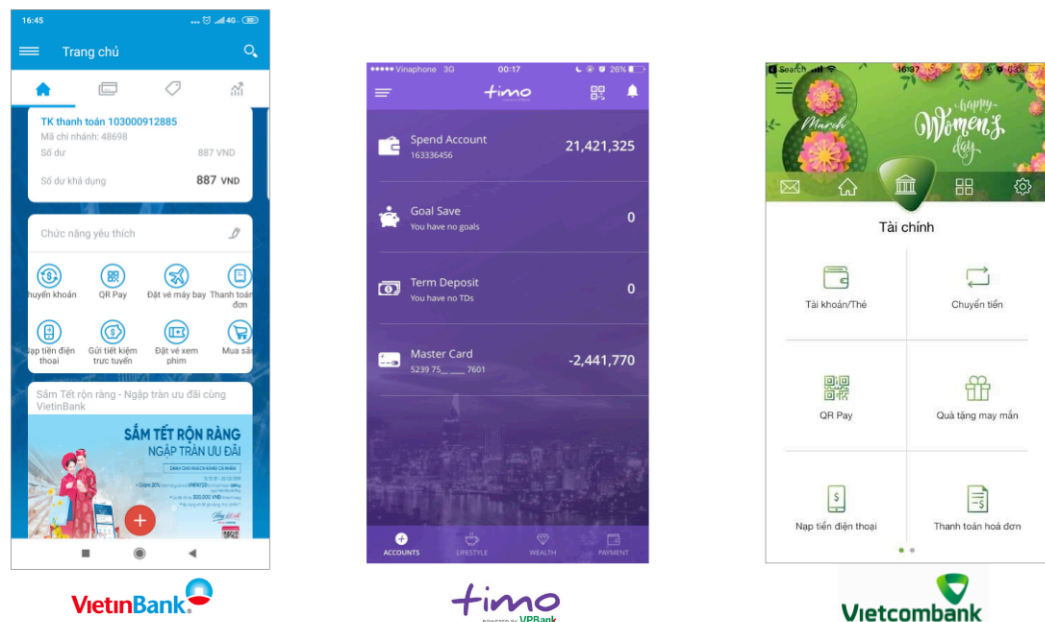


Figure 5. Banking Application UI from other competitors.

The banking services in Vietnam have several common services that can be applied for all financial organizations. However, the main certain points to help these applications stand out from the others are the visibility scale and appropriate organizing of the application's features. Customers find flexibility, user friendliness and reliability when using these apps. (Association, 2018)

Following Nielsen's 10 general principles for interaction design, the competitive analysis below placed Techcombank F@st Mobile Application against the others by using scale 1(lowest) to 5(highest) point system.

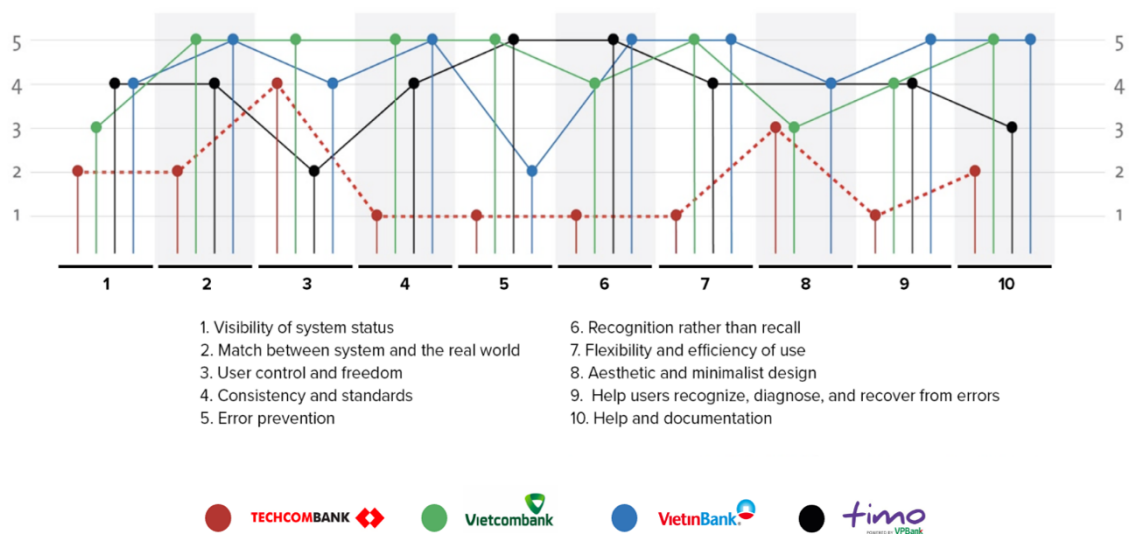


Figure. 6 Competitive Analysis.

Figure 6 clearly shows that the Techcombank F@st Mobile Application fared below the average for usability interactions.

After the analysis, there are few adjustments can be produced to redesign the User Interface of the Techcombank app such as reconstructing the home screen, editing the navigation bar and reorganizing/grouping similar kind of functions. However, these are just assumptions. The research needs to continue to expose the users' opinion.

5.2 User Analysis

Before getting to an interview, there are many different fields to take into consideration. For several purposes, everyone has their own motivation to create a bank account. For example, university students need it to pay for their tuition or receiving fund from their family. However, office workers do need a bank account for receiving a salary for each month. Additionally, elders totally pay attention to the savings and the interest rates or rewards that they will get. Nevertheless, these different group of people do use others financial services of bank beside their primary reason. For the first interaction, people usually do not take into account how the User Interface affects on the usabilitys. They intend to look for the desired features and drop off the app after a long time finding without results. Therefore, the target of this sector is to gather the data from the most valuable experiences from the customers. Then, the actual demands from them will be explored.

5.2.1 Affinity Mapping

Subsequently, the affinity mapping is carried out with the use of customer's references, particularly collection of pain-points and set of questions which need to be solved. The technique is an effective and efficient way of collecting similar or part-similar problems and questions then carefully organizing them into different groups that eventually produced a big picture. With the contribution from the marketing research team, the author finally explored the completed affinity map. The target population is customers who have been using the Techcombank F@st Mobile App; and they are divided into three different age group. As display in the figure below, group blue includes cutomers from age 18 to 30. The older group is displayed by red color and the age of this group is from 31 to 50. Lastly, senior group preresents the customers over 50.

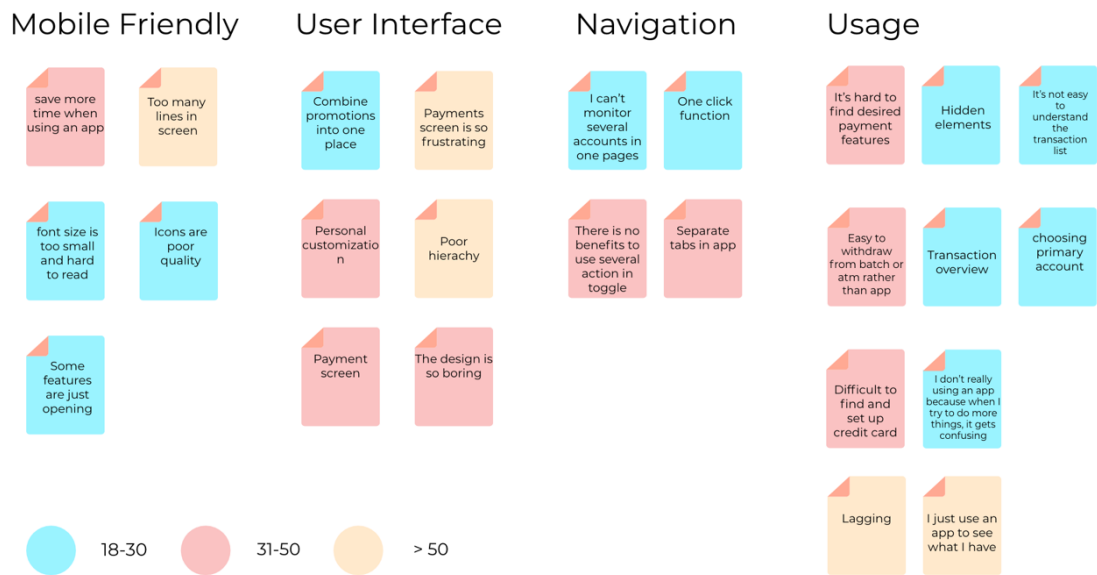


Figure 7. Affinity Map.

Responses were obtained from Affinity map can be organized into several aspects that had to take into consideration for the new User Interface design. The list of aspects included:

- Mobile Friendly
- Livelier User Interface
- Smart Navigation
- View Bank Statements + Current Cards
- Customer Services
- Flexible Payment
- Special Offers
- Easy Access
- Alert and Notifications
- Smart Categories
- Customization

5.2.2 User Personas

As presented in the methodology chapter above, personas is a technique to create fictional users from targeted user group with detailed description of their personalities and goals when using the app in the future. The author and marketing team subsequently created the main persona that describe below. The other personas will be attached in appendix.

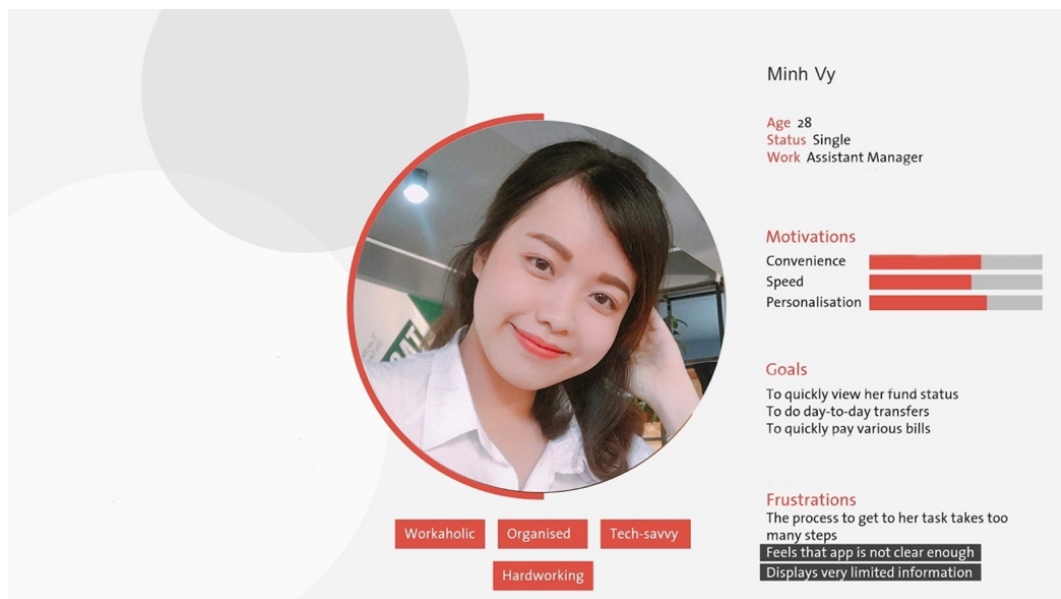


Figure 8. Persona no. 1.

Minh Vy-the assistant manager represents the young age group of customer who tends to find their convenience in every aspect of daily life. A tech-savvy person who are really hard working and organized. Hence, she expects to review the day-by-day transactions and fund status consistently. Moreover, the app should allow her to pay several type of bills by the end of month without many efforts. The current application, however, produces many steps to complete the payment. The main functions are fragmental and display very limited information.

5.3 Prototyping

5.3.1 Features Prioritisation

Based on the analysis results, the 2 by 2 matrix were conducted to carry out specific features. By categorizing them into different areas of the matrix, the information architecture and hierarchy of the new Techcombank app was revealed.

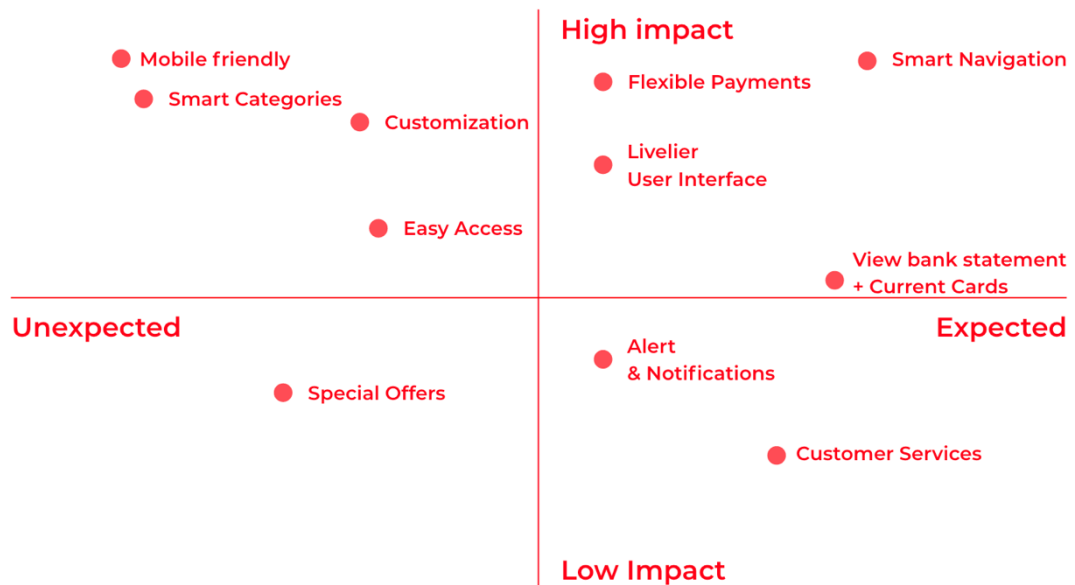


Figure 9. Features Prioritisation.

The product's owner and lead of the developer team totally approved with the list of features which was shown above. The next step will be disclosed in the next subchapter.

5.3.2 Information structure:

The activity diagram was used to construct the new architecture for the application. The process demanded the contribution from author and developers. For the best quality and informative of the structure, the diagram was created by using Vietnamese. However, the main improvements will be displayed in English for better understanding for readers of this thesis.

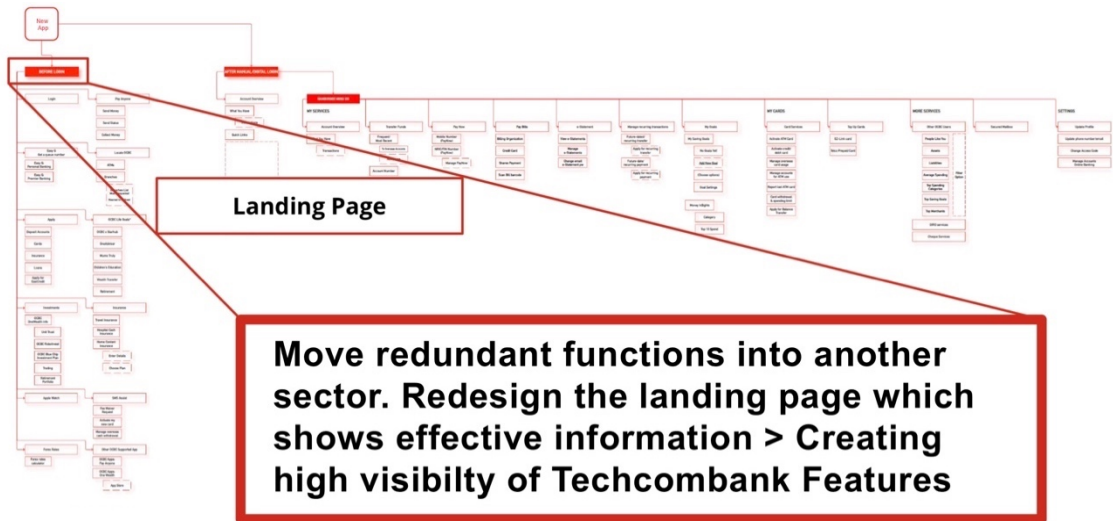


Figure 10. New Improvement for Landing Page.

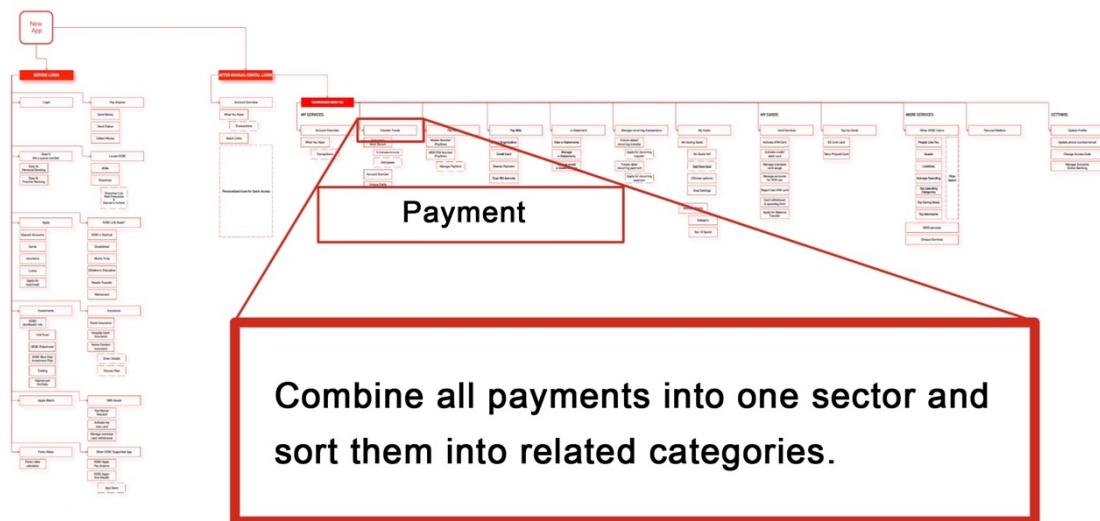


Figure 11. New Improvement for Payment.

The unsuitable wireframes, however, did contribute some elements and perspectives to improve the process of design. Furthermore, by combining the advantages of each version, the final low fidelity wireframe would be essential to build a high fidelity prototype.

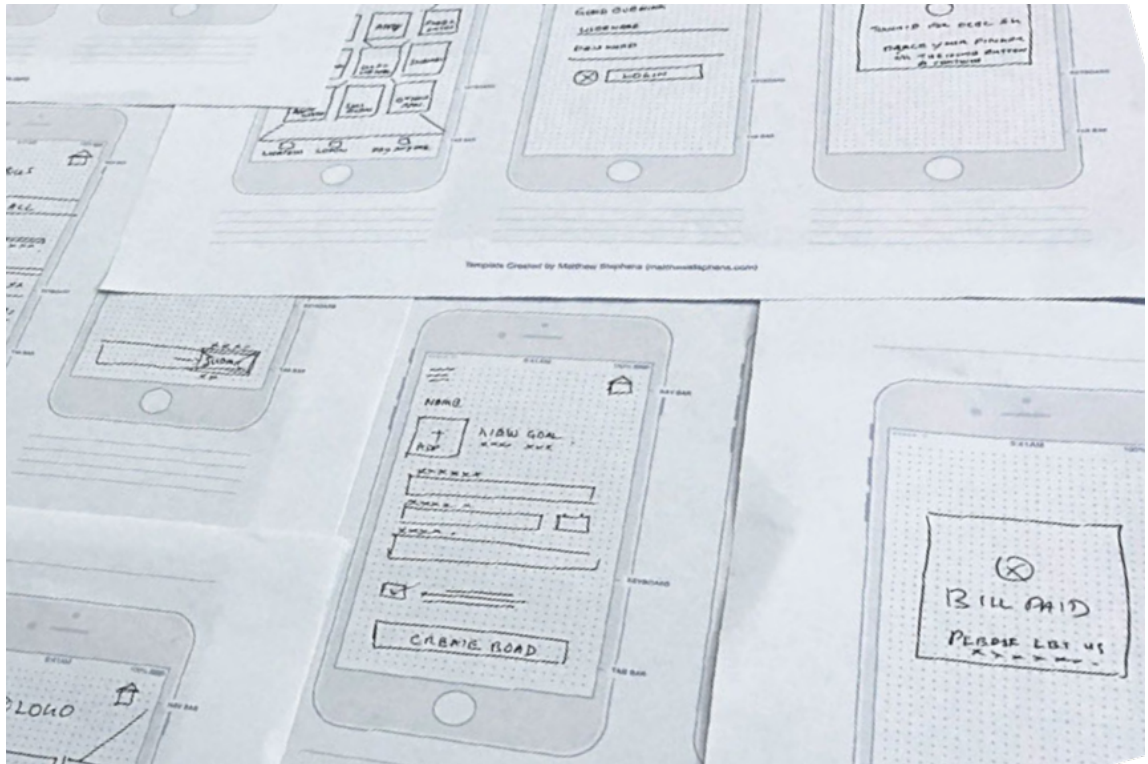


Figure 14. Paper Prototype.

5.3.4 Graphical Prototype

The development of first prototype with users tests was the base to help author enter the final phase – designing the final prototype. For this stage of creating high fidelity prototype, the software named Adobe Experience Design (XD) was chosen to perform the idea by building a graphical visualization and functional prototype which could work on mobile device for testing purpose.

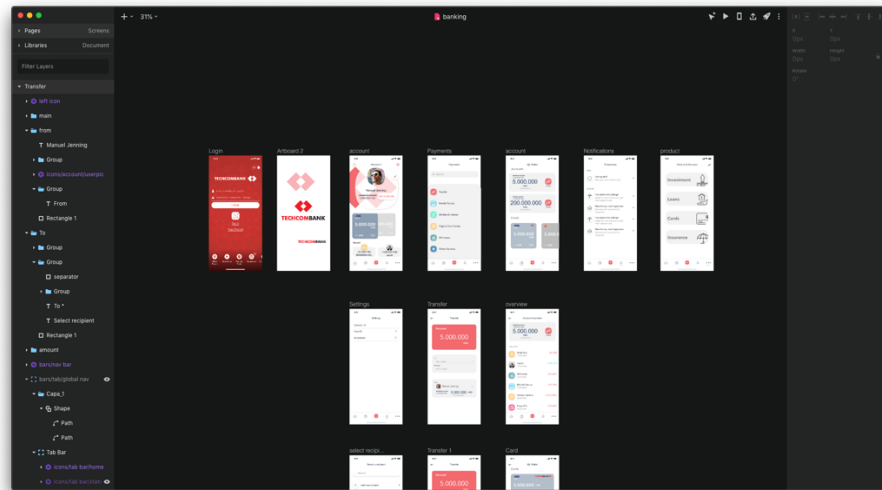


Figure 15. XD's interface.

This phase was the final of the process before the actual development. The interaction prototype was built with the abilities for users to tap on specific elements to navigate through the UI. Therefore, the liveliest actions could be provided for testers. Hence, several type of testers were involved in experiencing the prototype besides the developer team and marketing team. The test sessions were carried out among other department employees as well as active customers who urge to try new technology.



Figure 16. User Testing.

6 RESULTS

This chapter will cover an overview over final prototype and describe all of the functions, screens and navigation. The old version will also be displayed for comparison. Besides, some critical changes were encountered during the development phase will be discussed as well. These changes came from the testers, who is bank employees as well as loyal customers of the bank. The changes are suitable and essential to fulfilling the demands from target customers. There are two versions of the final UI: English and Vietnamese. However, for the most suitable with content in this thesis, the English version will be displayed.

6.1 The choice of color, typeface and icon

Color

There are three main colors were chosen to display the whole UI with the white background. The colors present the livable elements and improve the first impression from the users. The list of color with its own hex code is shown below. Besides, there are several sub-colors were chosen to present other elements in the app.



Figure 17. Main colors.



Figure. 18 Sub-colors.

Typeface

Typeface is known as the set of fonts composed of glyphs. (Christensson, 2006) The typeface was used in this project is Avenir. The reason why choosing this typeface mostly based on the support of Google font which helps developers implement these fonts without much effort. Secondary, the font displays well on the smartphone screen and creates a positive experience for users.

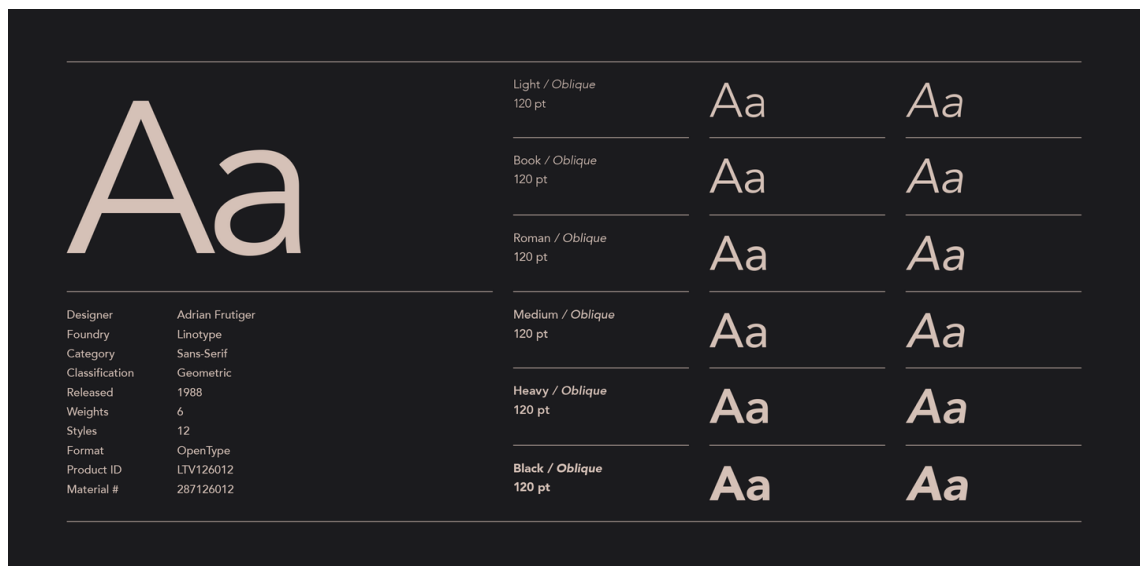


Figure 19. Avenir Typeface.

Icon

The set of icons was designed by the author by using Adobe Illustrators. Because of the poor icon quality discussed in the previous chapter, the new set of icons is needed to improve usability and overall experience. The icon will be present in each subchapter.

6.2 Login Page

The first interaction people need to perform to any system or application is login or register. The Login Page, hence, plays a vital role in the first impression of the users. For the new Techcombank F@st Mobile App, the Login Page presents the Techcombank logo along with Techcombank symbol as a pattern was used in the background. On the top right, the language switch is placed to help users choose between English and Vietnamese. The input fields including username and password are indicated in the center, followed by the option of security login (FaceID/TouchID) and other sign up options. In the bottom, several guiding is shown to help customers get through.

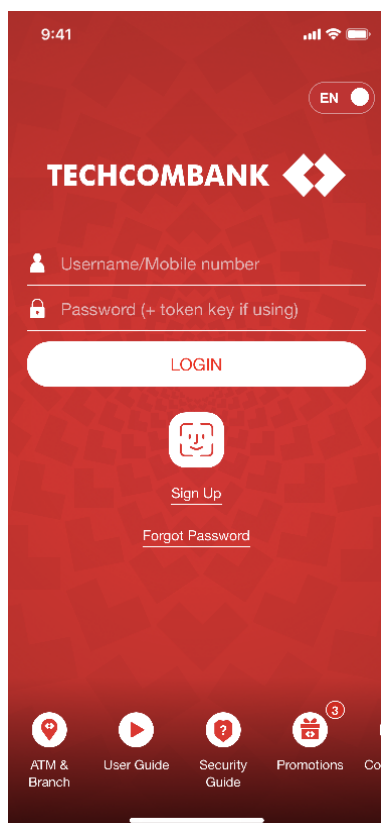


Figure 20. Login Page.

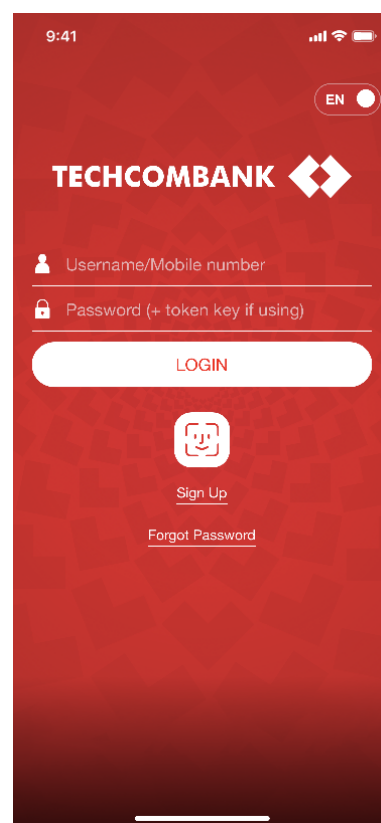


Figure 21. Login Page – Revised.

However, the problem encountered whenever users look at the login page, they always skip the content from the bottom. Looking from the lense of user, the content from the bottom was erased.

6.3 Navigation

Navigation is the most important factor to enhance usability and user experience for the new application. Due to the current frustration and redundant features in the toggle that were discussed in previous chapter, the toggle was removed and the new navigation bar was built to please the new purpose.

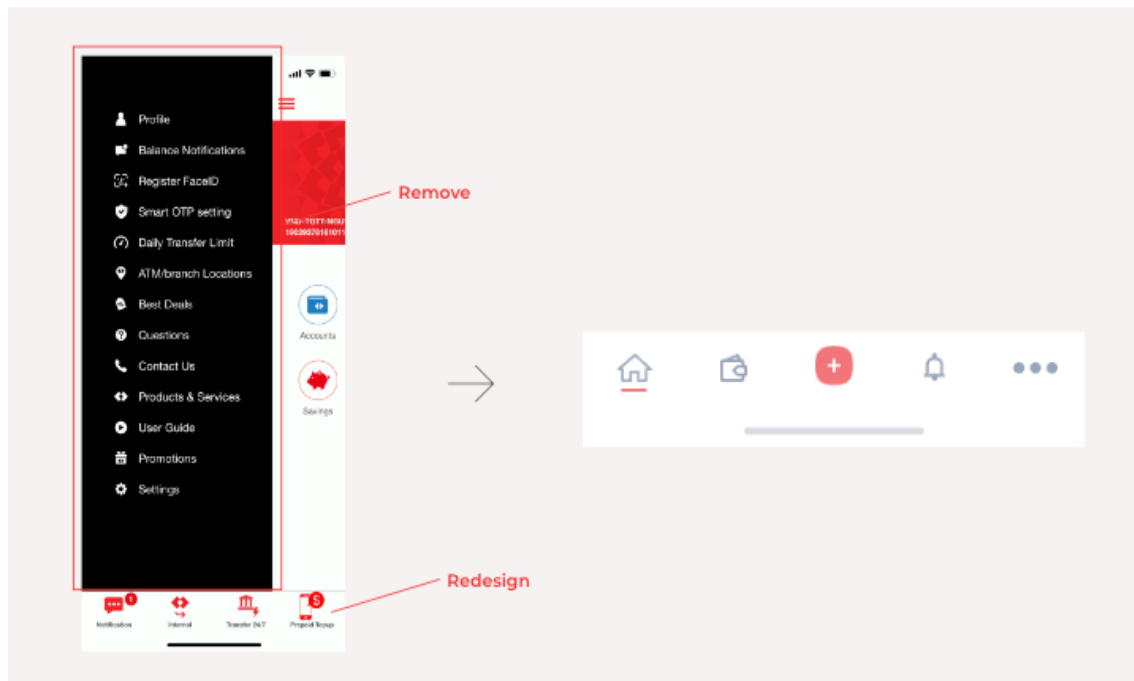


Figure 22. New Navigation.

The new Navigation Bar has solved many critical problems from an old version of Techcombank F@st Mobile App by creating 5 new tabs that including all functions, products and services needed for customers. The small red line under each icon indicates which page is chosen. On the other hand, the old, low-quality set of icons was replaced by the new and modern icons. Even if icons are the microelements of design which many people usually ignore, the icons still play a pivotal role to clarify the purpose of each function. Taking the main screen as an example, the home icon clearly presents for the customers that the page is the home screen and contains several essential information. The simplicity and clarity of the new icon set have been received many positive responses from the testers. Thus, the straight forward language between users and the processes within the app has been developed.

6.4 Main Screen

The Main Screen helps users to review most attractive information that was pointed out from the previous chapter. The pain point such as uncategorized session and fragment of features have been solved by combining and moving these features to another tab. Moreover, the main account, current cards as well as recent transaction are clearly presented.

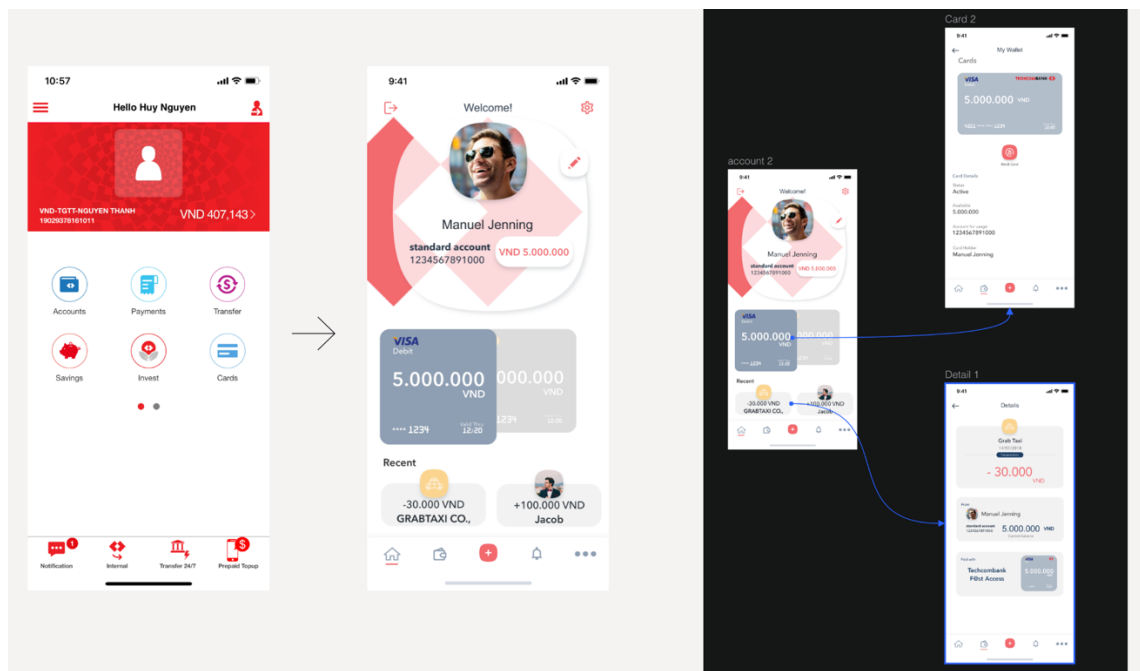


Figure 23. New Main Screen + Related Screen.

The main screen is now liveable and functioned. The place of toggle on the top left is now “Sign Out” and the Setting places in the top right corner. The new dashboard helps users to accomplish the goal by providing them the main account information including account number, balance and ability to edit avatar. Users are also given a ability to check their current cards or latest transactions. These related screend will be discussed in next parts.

6.5 My Wallet

By introducing “My Wallet” that includes all the accounts and cards of user, the problem discussed about lacking of information has been solved. Firstly, users easily

check all of their available accounts with available balance and account number. Furthermore, the transfer button allows user an opportunity to perform quick action for payment service. Secondary, the card field provide a list of cards and their basic information such as current balance, valid date, type of card and last 4 digit of card number. The screen flow of this session is presented below.

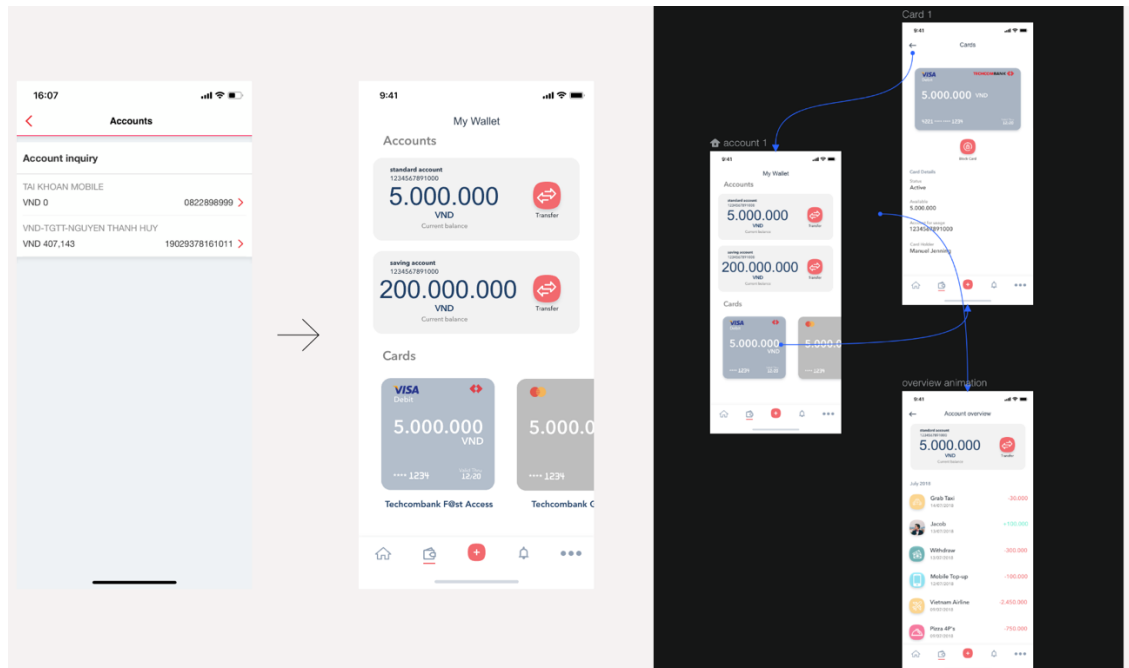


Figure 24. My Wallet + Related Screen.

6.5.1 Account Overview

By tapping to specific account, the account overview is displayed with account label and latest transactions. The button of transfer is still existed in this page to create the convenience for users whenever they want to use quick action.

The transaction list gives users a chance to review their transaction by showing a type of it with suitable icons, color indicator and date of purchase. The amount is showing on the right side with red color for balance spending and green color for balance receiving. The search function on the top right corner will lead users to search page where they can perform their search action.

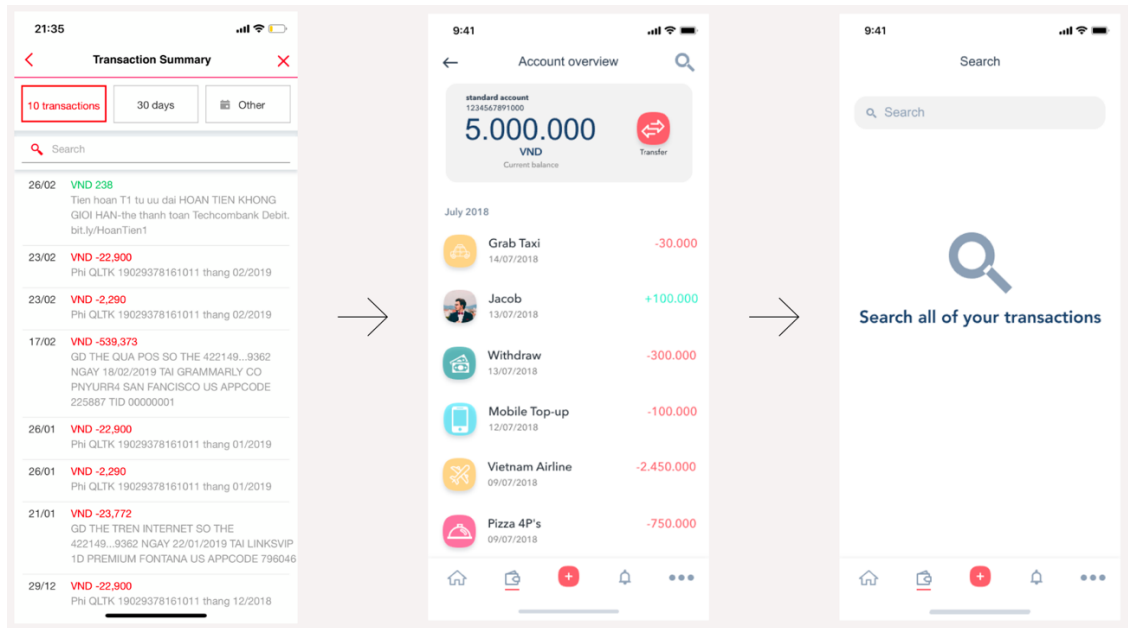


Figure 25. Account Overview + Search Transaction.

6.5.2 Transaction Details

No more lacking of information and boring summaries. The Transaction Details not only gives you a new liveable design but also provides enough information needed for your reviewing. The Transaction Details can be accessed by tapping transaction in Account Overview or simply choose the latest payment in Main Screen.

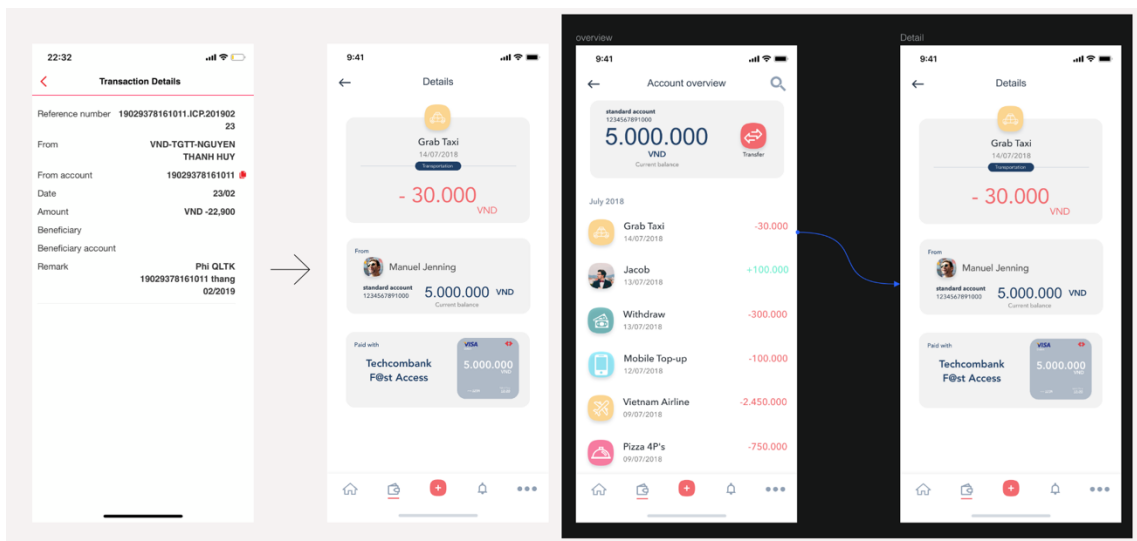


Figure 26. Transaction Details + Flow.

6.5.3 Card Overview

This function provides customer full information of their card from status, available balance, account for usage to cardholder name. Moreover, Card Overview allows users to block their card in case of lost, stolen or other emergency cases.

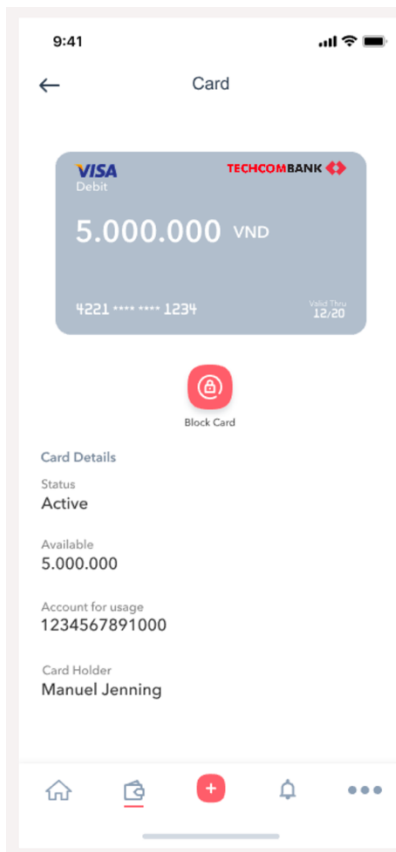


Figure 27. Card Overview.

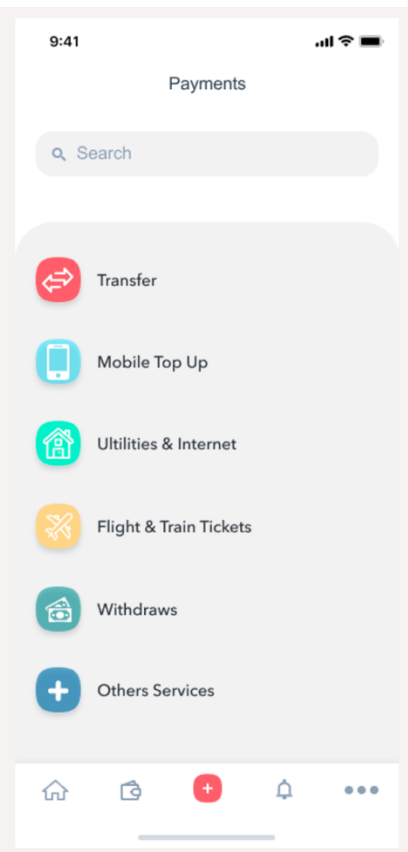


Figure 28. Payments.

6.6 Payments

In order to solve the main problem of fragment, the new Payment screen was created to combine all the payments service of Techcombank and list them in logic order. These services now have new icons and color labels and are ready to perform actions for users. Moreover, the Search bar is appeared to help people search for their desired services.

6.6.1 Payment Flow

The aim of this part is describing the process of payment from the start point to the end. For each payment type, there are some minor differences. However, the main points of these transactions are similar. Thus, the author only takes Transfer as an example for this part. The Payment Flow is described in a diagram below.

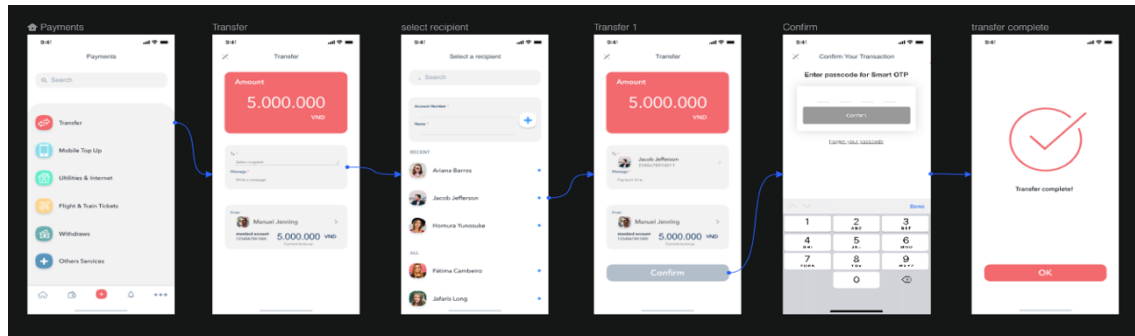


Figure 29. Payment Flow.

In this scenario, Manuel Jennings wanted to transfer 5 millions VND to his friend – Jacob Jefferson from his standard account. He first started by choosing Transfer in Payments Screen. The Transfer screen displayed with three main fields: Amount, To and From. He placed 5 millions to red Amount field and continued to choose his friend from Recipients Screen. The Recipients Screen provides the search function to help Manuel find his friend. However, Jacob was already his recent contact then he just needed to pick him from the Recent field. In other transactions, Manuel are free to choose among the others or add a new recipient by using the Add function under Search Bar. After chosen his friend, he tapped Confirm button and the application started to ask for his Smart OTP password (secure password created by user). He typed his password and completed his transfer.

This new payment flow may not have many differences from the previous application. However, the changes of UI elements create a smooth and intuitive experience. Accordingly, the testers were very impressed with the new changes and they would like to see it in the new Techcombank F@st Mobile App.

6.7 Others Screen

These screens have simply placed some information about additional or promotions. The introduction of these screens did help to accomplish the goal of reorganizing. The users from testing session found some interesting about these functions. However, they also stated that these were not very important to them and they would like to see it as the extras to check in their sparetime. For instant, the promotion screen provides many good deals that may attract users' attentions. By tapping to the news, user will be directed to suitable webpage which shows details of the promotion.

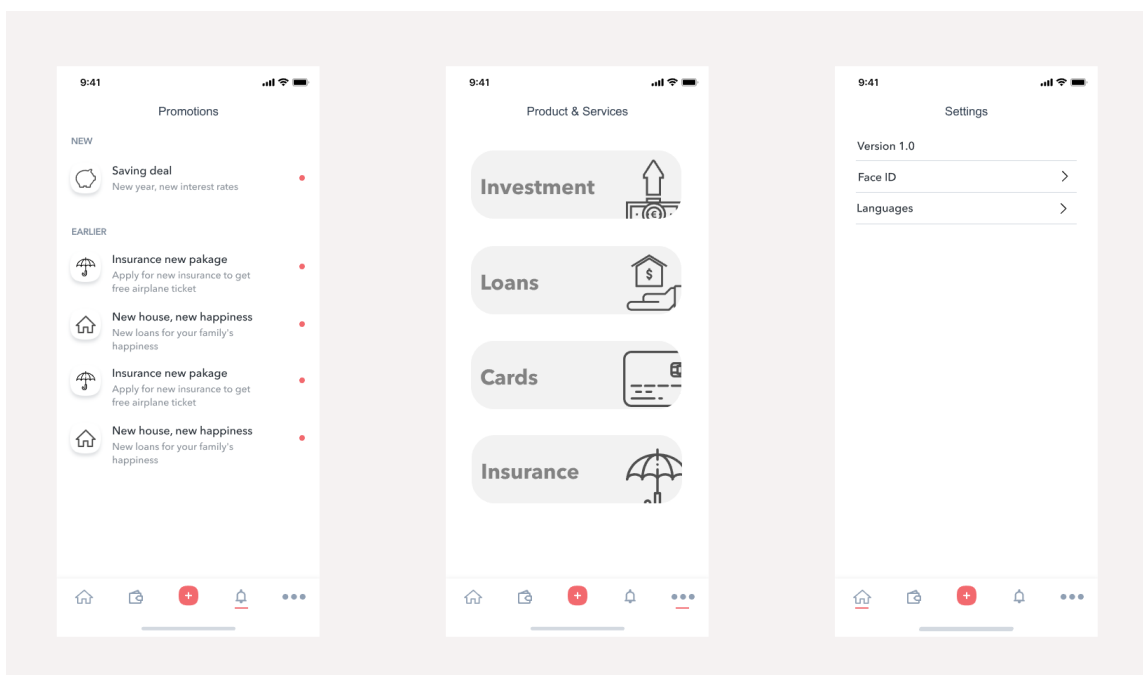


Figure 30. Promotions, Products, Settings.

Additionally, the settings screen displays version of this app, options for security and languages. These basic settings are critical for every financial application. The settings can be added by request from a product owner or a developer team.

7 CONCLUSION AND RECOMMENDATION

The final chapter aims to present the significance of the project which is the new User Interface of Techcombank F@st Mobile Application. In other words, the objectives of the thesis will be addressed in order to review the achievement of the project as mentioned in the first chapter. Therefore, discussion toward the project's outcome will be presented from a customer perspectives. Moreover, the recommendations are proposed for the developers and product owner.

7.1 Existing Application vs. Future Application

The problems with the existing application have been addressed in Chapter 5. The fragmented, unorganized features and redundant factors have been creating numerous frustrations and confusions for the customers. Therefore, the brand has been facing the problem of satisfying the customers and losing customers and credibility.

The new User Interface which is used to develop the future application, on the other hand, has been solved the critical problems above by meeting customers' expectations, and gaining their trust. From the research, testing and design iterations, the result meets the objectives that have been addressed in Chapter 1:

To redesign a new functioning, reliable, easy-to-use User Interface for new mobile application.

The new liveable design has proved its functioning by providing customers various crucial usabilities by grouping, organizing financial features of Techcombank into reasonable parts in each screen. The work flow of each process has proved its clarity and understandable. The mobile application has, therefore, become friendly and provided easy-to-use experience.

To produce one and only completed design of User Interface for both operating systems iOS and Android.

The new interface follows the guideline of design theories that have been proved their consistence over the years with many successful products from well-known companies around the world such as Apple, Amazon, or Adobe. The theories adjusted in Chapter

3 not only help the author to create the completed interface but also maintain the flexibility of the design which can be applied for both operating systems iOS and Android.

To provide a unique experience that users can get when using the User Interface

The new UI provides users with a whole new set of elements including colors, icons, and new screens. Judging from user-based feedback, the solution successfully created new experiences beyond other financial applications.

To deliver a product that meets the abilities of the development team as well as expectations of the stakeholder.

Every stage of the project involved the contributions and requests from the development team as well as the stakeholder. Their opinions totally were essential to help author deliver a reliable result. Furthermore, from technical perspective, they played the vital role of being tester to go through the whole prototype and contribute to the crucial feedback to help to revise and improve the UI.

7.2 Reflection

7.2.1 Techcombank at large

Any innovation of digital products such as an application or website needs to fit into primary service providers and align with the company mission. Therefore, understanding the structure of Techcombank services and missions were the starting point. The company profile is a must to study before developing anything under the company's brand. Any failure could cascade uncountable serious problems and ruin the company's reputation.

7.2.2 Learning Points

The advancement of finance application

Technology is now shaping the whole finance market. The way users interact with applications is changing the whole story now. To ensure their position on the field, financial organizations need to concentrate on developing their technology and adapt to users' need. In this way, the industry will be driven in the right direction.

The importance of User Interface

In order to present the information and objectives of the application, the UI design is a significant part of building a bridge between a system and users. Generally, the UI design is created with relevant and essential information to allow users reach desired actions with a minimum amount of frustration or resistance.

Testing is the key

The importance of users' feedbacks has been discussed throughout the thesis. The users' test, therefore, were a crucial part in helping developing the result. The author came to realize the importance of users' testing and how essential iterations are to achieve a good result.

Utilizing resources

The value of constantly validating and iterating is significant in product design. Using theories, related projects and resources did help to pursue the primary goal of the project. Besides, these valuable documents sharpened and enhanced the author's knowledge and skills for future endeavors.

7.3 Recommendations for further development

Testing and iterating

By conducting user testing, the author gained great insight and a roadmap for direction. Thus, the developers should follow the path of testing to gather enough objective data. This process helps developers refine the problems and improve the product to meet

customer expectations. The product owners should also be open to receiving feedback from employees as well as customers to improve their services.

Financial Research

The research is a must to adapt several important characteristics of the industry. Once UI/UX developers understand the characteristics, they start to invent better ideas and create the best solution.

Furthermore, it is crucial for developers in general to learn and receive advises from financial experts. Their perspectives are very valuable and intuitive to help improve the product and saving the development time.

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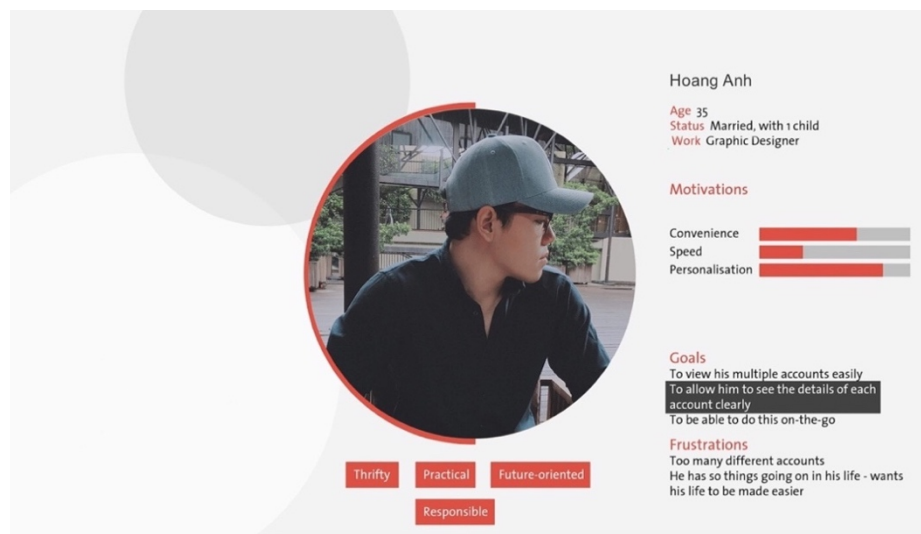
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Appendix: Other Users Personas



Moving to the next persona, the graphic designer in middle age has a small family. His daily purposes are totally different than other groups of customers. The married man has to have different accounts for several goals such as saving or payment for childrens. This type of people desirably wants to use the easy and mobile-friendly app that could help them handle numerous accounts.



Last but not least, the elder taxi driver who will be soon retired. He represents an older age group in society who are hard to adapt a new technology. The daily income from his job is the main reason why he will use the app. Thus, the customer expect the app has to be easy to understand and intuitive to use. Unfortunately, the current app is creating the big frustrating to him and he urges to see the big different in the new app.