Early phase of user involvement to validate the minimum viable product: An approach of Lean UX

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Md Atikur Rahman
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Abstract

Early product design and development in startup is filled with various challenges due to lack of resources, product idea, finding the targets markets, and so on. Scientific literature did not concentrate on those challenges during the development of the minimum viable product (MVP) in startups.

The aim of this research was to create an MVP to collect user feedback to validate the initial product idea and discover the challenges and benefits when collecting user feedback. A case of FOOODO (web-based food selling application) was considerated as startup situation to validate the idea by collecting unbiased user feedback. The result of the study presented the way of collecting feedback from potential users to validate the first version of the product in start-ups context towards the MVP.

To conduct the research a qualitative semi structured interview, observation and design science research (DSR) was used. The findings of the study presented the way of creating MVP through Lean UX process and various challenges factors subjected to MVP, future product concept, usability of MVP, right user selection and environment settings.

The result of the study suggested that most of the potential user are not able to understand the future product concept until they see something visually, whereas MVP plays an important role for collecting user feedback during the development of the first version of the product.

The research will contribute to the user experience (UX) practitioner's community to understand the challenges by various factors that start-ups face during user feedback and MVP experimentation session and discover the benefits of collecting feedback with a minimum version of the product.

Keywords
Lean UX, startups, MVP, prototype, user feedback, challenges, benefits, user experience, user-centred design.

Supervisor
PhD., Professor Netta Iivari
PhD., post-doctoral researcher Dorina Rajanen

Foreword

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1. Introduction

User experience (UX) research and design is an exciting context in the human-computer interaction (HCI) domain. The objective of UX is to create great design, effective solution, easy to use the product. In order to create an effective solution and useful design, feedback from the potential user is very significant for startups. The Lean startup method was widely introduced to gather faster feedback from the potential customers to test the product idea with the minimum viable product (MVP) (Hokkanen et al., 2016). Hokkanen et al. (2015) stated that good UX with the early version of the product could spread positive word of mouth, and it is useful for engaging users for a more extended period.

Moreover, when the product design task and market validation task are carried at the same time, MVP plays a vital role in mutual adjustment between the users and designers in the product design context (Duc & Abrahamsson, 2016). On the other hand, MVP plays the role of bridging the gap among entrepreneurs, customers, investors, and developers. Duc & Abrahamsson (2016) also describe that MVP supports the design process, reduces the communication gap, and facilitates cost-saving activities.

The software product market is open for everyone; people can develop a product with their capabilities, idea, and perseverance. For the development of a new product in the software industries, the Lean startup method (Ries, 2011) and customer development model (Blank, 2013) have been introduced for idea generation for scalable user experience (Hokkanen et al., 2015). On the other hand, Lean UX is introduced to create a rapid product with minimum resources that satisfies the customer need (Liikkanen et al., 2014). Lean UX approaches suggest becoming more closer to users during the experimentation of the product. Such practices ensure the probability in the business instead of building a product first, then make it marketable (Hokkanen et al., 2015).

Therefore, a good UX strategy needs to adapt in order to design and validate the MVP or prototype to collect meaningful feedback from potential users to avoid the uncertainty, waste of resources, money, and time for the startup business. In this research, an initial idea of a product will be transformed into the MVP to experiment with real users.

1.1 Product idea

The idea of the product is to share homemade food with neighbors. More specifically, when people exhausted by the end of the day due to work or study, they can get homemade food through this application. Neighbors who love to cook can sell the food for earning additional money through the same application. I assume that the idea of the product may contribute to solving the food matter, particularly for those who do not live with their parents or family. However, the research problem is explained in section 1.3 (research problem and research question).

1.2 Target users

The idea of the product has three classes of end-users, such as customers, food sellers, and admin users who control the system. The targeted customer is mostly students who live alone, service holders, and other professions. In contrast, any of the customers may act as a seller to sell homemade food with the corresponding platform.

1.3 Research problem and research questions

1.3.1 Research problem

In the past ten years, UX has become a central concept in the field of HCI. There is a wide range of web and mobile-based applications existing in the world. Lots of capital, resources, and time is invested in developing software product. Some of them are widely successful, and some are not. Many success milestones are existing, for instance, Facebook, Instagram, Amazon, AliExpress which are very popular around the planet.

Nevertheless, looking into the new product idea, the percentage of success rate is inadequate. Over 98% of startup broke in terms of new product ideas over the world (Bosch et al., 2013). Different statistic found from the research of Harvard Business School's by Shikhar Ghosh shows 75% have failed (Blank, 2013). Klein (2013) stated an example of a company called Webvan. Webvan spent around $400 million to build an automated warehouse operation for trading groceries online. However, the reality is that the potential customers were not ready to purchase groceries online. Consequently, instead of building the entire automated system competent of transporting groceries to millions of customers, they could validate their hypothesis by doing a lightweight experiment and repeat the experiment to learn the user needs rather than spending lots of money and time. Maguire & Bevan's (2002) study says that a thriving product start with an understanding of user demand and need. Finding the way of learning about user is critical (Klein, 2013). Hence, it is significant to understand the user's demands, what they require, and how they want to use the application. Often experience and assumption may not work in the real-world context, and the project might stumble. Furthermore, without user research, the development of a product is like building a house without solid foundations.

Due to a shortage of resources, experience, and budget, most startups want to develop and test their hypotheses without a waste of time and money. Minimizing the investment in the early product version, the design of the product still needs to have a minimum standing level to enable testing of the hypothesis. Furthermore, the validation of the product hypothesis should be done by building an MVP and measure the key performance indicators with the potential user. (Hokkanen et al., 2015)

Academic research already gains attestation in the domain of UX, especially concerning the Lean UX and building MVP in the early phase of the software development, but the research for collecting user feedback with MVP to validate the product idea in a startup is missing.

1.3.2 Research questions

This research aims to investigate the way of accumulating user feedback through MVP to validate the initial product idea in startups situation towards the Lean UX approach. It is exciting to examine how users conceive and interact with a future product idea. Besides, this study also focuses on discovering the challenges during feedback and find the benefits. The outcome of this study may guide startups to develop their first version of the product to validate the idea through MVP, besides reducing the complexity while building the first version of the product. This study determines to answer the following three research questions:

RQ1. *How to collect user feedback throughout the MVP to validate the initial product idea in a startup?*

There are numerous ways of accumulating user feedback for a software product, which is notable for every startup. As startups operate with absolute uncertainty with insufficient resources (Ries, 2011) therefore, it is crucial to know how to collect user feedback through MVP in order to validate the hypothesis regarding new product development in a startup context.

RQ2*. What kinds of challenges are there when collecting user feedback?*

This research question aims to find several challenging factors while receiving user feedback. The answer to this research question may contribute to the designer, researcher, and startups communities to get familiar with the possible challenging factors involved with MVP and feedback for early product development.

RQ3*. What are the benefits of collecting user feedback with MVP?*

The benefit of user feedback is quite familiar to the UX research community. Nevertheless, this research will focus on the advantage of user feedback through the MVP for startups product so that startups and small entrepreneurs in tech productions can determine how to collect user feedback in early product development through MVP and obtain a competitive advantage.

1.4 Overview of the research method

The research was conducted in two separate phases. The first phase of the research was carried out utilizing design science research (DSR), and the second phase of the research was carried out utilizing qualitative research in addition to DSR.

In the first phase, a high-fidelity MVP was developed as tools by the guidance of Lean UX methodology (Gothelf, 2013). This phase of the study was prepared the ground for conducting the rest of the research.

The second phase of the study was carried out through a qualitative semi-structured interview including observation and prototyping with users to collect the meaningful feedback on MVP by the potential user to validate the initial product idea and investigate the challenges and benefits of collecting user feedback in the early phase of the product development. This phase of the research has explained all the three research questions respectively.

1.5 Structure of the research

The structured of the research is represented in Figure 1. The central definitions, research keywords and related work concerning User-centered design (UCD), User experience (UX), Startups, Lean startups, Lean UX, Minimum viable product (MVP), and User feedback is presented in chapter 2. Besides, the rest of the studies, including the Research method, Findings, Summary of the result, and Discussion and Conclusion, are presented in Chapters 3, 4, 5, and 6 respectively.

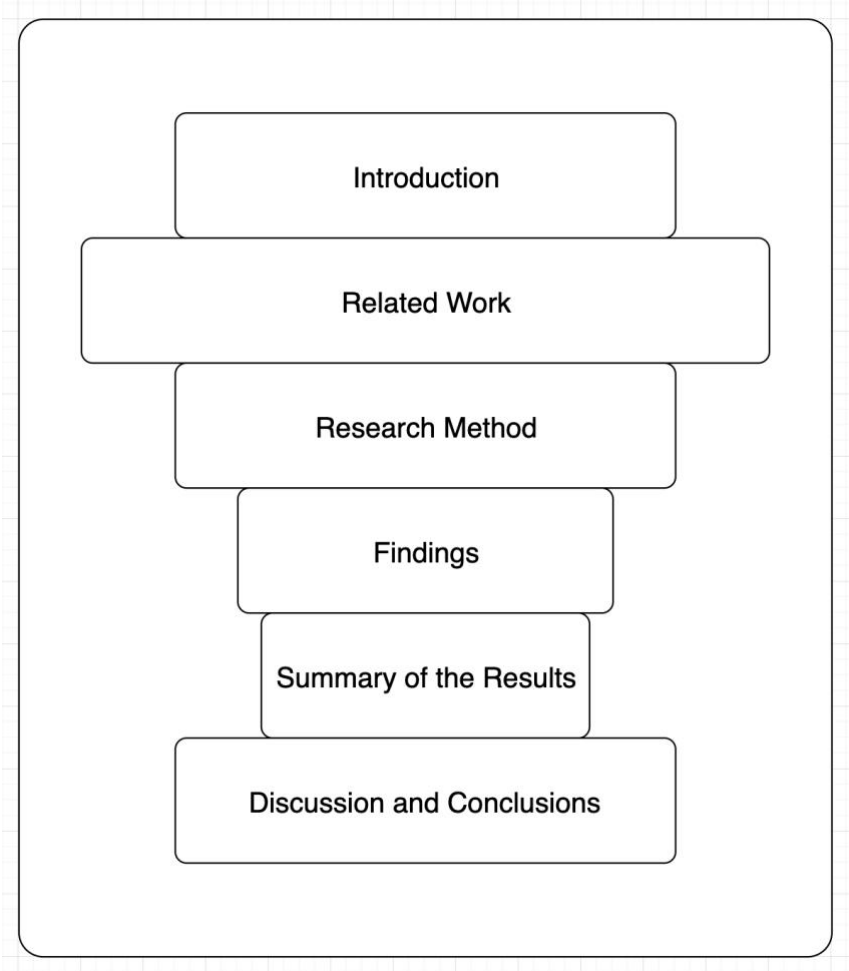

Figure 1. Structure of the thesis

2. Related work

This chapter explicitly describes the theoretical background, central definitions, and keywords which are related to the research topic.

2.1 Human-computer interaction (HCI)

HCI was not a popular topic of interest in the early ages of computers. Nevertheless, over the past 30 years, the growth of HCI expanded the field into different disciplines, and it has become an essential topic of research in the HCI community. (Helander, 2014)

According to the Interaction Design Foundation (2019, 15 March), HCI is a multidisciplinary study that highlighted the design of computer technology, more specifically, the interaction between the computer and the human. Multidisciplinary HCI study consists of computer science, cognitive science, human factors, and engineering. Currently, HCI indicates the research on human problems, which consist of perception, human intelligence, cognition, and interaction. (Holzinger, 2013)

2.2 User

A user is a person who use the product (ISO, 2010). In other words, who use a computer network or service. The users are the ultimate human who use the software product. In terms of information technology industries (IT), a user is considered as person, organization or an entity who receives services in the form of information transformation provided by the information processing system. Furthermore, user is a person who prepare the input data and receive the data through various terminal, or indirect connections. (Wikipedia Contributors, 2017)

2.3 User-centered design (UCD)

In 1980 the research laboratory of Donald Arthur Norman at the University of California San Diego (UCSD) introduced the term "User-Centered Design (UCD)" and become universally accepted after the announcement of "User-Centered System Design: New Perspectives on Human-Computer Interaction" (Norman & Draper, 1986). According to Lowdermilk (2013), the human-centered design (HCD) emerged from the discipline of HCI, and it is a software design methodology for developers and designers. More importantly, it encourages the designer and developers to make better applications estimating user needs.

UCD is not just about the design that concentrates on aesthetics or making something look beautiful; UCD is more than how things look or creating flashy animation, instead of how effectively an application achieves the user demand (Lowdermilk 2013). Furthermore, HCD is an approach that recognized human needs and capabilities first and designed the product considering human factors (Norman, 2013).

Furthermore, the outline of UCD presents by the Interaction design foundation; UCD is iterative process of design in which designers concentrate on the users' needs in every steps of the design process. ("Interaction design," 2019). UCD is a philosophy that

facilitates the most effective way to confront the information gap, which addresses the issues of the current design approaches considered as technology-centered design (Endsley, 2016). The method of user-centered design is not the subjective assumption of human behavior but often rely on data to support design decision. Besides, it should take into account that the decision should be made by listening and observing the user, rather than personal preferences. (Lowdermilk, 2013)

Based on the interest of user and usability, Norman presented essential advice on how a design should stand:

- Make things easy that determine the possible action,
- The conceptual model should be visible enough including the alternative action and result of the action,
- It is better to make things easy for evaluating the present state of the system,
- Follow the natural mapping between intuitions and possible actions.
  (cited by Abras et al., 2014)

The significant advantage of the user-centered design is to learn the factors that refer to human psychology, organization, social, and ergonomic. In other words, the approach of UCD address to develop the products which are relatively productive, effective, and safe. The process of UCD suggests involving users in the design process to ensure the purpose of design (Abras et al., 2014) that solve a technical problem with the help of the user. (Lowdermilk, 2013)

2.4 User experience (UX)

The goal of UX work is to produce a meaningful product with good experience (Hokkanen, 2017). Whereas User Experience Design (UXD) is the method of creating a meaningful product that provides valuable experience to the user, which articulate with branding, design, usability, and function ("Interaction design," 2019). The primary requirement of the user experience is to understand the customer precisely what they need. The term UX uses for reporting the activities, including user research, product design, concept design, user testing, and evaluation. It also addresses learning the potential user to satisfy the demand considering both emotional and practical aspects (Hokkanen, 2017). According to Roto et al. (2009), UX is the concern of most successful product development, whereas UX is still considerated as the fulfillment of the user interface (UI). The research argues value and concept of the product is good UX, whereas, UI is the process of interacting with the product (Roto et al., 2009).

On the other hand, UX design considers all the interactions done by the user with a product, service, or organization, which is not limited to the physical products by definition (Moule, 2012; Jouhtimäki, 2015). The fundamental character of the UX is UX itself and how UX is made. UX itself addresses the sense of pleasure and pain in a particular moment with several intensities. UX is a momentary good-bad feeling during interaction with the product (Hassenzahl, 2008).

2.5 Usability

Usability is significantly crucial for growing software markets for decades (Grudin, 1991; Nielsen, 1993; Rosson et al., 2002). Nevertheless, it has been challenging to bring usability in the software development life cycle for a long time. One of the main reasons

is that the benefits of usability are not recognized (Karat, 1994; Rajanen & Iivari, 2007; Rajanen, 2011).

2.6 Design science research (DSR)

DSR is a research method that contributes new knowledge to the body of scientific research in which a designer answers the questions refers to the human problems by creating new and innovative artifacts (Hevner & Chatterjee, 2010). The principle of DSR start from the knowledge and understanding of the problem and provide an effective solution by building application or artifacts. According to Hevner (2004), DSR is conducted when intended to improve the world and human life through ICT artifacts.

The evaluation of design refers to the utility, quality, and efficiency of the generated artifact through a well-excluded evaluation method. In terms of research contributions, DSR should provide clear and valid contributions in the domain of design artifacts, methodology, and design foundation. Research rigor addresses to both construction and evaluation of the artifacts. Whereas, the search process is a way of problem-solving by considering the current state and goal state (Simon, 1999). In terms of communication, DSR should be presented for both a management-oriented and technology-oriented audience. Technology oriented audience uses the artifact effectively for the organizational context and management-oriented audience concentrate on understanding the problem and adapt the artifact as an effective solution. (Hevner et al., 2004.)

An acceptable common framework, template or mental model is necessary (Vandenbosch, 1995; Swaab, 2002) for DSR. Moreover, there are various frameworks developed over time for IS research. It is recommended to apply the suitable framework for conducting and reporting DSR, the framework could be applied based on how it supports the context. One of the popular DSR framework was introduced by Hevner & Chatterjee (2010) are illustrated in Figure 2.

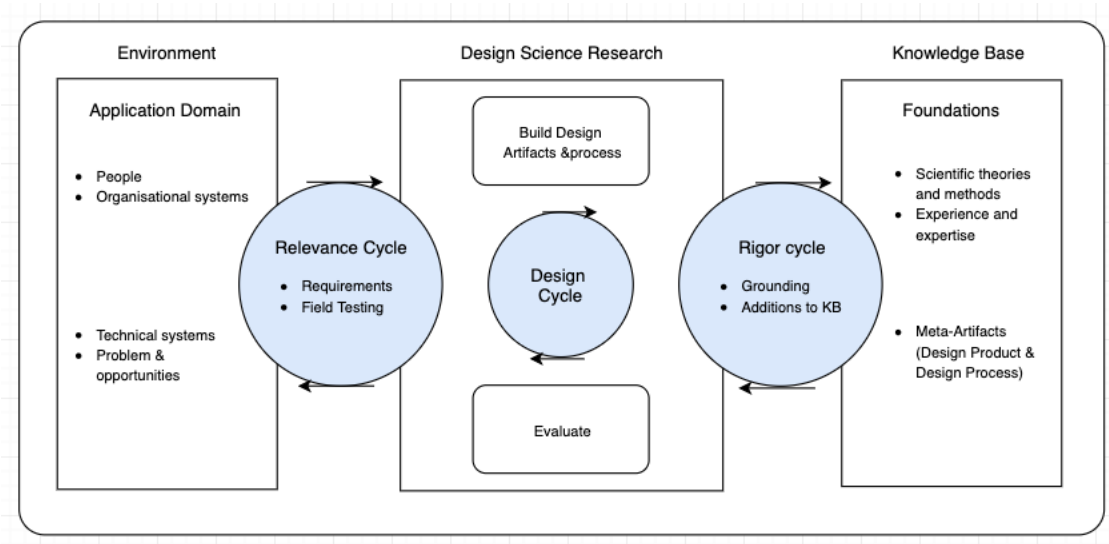

Figure 2. Design Research in Information Systems (adapted from Hevner & Chatterjee, 2010)

According to Hevner et al., (2010) DSR process consists of six activities such as problem identification and motivation, definition of the objectives for a solution, design and development, demonstration, evaluation, and communication. DSR is significant for supporting the IS professionals. It establishes the integrity of IS design science research

(Hevner, 2007). DSR enhance the limits of human and organizational capabilities creating new product and innovative artifact (Hevner, 2004; Hevner, 2007).

In recent year, DSR has gained attention into the IS research area by creating the value and integrating design as a significant component of research (Peffers, 2007), although past 15 years DS research has been slow into the mainstream of IS research and did not gain much attention publishing in engineering journals.

2.7 Startups

A startup is a newly created small company aiming to solve a problem and explore new business possibilities (Giardino et al., 2014). A startup is considerate as human institution formulated to create new product or service under consideration of extreme uncertainty (Ries, 2011). Moreover, a startup is a young institution (Bosch et al., 2013) formed to explore for a repeatable and scalable business model (Blank, 2013).

Nobel (2011) asserted that a startup intends to build a new business idea with fast growth in the form of a new venture with the consideration of failure (as cited Hokkanen, 2017). Most of the startup drops due to lack of a business plan, funding, bad timing, and lack of anticipation (Nobel, 2011). A company might have a great team, a great idea, but still, there is a chance of failure due to lack of funding, mature model and so on. Nevertheless, the failure is regarded as an essential part of the business opportunity that builds new growth, causes new birth, stimulates to happen something by enabling individuals valuable work experience (Nobel, 2011).

Most entrepreneurs think that their journey is unique, and they advance in a path where there is no roadmap, business model, or template that can be utilized (Blank, 2013). In the first five years, 60% of the startup failed, and venture capital-funded startup failed by 75% (as cited Giardino et al., 2014).

However, in order to create value to the public market, the development and global distribution of the product may not require significant investment to start with as there is an opportunity for crowdfunding that enables anyone to get funding with a magnificent idea (Mollick, 2014; Hokkanen, 2017).

2.8 Lean startup

The origins of the Lean startups' theory emerged by the automated industries and agile software development (Womack et al., 2007; Highsmith & Cockburn, 2001). Current product development is limited to the linear order and agile development approach, followed by a short & repeated cycle (Blank, 2013).

In contrast, there is a significant difference in Lean Startup approach: a minimum version of the product is developed with lightweight experiment iteratively with the real user as early as possible. Every version of the product is utilized to gather meaningful feedback from the targeted market segments, and feedback is collected for further development (Ries, 2011). Lean startups emphasize the identification of the right thing to build – the thing customer wants and intending to pay for it (Ries, 2011). Lean startup is based on the Lean ideology that eliminates waste from the product development process, which is influenced by the agile methodology (Highsmith & Cockburn, 2001; Hokkanen, 2017). The approach of Lean startup diminishes the guesswork regarding "what customer wants" and enables the saving of resources (Reif, 2017).

Blank (2013) recognized startup builds MVP that contain the main features in order to gather feedback from the customer then start to revise over with MVP (Blank, 2013). When MVP is built; a startup can experiment with the initial idea of the product and service (Ries, 2011). The lean startup method follows a loop called MBL- Build-Measure-Learn (see Figure 3). The mechanism of MBL produces the idea, product, and data (Ries, 2011). This loop supports startups to remove the waste and concentrate on certain elements to test and find a suitable business model (Nguyen-Duc et al., 2017).

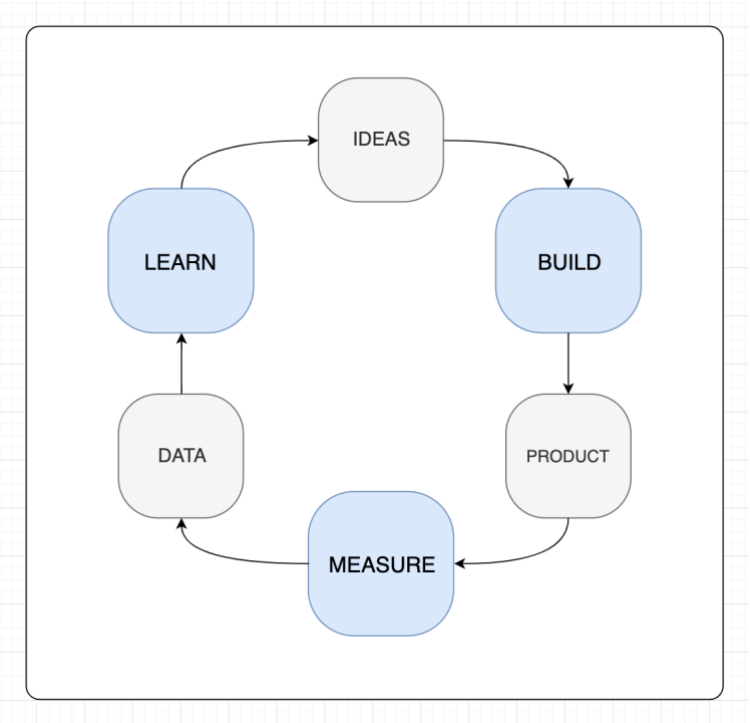

Figure 3. The Lean startup process (adapted from Ries, 2011)

2.9 Lean UX

Lean UX is a set of practices with a collaborative, cross-functional way of product development stimulated by the Lean startup and agile methodology (Gothelf & Seiden, 2016). Product design strategies have grown over time, and the evaluation of product design is Lean UX (Gothelf, 2013). The methodology of Lean UX has injected by Gothelf (2013) from the Lean startup principles of Ries (2011). The practices of Lean UX are determined to transform conventional HCD work to perform better iterative and fast software development (Hokkanen, 2017). Lean UX aims to create a rapid product with limited resources acknowledging the best customer satisfaction (Hokkanen, 2017). According to Gothelf (2013), Lean UX provides less attention to the documentation but emphasize on building a shared understanding of the actual product that addresses the true nature of the product in a collaborative and cross-functional way.

The following sections will cover the details about Lean UX, namely the foundation of lean UX, the principle of Lean UX, and the Lean UX process.

2.9.1 Foundation of Lean UX

The foundation of Lean UX consists of design thinking (Brown, 2008), agile software development (Beck et al., 2001), and Lean startup methodology (Ries, 2011).

1. ***Design thinking*** The president and CEO of IDEO (Tim Brown) says, design thinking is a power of innovation by direct observation of what people need, like or dislike. Based on that product is built to persist in the market. Design thinking is significantly crucial for Lean UX because it involved the explicate positions of every aspect of a business with the design method. This approach addresses to solve the problem and encourages it to use for nondesigners as well (Gothelf, 2013).
2. ***Agile software development*** *The* heart of Lean UX is agile software development which emerges from the core principle of agile software development (Gothelf, 2013).
3. ***Lean startup method*** The method of lean startup addresses a loop called MBL (Build-Measure-Learn) that minimize the risk and fast learning approach to build MVP that transform into the means of learning as early as possible (Gothelf, 2013).

2.9.2 Lean UX principles

Gothelf (2013, pp. 7-13) represents 15 lean principles in his book "*Lean UX applying lean principles to improve user experience*" The principles are:

1. ***Cross-Functional Teams*** Lean UX advocates collaborating with diverse disciplines such as software engineering, product management, interaction design, visual design, marketing, and quality assurance.

2. ***Small, Dedicated, Colocated*** It is recommended to make a small team not more than ten people, which enables accessible communication, exchanges instantly even it enables to build good relationships among the team members.

3. ***Progress = Outcomes, Not Output*** The achievement of the business goals regarded as outcomes, and Lean UX measures the process in order to determine the business outcomes.

4. ***Problem-Focused Teams*** This principle focuses on problem-solving activities rather than features. It empowers team members to come up with great solutions combining in-depth self-importance and ownership of the solution.

5. ***Removing Waste*** Lean UX is goals and outcomes oriented. If something does not contribute to the project are advised to remove from the process. A discipline of waste elimination activity that help teams to learn faster and rapid progress.

6. ***Small Batch Size*** Lean UX addresses to create a limited design that is significantly important to move forward and makes the team productive.

7. ***Continuous Discovery*** This is the process of engaging the potential customer during the design and development; the main goal is to understand user activity.

8. ***GOOB: The New User-Centricity*** GOOB stands for "*getting out of the building*." The concept of GOOB focuses on spending time with user and explore the marketplace outside of the building to understand the user need instead of meeting in the office room.

9. ***Shared Understanding*** It is a currency of Lean UX that concentrated on the combined knowledge of the team.

10. ***Anti-Pattern: Rockstars, Gurus, and Ninjas*** This principle advocated the team-based mentality.

11. ***Externalizing Work*** It addresses ensuring the participation of others in public view in terms of information sharing activities.

12. ***Making over Analysis*** In order to create the first version of the product Lean UX creates the value instead of spending time in the conference room.

13. ***Learning over Growth*** This principle persists on learning first then scaling.

14. ***Permission to Fail*** Lean UX teams is allowed to experiment with the idea in order to discover the best solution for business, even the idea fails.

15. ***Getting Out of the Deliverables Business*** This principle advocates to avoid the documentation from the design process as it does not resolve the customer problem, but the excellent product does.

    (Gothelf, 2013. pp. 7-13)

2.9.3 Lean UX process

The process of Lean UX is iterative, and it consists of four steps: Declare Assumption, Create MVP, Run an Experiment, and Receive Feedback and Research (Gothelf, 2013, p.15 -189). The process of Lean UX is illustrated in the following figure (Figure 4). Lean UX radically transforms the way we work; it starts with the assumptions instead of requirements and tests the hypothesis to measure the desired outcomes. (Gothelf, 2013)

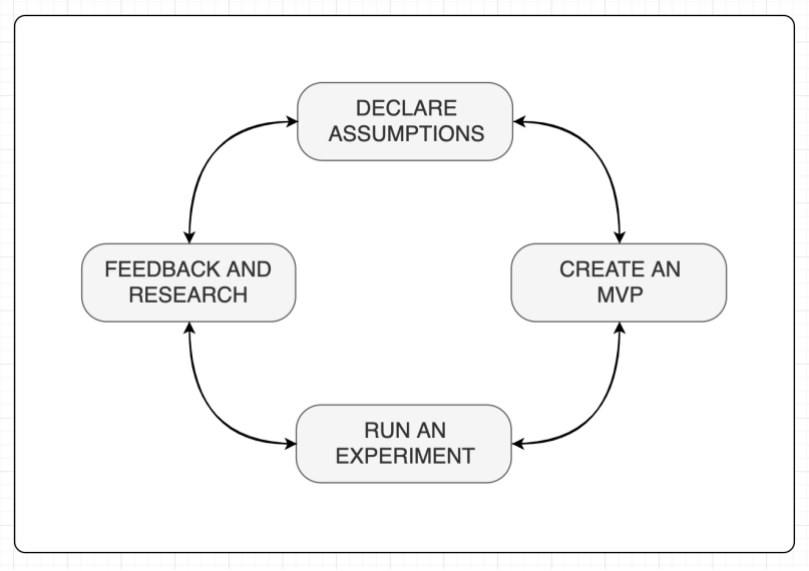

Figure 4. Lean UX design process (adapted from Gothelf, 2013)

1. ***Declare Assumption*** The first step of the Lean UX is to declare the assumptions which consist of Vision, Framing, and Outcome. The assumption includes the problem statement, assumption periodization, hypothesis, outcomes, persona, and features of the primary products.

2. ***Create an MVP*** It helps to test the assumption. MVP is typically a prototype (such as paper sketches, clickable wireframes). For creating an MVP, Lean

UX suggested a collaborative design that allows us to build a product concept together and solve the design problem through a shared understanding.

3. ***Run an Experiment*** The key concept of these steps is to run an MVP experiment to figure out the market possibilities and what people want, not just what they say.

4. ***Feedback and Research*** Collecting feedback and analysis of it are the finishing steps of the Lean UX cycle. The result of the experiment addresses to inform the team whether the hypothesis regarding an assumption is correct or not. In the next iteration, the team refactor the assumption and run the experiment for farther improvement, which is known as pivoting.

(Gothelf, 2013.)

2.10 Minimum viable products (MVP)

MVP is an idea for developing a product in a start-up setting with a limited number of features that reduce the risk for investors and target to succeed in the open market (Interaction Design Foundation 2019, 15 March). Moreover, MVP is a prototype in the early product version to test the concept (Blackwell and Manar, 2015). An MVP is the smallest version of the product that enables a Build-Learn-Measure (MBL) feedback loop, this version of the product is developed with a minimum amount of effort (Ries, 2011). To validate the initial hypothesis MVP is the smallest deed that helps us to learn (Gothelf, 2013). According to Grama (2016), MVP is a product that contains a minimum number of features designed to validate and learn about the product and its iterative development process.

In terms of Lean UX, an MVP is a prototype that is made of paper sketches or a clickable wireframe to collect relevant data to answer a given hypothesis. Therefore, MVP can be considered as e-mail, interview, button to nowhere (Gothelf, 2013). In other words, MVP could be a short animation with an explanation of what does the product do, and why a user should buy it (Ries, 2011). Nguyen-Duc et al. (2017) asserted that it could be a user interface that provides the feeling of the actual product.

2.10.1 Creating MVP

There are several ways to create an MVP. Lean UX suggests using the collaborative design process, which includes problem identification, individual idea generation, presentation, iteration, and team idea generation (Gothelf, 2013). A minimum viable user experience (MVUX) framework is represented by Hokkanen (2016) to support early product development in startups. The framework is presented in Figure 5. The main elements of the framework are Attractiveness, Approachability, Professionalism, and Selling the Idea. "*Selling the Idea*" is the aim of the framework which offers startup a possibility of receiving feedback from the target population. Besides, the other three elements (attractiveness, approachability, professionalism) build a foundation to encourage people to start using the product. (Hokkanen, 2016)

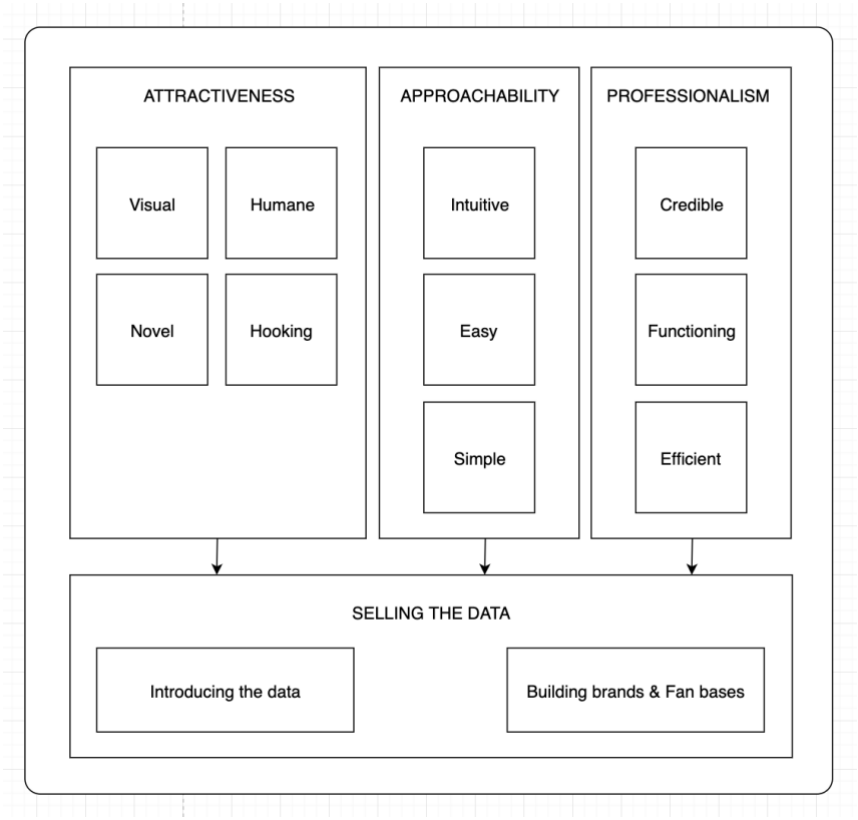

Figure 5. MVUX framework for supporting early product development in startups (adapted from Hokkanen, 2016)

Gothelf advocated to build MVP without code and suggested a few MVP prototype methods and tools which includes paper based low-fidelity prototypes, low-fidelity prototypes (Clickable wireframe), mid and high-fidelity prototype, and hand-coded live data prototype. Furthermore, in order to create low fidelity prototype the there are various tools such as Balsamiq, Microsoft Visio, OmniGraffle (Mac only, Microsoft PowerPoint, Fluid Designer/Pop Prototype on Paper. (Gothelf, 2013)

2.11 Early validation

A large number of startups make the same mistake, and they feel that the idea is exciting and calm instead of repeating to solve a real problem (Klein, 2013). Blank (2013) report that most of the entrepreneurs think that their product idea is excellent, unique, and there is no shared roadmap or business model exist in the market. However, Lean UX addresses to validate the initial hypothesis by the potential customer and find what actual problem is, and what are the suitable solutions to deal with. The hypothesis validation should be done by building MVP and experiment with actual potential users considering lean startup principle Ries (2011) "*getting out of the building*" (GOOB) (Hokkanen, 2016). Klein (2013) proposed validating the initial hypothesis before building the product. A hypothesis is an assumption of the product. Nevertheless, problem is that many of the assumptions are wrong, which leads to the downfall of a product (Klein, 2013).

Therefore Klein (2013, chapter 1) presented three steps of validation in Lean UX book, which are:

Problem validation The problem validation is performed by the observation. When people are already interested in some particular things and performing something, then it

is easier to come up with the idea that people will like enough to use. Often the product idea is excellent, but it does not solve any problem, and people are not willing to buy the product, even the idea is excellent. It is significant to listen to the user group complaining about specific issues to recognize that the problem is valid. Hence, early problem validation reduces the chance of failure rather than invest a large amount of money. (Klein, 2013)

Market validation In order to examine the market validation, it is required to focus on group of people, why they are interested in a particular things. Once the market is distinguishable and finds the problem that is faced by the group of people, in this stage the primary market is validated. (Klein, 2013)

Product validation Once the problem, market and group of people are identified, it does not mean that the targeted population will be willing to pay for the solution by using the product or service. Product validation takes longer than that of problem validation and market validation, which is iterative process. (Klein, 2013)

2.11.1 The experiment of early product and validation

Experimenting MVP is an integral part of Lean UX, which minimized the waste (as cited Nguyen-Duc et al., 2017). Choosing the right MVP or prototyping method for startups is significant for the quick experiment of the business idea for collecting user feedback, and it is an unavoidable part of startups software development (Nguyen-Duc et al., 2017). A prototype centric learning model is introduced by (Nguyen-Duc et al., 2017) see Figure 6.

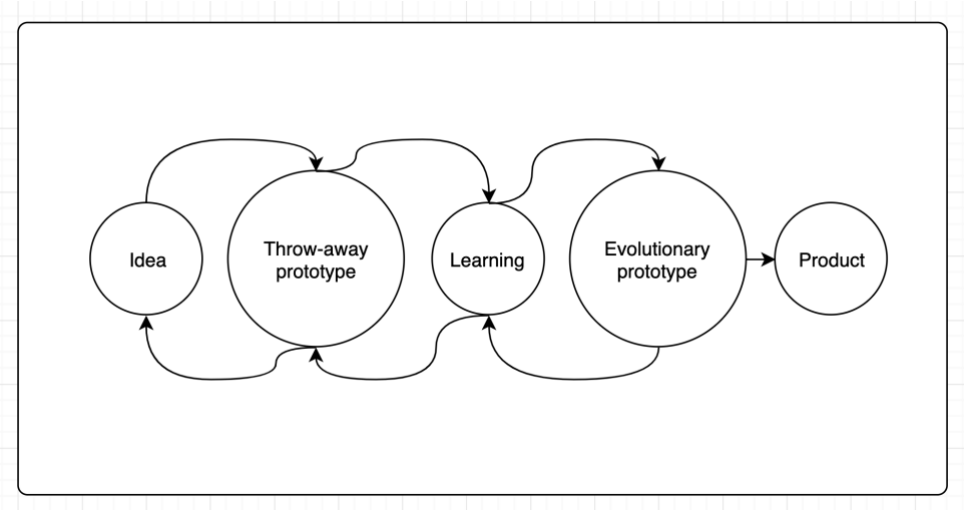

Figure 6. A Prototype centric learning model (adapted from Nguyen-Duc et al., 2017)

Klein (2013) presented a few tools for early product experiments and validation. The tools are:

Ethnographic study The best possible way to find the problem of the potential user is by spending time with them. The main goal is to observe the people about their current practices and problems. Moreover, it helps us to collect useful data and generate new ideas for building useful product. (Klein, 2013)

Landing page tests Once the ethnographic study is over, Klein (2013) suggested making a decent landing page design where the main feature will highlight (i.e., "Buy now"). Additionally, make little traffic to advertise using Adwords, Facebook, and observe how

many people click on the ad and how many of them click on the "Buy now" button. Google Analytics is a useful tool for this observation. (Klein, 2013)

Prototype test A prototype testing is the best way of validating and experimenting with the product, which allows understanding if the the product is usable; if not, there is still time to fix. However, Klein (2013) suggested that prototype has to be interactive enough so that people can get the real feel of the product and it should contain the main features of the product. (Klein, 2013)

Pain-driven design This design method addresses to find the pain point of users during solving the problem by users. In that case, observe the user by testing the product and how they behave with it and find out precisely what makes users confused, get the most pain, and often become crazy. Moreover, how does the user avoid or solve the pain? In the end, find all the pain points and come up with a smart solution. (Klein, 2013)

2.12 User feedback

In most cases, people represent the requirement by the short description of a small feature. However, the most productive way of collecting feedback are from the potential user, stakeholder, people, organization and who have insight into the product. In other words, in most cases, people ask the user for the requirement. Hence, Garrett (2010) stated that the requirements come out of the process and fall into the three phases. The first one is what people want is very clear; a good idea can find the way into the final version of the product. The second most important thing is what people say and what people want is different (Garrett, 2010; Norman, 2013). Gothelf (2013) suggested observing the people actually what they do, not just what they say.

Moreover, lastly, people do not know what they want for the future product (Garrett, 2010). Gothelf (2013, pp.57) suggested to measure the behavior of people actually what they do, but not to emphasize on what they say. Therefore, an MVP is relatively suitable, which makes a user understand the first product; also, it is better to create the smallest MVP possible with a clickable feature for collecting feedback from the user (Gothelf, 2013).

Participatory design or user involvement in the design has gain attention in the design process (Abras et al.,2014). People who use the artifact is the primary user, also who use the artifact occasionally are the secondary users, and who will be affected by the use of the artifact are considered as a tertiary user (as cited Abras et al.,2014). Research suggested to involve all sorts of users, stakeholders in the design to make the artifact successful (Abras et al., 2014).

There are several ways of collecting user feedback few of them are discussed in the following sections.

2.12.1 Conducting survey

The term “survey” is used for wide range of ways, but in general it is used for selecting the pre-determined group of population for collecting small amount of data individually. Data are composed through a specific form, usually by creating sets of questions or interview. (Kelley, et al., 2003)

Surveying is an easy way of collecting user feedback. When conducting user feedback, it is necessary to ask a bunch of questions and get the answer from the participant. However, the problem is that most startups make the same mistake. They ask the wrong people and ask the wrong questions; as a result of this, they get the wrong data. Moreover, before conducting a survey, it is notable for providing attention to the following factors. (Abasov, 2019)

- Concentrate on the goal what researcher/designers are trying to achieve
- Make sure when to ask and whom to ask
- What to ask and how to ask people
- What tools should use (e.i. Google forms, Survey Monkey, Qaltrics, Wufoo). (Abasov, 2019.)

2.12.2 User Interview

In terms of UX work, an interview is conducted for various reasons such as selecting participants for research, usability studies and evaluation, gathering information about the task, and developing scenarios and use cases (Wilson, 2013). In order to collect meaningful feedback, user interview is a widespread technique, and it is a part of UX research methods to learn, where a researcher asks questions to the user about the topic or artifact to receive insightful data about the application, website, product or services. (Pernice, 2018.) Besides, this approach is efficient for validating the initial idea and get familiar with the pain point of potential customers. There are numerous ways of conducting interviews, such as; In person, skype interview, phone calls, and email. Additionally, there are several ways of recording the interviews, such as; voice record, video recording, and notetaking (Abasov, 2019). According to (Pernice, 2018) a set of guidelines proposed while conducting interviews. The guidelines are:

Set a goal for the interview Define a clear goal to learn from the user about the product.

Make the user feel as comfortable as possible Before the interview explain user about the purpose of the interview and mention the time and date. Start with an easy question and listen to the user until they conclude their opinions.

Prepare the question before the interview Prepare the set of questions and remember everything that needs to learn from the user.

Anticipate different responses, and construct follow-up questions Based on the research goal, construct the follow-up questions. This means that if the user does not reply to particular questions, it is sufficient to encourage the user to discover the possible answer.

Write dialog-provoking interview questions Jog the brain by asking specific moments rather than about the general process.

Avoid leading, closed, or vague questions It is recommended to avoid the leading question, closed question, and the vague question.

Prepare extra questions Some participant is willing to talk more and interested to answer more question than expected. Hence it is better to prepare some additional questions for them.
(Pernice, 2018)

2.12.3 Observation

Observation is a method of research that includes structured observation and unstructured observation. Structured observation is an activity of recording physical and verbal behavior, whereas unstructured observation refers to understand and interpret cultural behavior. (Mulhall, 2003)

Observation is significantly used to record the data from the environment. It is not a passive way of recording data like a video camera or tape recorder. Observation is active, whereas human brains are active participants, including eyes, ears, and obtaining data. Furthermore, all human observation is part of perception. (Fox, 1998)

Conducting observation is relatively easy, fast, and it does not require a wide range of practice. According to ("Interaction design foundation", May 2019) before conducting observation, it is significantly essential to prepare the subsequent tasks;

- Clarify what needs to learn throughout the observational study,
- Recruit participant for research,
- Recruit observers,
- Explain to the participant what the task of them is and what they will observe.

There are different types of observation, such as controlled observation, naturalistic observation.

Controlled observation Is conducted in a laboratory environment; it focuses on informative qualitative data, that generated through the qualitative observation. It is advised to observe and record each step of the process qualitatively, whereas each step of the process can be recorded by a yes/no or rating scale out of 3 or 5. Controlled observation is easy to reproduce, easy to analyze, and easy to maintain ("Interaction design foundation", May 2019).

Naturalistic observation Is conducted by spending time with potential users and observes their behavior with the product. This approach is more reliable as it allows us to observe the real-life product with the user, and it is more useful for ideation ("Interaction design foundation", May 2019).

During conducting observation, the following factors need to take into consideration (Fox, 1998).

- What user is doing,
- What task is performed by the user and how they intended to integrate into their lives,
- Examine the whole activities and observe how the product is used with the devices and flow of their lives,
- Note if some observation is repeated and consider for future observations.

2.12.4 Ethnographic study

Ethnography is an approach of learning about the social and cultural life of communities, institutions, and other settings that is scientific, investigative, inductive, and deductive. Whereas, the researcher is used as primary tool for collecting data (LeCompte et al., 2010). Besides, ethnography is qualitative research that focuses on details observation of

human nature in real-life contexts. The approach of ethnographic is used currently in the HCI area. The main objective of ethnography is to make visible the real world throughout the detail description of the activities of social actors in specific contexts. Moreover, ethnography is utilized, deployed in numerous ways such as re-examination of previous studies, quick and dirty or lightweight ethnography, concurrent ethnography, and evaluative ethnography. ("Interaction design foundation" May 2019)

2.12.5 Participatory design

The approach of participatory design emerged in Scandinavia to reduce the gap between users and designers. It is significantly essential to identify the suitable users and how to involve them in the early product design (Abras et al., 2004). Nowadays, participatory design has gained attention for designing novel systems. This approach helps designers to understand user requirements in order to create a new product.

Preece (2000) presented participatory design, which is known as participatory, community-centered design (Abras et al., 2004). The participatory design suggested creating a simple design, i.e., drawing on a paper then pay attention to evaluate the initial idea involving the potential user to improve the usability (Abras et al., 2004).

2.12.6 Lean way of user feedback

Feedback and research in Lean UX are a continuous and collaborative process. Lean UX process advocate the entire team to go outside of the building to meet the customers to learn from them (Gothelf, 2013). The continuous and collaborative approach allows the team members to observe how the hypothesis is tested. To conduct a research and feedback session, Gothelf (2013) proposed a few useful guidelines;

1. Review the question, hypothesis, assumption, MVP and decide what need to learn,
2. Identify the people to talk in order to identify the learning goal,
3. Create an interview guide,
4. Conduct the interview and take notes,
5. First start with the question, conversation, and observations,
6. Demonstrate the MVP and allow the customer to interact,
7. Receive the feedback by notetaking.

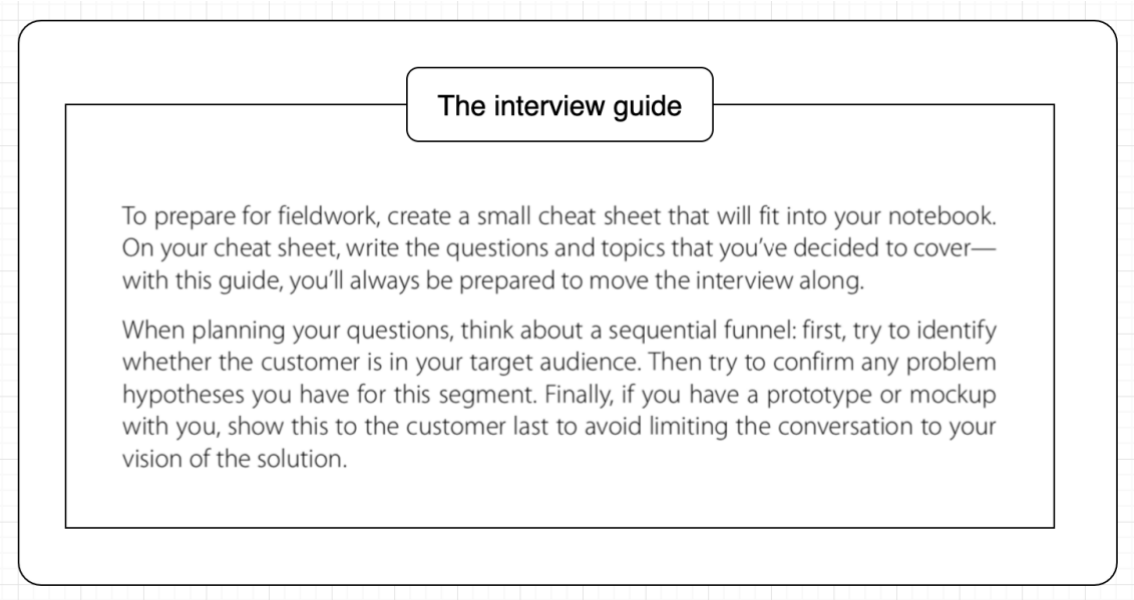

Figure 7. Interview guide adapted from Lean UX (Gothelf, 2013, p. 76)

Figure 7 presented a few useful tips for interviews and feedback. Additionally, allow customers and potential customers to interact with the initial prototype and receive valuable feedback. However, Gothelf (2013) suggested the following setups for conducting research and feedback session.

Simplify test environment For conducting the session, it is better to keep the environment simple, quiet place, a computer with an internet connection, and a webcam. Gothelf (2013) advocated using desktop recording and broadcasting software, for instance, Morae, GoToMeeting, or Silverback.

Who should watch While experimenting, the entire team should watch the experiment and observe.

Recruiting participants Scheduling, recruiting and confirming participant is essential although it is time-consuming.

Making sense of the research Interview and lab work observation generates a lot of raw data. Making sense of those data is often time-consuming and frustrating. Hence, it is advised to synthesize the research findings through team activity.

Confusion, contradiction, and lack of clarity Data are collected from the different sources and synthesize them for research. Sometimes it may confuse and might lack of clarity. Therefore, it is required to manage and ensure maximize learning through look for patterns, park outliners, and verify other sources.

Identifying problem over time The most UX research aims to get a conclusive answer of a question or set of questions, whereas the Lean UX symbolized conducting the study on a smaller scale over time rather than a big study at a time.

Gothelf (2013)

2.12.7 Research gap

In this chapter, the related work on UX, startups, Lean UX, MVP, user feedback was presented. In terms of Lean UX, Hokkanen (2016) demonstrated the MVUX framework for supporting startups, which is part of MVP creation (Lean UX process cycle 2). Nevertheless, Hokkanen (2017) claim that although the Lean UX is combined from the theory of Lean thinking and design, which offered reasoning guidelines, there is still a lack of scientific evidence (Hokkanen, 2017). Besides, there is still research needed in the area of prototyping or MVP in startups (Nguyen-Duc et al., 2017).

Therefore, this research will be conducted towards the Lean UX process, starting from declaring assumptions, create an MVP, run an experiment, and feedback and research. More importantly, this research will focus on Lean cycles 2, 3, and 4 (see Figure 8) (Create an MVP, Run an Experiment, Feedback & Research) to investigate how to build MVP to gather user feedback for validating the initial idea with the real-time user.

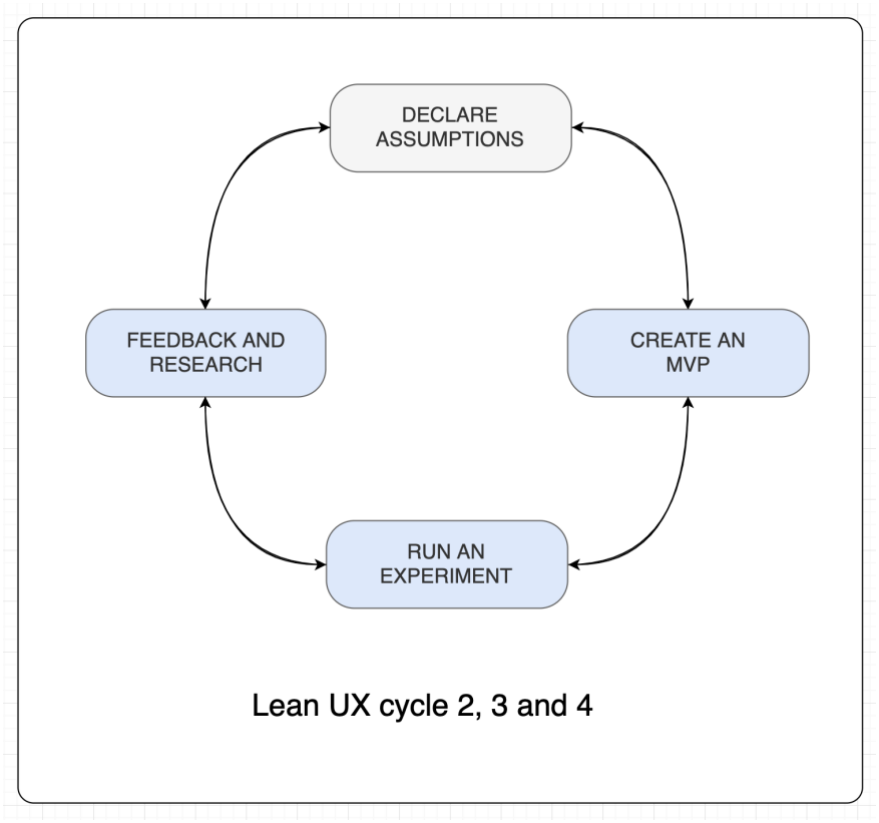

Figure 8. The research focus on Lean UX cycle 2, 3 and 4.

3. Research method

3.1 Research Design

In this chapter, the research design is presented. This research consists of two different phases, such as research phase 1 and research phase 2. The details of the research design have been presented in Figure 9.

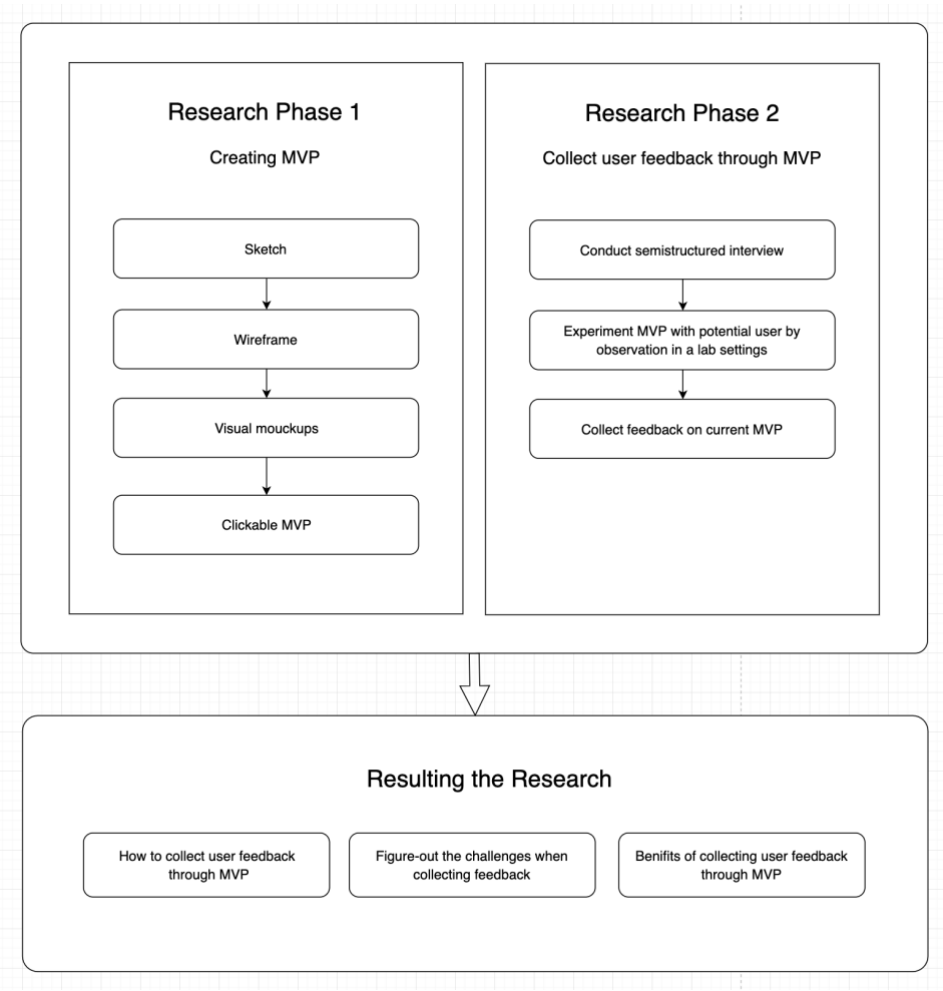

Figure 9. The research design

Research phase 1

In research phase 1, a clickable MVP was built to prepare the ground for research phase 2. To build MVP, this research followed the Lean UX methodology as a design process. However, to consider academic research, we adopted the DSR approach. DSR is a method of research that allows a designer to answer the question related to a human problem building new and innovative artifacts. DSR starts with identifying the problem and opportunities in the real application environment (Hevner, 2007). Research phase one is the activity of the design and development of artifacts in the form of MVP. Hevner et al., (2004) construct DSR guideline which consists of design as an artifact, problem relevance, design evaluation, research contributions, research rigor, design as search process and communication of research.

The artifacts are created through the analysis, design, implementation, and the result of the artifacts are considerated as innovations, ideas, practices, technical capabilities, and products. In terms of problem relevance, DSR aims to develop technology-based solutions relevant to a real business problem. The problem should be relevant, interesting, real and the design artifact must be useful. (Hevner et al., 2004)

Therefore, research phase 1 will be followed by DSR to create an artifact in the form of MVP.

Research phase 2

Research phase 2 is the demonstration and evaluation of MVP by potential users. Hevner & Chatterjee, (2010) stated that DSR demonstration is carried out for experimenting artifact and find how the artifact is used to solve a problem. The demonstration is utilized through various activities such as experimentation, simulation, proof, case study or other appropriate activities. Furthermore, the evaluation activity addresses to observe and measure how the artifacts support to solve the problem. This activity involves comparing with the objective of the solution and observing the solution during the demonstration. The result of the evaluation also addresses to iterate to back steps for further improvement. (Hevner & Chatterjee, 2010)

Therefore, the demonstration and evaluation process is utilized throughout 3 different parts, such as conducting qualitative semi-structured interviews, experimenting MVP with potential users (observation), and collecting user feedback on MVP (semi-structured interviews). According to Wilson (2013), a semi-structured interview is conducted with predefined topics with open-ended exploration. It is suitable when there is existing knowledge about the topic or issues under investigation, but still, there is a lack of information about future need. This method of research allows us to gather data on a specific topic, user goals, attitudes, and opinions (Wilson, 2013). Semi-structured interviews are in-depth interview process, which is utilized commonly as an interview format with individuals or often with a group in the form of discussion about the problem, topic, or issues, which allows generating the answer of the research topic (Jamshed, 2014).

On the other hand, observation is the method of research that is used for descriptive research (Malhotra, 2015), which aims to describe a phenomenon or characteristic with the presence of the researcher (Curedale, 2013). Moreover, structured observation addresses the activity of recording physical and verbal behavior, whereas unstructured observation applies to understand and interpret cultural behavior (Mulhall, 2003). The structured observation is conducted by analyzing the purposes of the study, subjects, time, and place based on the hypothesis (Curedale, 2013; Malhotra, 2015). In contrast, unstructured observation refers to the behavior or phenomena to be recorded when it occurs, which is suitable for an undefined hypothesis or research (Curedale, 2013; Malhotra, 2015). According to Endres & Rombach (2003), observation is carried out for experimentation within the framework of projects, surveys, and case studies. In software engineering, it helps to introduce, develop, evaluate the applications, tools, or methods. Moreover, an experiment is an intentional study to gain new knowledge by setting up an environment to experiment hypothesis for verification by targeted users (Endres & Rombach, 2003).

Therefore, to conduct the research phase 2, qualitative semi-structured interviews and a naturalistic observation are used to explain the research topic and issues.

3.2 Research approach

The design itself is broder sense that consists of human activities, manipulation of natural systems or artifacts (Niiniluoto, 1993).

The DS activity is carried out by learning and doing process. The new knowledge of the design should contribute to the previous knowledge to build on top of it. Furthermore, the produced knowledge should be valid, reliable and valuable for others. The result of the research should be reported and utilized in the scientific and practitioner's community. (Hevner et al., 2004)

The research aimed to build an MVP for experimenting, collecting user feedback, and investigating the challenges and benefits. I adopted the Lean UX methodology by Gothelf (2013) for MVP implementation, experimentation, and feedback and research. The author was directly involved in the design process and built MVP, which was used for experimenting and collecting feedback from potential users. Various literature has paid attention to the 8th Lean UX principle GOOB ("*GOOB- getting out of the building*"), which suggests spending time with the real-time user. To execute the 8th principle author traveled from Finland to Bangladesh for spending time with the potential users in the form of informal discussion. The data collection process was carried out from 31st June to 8th August 2019.

Moreover, at the very beginning of the research, various scientific literature reviews were conducted based on User-centered design, UX, Lean UX, Startups, Lean Startups, MVP creation, and experimentation. The literature review was conducted in the exploratory approach to understand startups, startups products, MVP, Lean UX, and other settings that connect to software startups.

3.2.1 Research phase 1: Building an MVP (a case of FOOODO)

In this section, this research concentrated on building an MVP for the web-based platform from a very scratch level. Lean UX methodology was applied as the design process for building the initial MVP. The process of building MVP has been explained in the following subsections.

Declare the assumptions

The assumption or product idea comes up from the life experience of the author. The author has lived alone since 16 years of age for his study and job, and faces difficulties of having a good quality of food in his city. To solve the issue author decided to build a homemade food sharing application as a part of this master's thesis.

Cooking food for ourselves is almost every day's jobs, often we do not eat all the food that we cooked, and sometimes we waste it. In contrast, many people face the problem of having good food, especially homemade food. Hence, instead of wasting the food it could be shared with neighbors, so that neighbor who live alone and do not have good food can get support through a platform. On the other hand, the seller can earn additional money by trading homemade food.

However, to concretize the assumptions of the product idea, a **user story** was created as follows:

- 1. As a user, I want to see the available homemade food nearby me
- 2. As a user, I want to buy homemade food that is nearby me
- 3. As a user, I want to choose the delivery service or pick up myself
- 4. As a user, I should have multiple options to pay i.e., cash, credit card, or MFS
- 5. As a user, I want to save payment card for future payment method
- 6. As a user, I want to save the delivery address for future delivery
- 7. As a user, I want to see the cart details, including all the charges i.e., product price, taxes, and delivery charge.
- 8. As a user, I want to see the approximate amount of time to receive delivery
- 9. As a user, I want to see the product details including what ingredient are used for making the food
- 10. As a user, I want to see the rating and review of the seller
- 11. As a user, I want to see the most popular delicious food as categories
- 12. As a user, I want to become a seller for selling food
- 13. I want to register as a seller
- 14. As a user, I want to upload the picture of a food item for selling.

Collaborative design

Collaborative design process was applied, which is adopted by Lean UX methodology. As part of the collaborative design process, a UX expert (author), developer, and marketer were involved in the design process (see Figure 10).

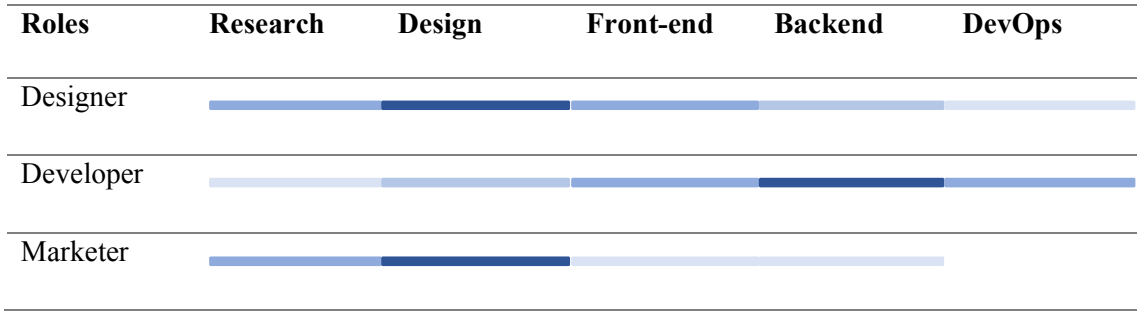

Figure 10. Collaborative design team's skills where the high-performance skills present with deep color and fewer skills presented light blue color

A little competitor analysis was done together based on existing food selling platforms. All three team members were requested to draw the initial concept in the form of the sketch using paper and pencil. Individually, everyone transforms the idea into a visual paper sketch. Next, a collaborative feedback session was conducted between three team members based on the proposed visual sketch. In order to iterate the sketch, we incorporated the valuable feedback from team members and finalized the sketch that applied for wireframe implementation.

Wireframing

Based on the paper sketch, a wireframe was designed using a Balsamic wireframing tool to transform the paper version to a digital version of a wireframe. Then, the static wireframe transformed into a clickable wireframe. Other team members (marketer and developer) were invited to interact with the clickable wireframe for enhancement of the product idea, including usability. Moreover, to transform the concept to visualize low-

fidelity prototype, 12 pages of wireframe screens was implemented for both customer and seller perspective, respectively. See the wireframe in Appendix 1 and Appendix 2.

Visual mockups

A visual mockup was designed according to the ultimate wireframe. Adobe XD was used as experience design tools. Throughout the visual design, a collaborative brainstorming session was carried out for selecting the color and prepare the branding guideline. In order to finalize the branding of the application, a little competitor analysis was carried out, which includes guidelines, color, and logo. Moreover, to accomplish all the screens for visual mockups, it takes around a week. The visual design exported as .png image format for the web, including 2X images for retina display. See the visual design both for the customer and seller perspective in Appendix 3 and Appendix 4.

Clickable and interactive MVP

After completing the visual mockups, study decided to build the clickable, interactive MVP using latest front-end technology i.e., HTML, CSS, SCSS, and JavaScript but it was very time consuming and might take much effort to build it which is not suitable for such startups company who do not have additional resources and capital.

However, we used the InVision as a tool that supports building an interactive clickable user interface using mockup images, which was comfortable, time-saving, and suitable for collaboration as well. Around 26 visual design screens (2x.png format) were imported into the InVison platform to build the interaction. Then most common demo functionalities were built as the first version of the product. For instance, a buyer can order food through an interactive checkout process. In contrast, the seller can create a profile and add a food picture to be published in the platform for selling.

To sum up, the created MVP is a limited version of the product for conducting the interview and observation to receive meaningful feedback and also prepare the ground for research phase 2. The live MVP is available at the following URL: https://projects.invisionapp.com/share/UXSRKENCGT8#/screens.

3.3 Research phase 2

Research phase 2 was conducted with several approaches consisting of an informal interview, MVP experimentation, and feedback and research. The aim of the research phase 2 was to find a way of accumulating user feedback within the MVP for startup product development and discover the benefits and challenges. The summary of the interview and experimentation is illustrated in Table 1.

Table 1. Summary of the interview and experimentation study.

Participant	Sex	Age	Occupation	Location	Date	Data for analysis (Text)	Data for analysis (Video)	Conversation language
A	Male	29	Graphic Designer	Restaurant	21.06	1 page	x	English
B	Male	30	Student	Private Apartment	14.07	5 pages	2 min	English

C	Male	28	Software Engineer	Private Apartment	19.07	5 pages	3.07 min	English
D	Male	21	Student	Private Apartment	27.06	3 pages	2 min	Bangla (native)
E	Male	32	Banker	Restaurant	22.06	4 pages	2.4 min	English
F	Male	32	Software Engineer	Restaurant	22.06	4 pages	3.15 min	English
G	Male	30	Medical promotion officer	Private Apartment	01.07	3 pages	1.46 min	Bangla (native)
H	Male	31	Software Engineer	Restaurant	22.06	3 pages	1.5 min	Bangla (native)
I	Male	24	Student	Private Apartment	22.06	4 pages	2 min	English
J	Male	20	Student	Private Apartment	27.06	3 pages	2 min	Bangla (native)
K	Male	30	UX Designer	Private Apartment	19.07	6 pages	2.8 min	English
L	Male	30	Research assistance	Private Apartment	08.08	6 pages	2.12 min	English

3.3.1 Setting up an interview (Semi-structured interview)

Various scientific research suggested conducting a qualitative interview as a method of qualitative data-gathering technique. Moreover, it is the most common data-gathering technique that focuses on the subjective world including listening, encouraging, promoting, and directing. It also allows us to gather facts, data on topics, attitude, and understand the user's demand, and opinions. Furthermore, a semi-structured interview is carried out based on topics, problems, and questions that emerge from a different source of information. (Wilson, 2013)

Moreover, the informal interview aimed to recognize the user demands concerning the future product idea and this study focuses on how a user thinks about the new innovative product that is not developed yet but having background knowledge of similar kind of existing applications. Therefore, a semi-structured interview was determined to understand the user's demand and validate the product idea in the early phase of the development. The interview was carried out with 12 participants. The summary of the interview has been explained in Table 1.

Before the interview session, an introductive session was conducted to get familiar with the context of research, questionaries' and other relevant settings (i.e., environment, time, and place). Other interview guidelines were adapted from Lean UX by Gothelf (2013) that is described in the previous chapter (see Figure 7). All the participants were allowed to choose the conversational language between English and native Bangla. Many of the targeted users were not good enough to speak in English. Therefore, research was conducted in both languages in English and Bangla. However, out of 12 participants, 8 participants were willing to speak in English as conversation language, whereas 4 participants spoke in native Bangla language. The interview conversation was recorded with the iPhone 7+ mobile device. The English conversation was transcribed throughout sonix.io (an artificial intelligence voice to text converter). Nevertheless, the problem was, this tool was competent in transcribing English conversation to English text. However, in terms of Bangla, I had to transcribe manually, which was time-consuming.

Select user segment in the interview

It is significantly essential to connect the right segment of people for rapid idea validation for UX work in the startups (Hokkanen, 2015).

The user segment was selected for the case of FOOODO with the following categories; For instance, undergraduate students, service holders, and who live alone. The user segment was targeted at the age of 20 to 35 years old. In this segment most of the user are familiar with software technology and the internet and they usually live alone and face the problem of having good quality of food. Additionally, to find the potential user social media and personal contact were used and selected users from various professions, for instance, software engineers, bankers, designers, students, and other private service holders.

3.3.2 MVP Experimentation (Observation)

After conducting the semi-structured interview, this study concentrates on MVP experimentation with selected user segments. Participants were requested to interact with the MVP to observe and collect meaningful feedback. The environment was set up with a laptop (MacBook Pro) connected to the internet with enough light source for producing reliable quality video recording. In the computer, we opened the InVision platform, where we created the interactive MVP for FOOODO application. After that, participants were requested to interact with the MVP as a customer as well as the seller. As a customer, they buy a product with an on-demand delivery service. As a seller, they were asked to create a profile in the system and published a product for selling. The whole experimentation session was video recorded through an iPhone 7+ mobile device. The summary of the MVP experimentation has been presented in Table 1.

3.3.3 User Feedback

Various scientific researches suggested receiving valuable feedback with a prototype. For instance, Hokkanen (2015) stated that the right way of accumulating user feedback is with a prototype often called MVP. Hence, after conducting experimentation with MVP, a feedback session was carried with correspondent participants in the form of an informal interview. All the participants were asked several questions (see Appendix 5) related to the product idea and their experience, which was also voice recorded with a mobile device.

4. Findings

The data collection was based on interview and experimentation of the MVP with potential users. The objective was to discover how to collect user feedback throughout the MVP for validating hypothesis in startups and find out the challenges and benefits of user feedback.

A thematic analysis was conducted to analyze the data. A thematic analysis starts with transcribing the data, coding and coded data is grouped into the themes with a visual representation. This analysis technique is good to identify and classify the themes (Vaismoradi et al. 2013). Thematic analysis allows flexibility, the richness of data and more importantly it allows to use both inductive and deductive research. Inductive approach is used when there is no previous study or phenomena exist whereas, the deductive approach is used to test the existing theory (Vaismoradi et al. 2013).

However, the data was analyzed by more focusing on inductive approach for empirical data analysis. Before the analysis, all the audio recorded files were transcribed into word documents through NVIVO (a qualitative data analysis tool). After that, the study was looking for various categories of data that refer to the research theme: for instance, collecting user feedback and opinion about product idea, various types of challenges related to product idea, users, MVP and so on. On the other hand, this research was also looking for process related challenges during collecting user feedback and experimentation. The process related challenges include environment settings, use of tools and equipment, technical terms etc. Besides the challenges, the empirical data analysis was also looking for what are the benefits of collecting user feedback through MVP. Those benefits include early product validation (problem validation, market validation, product validation), usability improvement for current product, new product features and idea, and other insightful data for early product concept.

4.1 Collecting user feedback through MVP

As part of this research, a case of FOOODO application has been taken into consideration as an early product. The idea of the application has been explained in section 1.1.

All the participants were requested to interact with the clickable MVP to experiment and they were requested to buy a ready homemade food from FOOODO platform. Participants also were requested to act as a seller in order to publish a homemade food item to sell in the system. All those interactive sessions were recorded in the form of videos for observation. After conducting the observation, feedback on MVP was collected. All the users were asked several questions related to the usefulness and usability of the product (see Appendix 5 for details questions). Few of the participant's statements are following:

"I enjoyed this platform to use, because, on the same platform we can sell the food and buy as well." Participant J

"Well, I like the layout, like its readability is quite good. And I can easily take this information or what I need. And I don't need to go through or down to take some action. I think everything is quite useful to me." Participant K

"What I like in your application about the tracking system it was incredible" Participant C

"This service is very useful and easy to use you do not have to struggle to understand where to click and how to buy a product" Participant F

"This is easy to use, and it will help for finding the good food. this service has good usability as well." Participant H

"Yeah! I was interacting with your UI (user interface). I have seen the process of Food order was easier for me. It was not very difficult to order a portion of food. And also, as a seller perspective, I think it was also very user-friendly." Participant C

On the other hand, in order to understand negative/positive experience and feedback for improvement, most of the participants who are professionally involved with the software product development articulated very meaningful feedback towards the MVP. For instance, Participant C is a software developer and having a good understanding of UX and usability.

"*Probably you should make some documentation of our previous instructions. Maybe some kinds of visual onboard tutorials that people can see how to make an order or how to use this application. Also, as a site administrator, you should have to make sure that, seller doesn't sell some rotten food. More importantly, you should verify the user's profile. Either buyer or seller"* Participant C

Hence, a good participant can provide quality information about the future product concept.

4.2 Challenges when collecting feedback through MVP

4.2.1 Challenges subjected to product idea

Challenges related to the interview method

The aim of the first part of the interview was to understand the user need and validate the initial idea for the future product development. The research finds that, many of the users did not understand the product concepts without demonstration of MVP during the interview.

Participants were asked "do they ever face any situation that they get hungry and do not have any food at home after work or study?" Most of the participants reported that they face this situation very frequently but, participant H and J was not aware of the problem before. But, when the participants interacted with the MVP and explored the product concept, they understood the necessity of the product and interested to use the service.

Before seeing the product/service

"*No! I did not face this situation ever before"* Participant H

"No! I did not face this short of problem before. Because, I live with my family" Participant J

After seeing the product/service

"Yes! it's good and I will use this service. As there is no platform available like this that is why I did not feel to use it, If the platform is available then I could understand the necessity of it. And also, this application is complete in UX expect. But this service is not fully ready, if it is fully ready, it would be good to understand." Participant H

"Yes! I hope this is good, if someone cook for me after my school" Participant J

Hence, users are not able to understand about the future need until they see the something visually or fully functional systems, although the participants has professional software development experience. Therefore, MVP plays a significant role for conducting informal interview with potential users.

Challenges related to the future product concept and users

During the experimentation and feedback session on MVP, there's lot of issues and complexity arises from the user point of view. After the experimentation session participants were asked that is the product/service better than any other food selling platform (i.e. Foodpanda, Hangrinaki etc.) (see Appendix 5).

"*This is better! Sometime Foodpanda has some problem, but this platform does not have any issues. In Foodpanda, it takes time to deliver the food. Or face problem during the food ordering. And I do not think, this platform will take more than expected time, because it will be delivered from nearest neighbor.*" Participant J

However, Participant J was known person, and he lives in a village where there was no online food ordering platform and he never had used the online things for food ordering before, but he assumes that, other platform like Foodpanda, Hangrinaki cannot deliver within the time frame. Hence, selecting the right participants is significantly important for receiving valuable and reliable data feedback on MVP. Hence, what we ask and what people answer is sometime different depending on the participant or users that reflects on data quality. Furthermore, sometimes it could be difficult to receive reliable data involving people only in a personal contact (i.e., friends, brothers, and family members).

Participant G was asked "What positive things you experienced with this product/service?" He points out an example which is not relevant to the topic of interview and observation. He might not understand the question at all and did not find the context of speaking, but he continued the conversations with irrelevant topic.

"Of course, this type of platform is very important to have. In the consequences of Bangladesh, once upon a time SA-PARIBAHAN was bus service which allows to do parcel courier service as well. According to people need they has to transport the bigger size of parcel and SA-PARIBAHAN was started to open the brunch in different place in the country with van service instead of passenger transport. Hence, in food sector I think this kind of service is needed. And I do not find any negative things in this service." Participant G

Hence, what we ask and what people say is different. People like to keep continue talking even they do not understand the term.

Participant B claim that;

"*When I tried to buy it I tried to look for the descriptions like, what sort of food is it, ingredients, who made it. I mean the quality of the food and other stuff. It was missing on the website".* Participant B

Although it was right there in the same page with all the necessary information. User do not look into the details but just wants to perform some action only. But of course, it's designer fault if something is not visible enough to the users.

Participant I had good observation about the future product, although he is not technical person, but he has IT background. He assumed and compared the MVP with other traditional platforms although he never used the other traditional platform before.

"It's quite different from our traditional service like Foodpanda and Hunrinaki. Because in our city a lot of traffic jam. So if we order a food it takes many time to get our food but in FOOODO It's quite easy and we can get our food easily and very fast." Participant I

In contrast, participant G did not have the idea about the existing food selling platform and how does it work. During the comparison with MVP with other existing applications (i.e. Foodpanda, Haungrinaki) he indicated that, Foodpanda and Hangrinaki are food producing company and this information was wrong because Foodpanda and Hangrinaki are food selling platforms based on restaurant food.

"Of course, this is good. Because, the available service in Bangladesh like Foodpanda, Hanrionaki cook the food themselves and sell through the online system. In that case there are more commercial than service. but his platform allows to become seller of my neighbour and often vice versa. Hence, foodpanda is totally a commercial concept whereas this application do not focus on the 100% commercial but it sell the extra food that we have at my home and I get some extra money." Participant G

Challenges related to the MVP

In contrast, users like to see the full version of product including real data instead of demo or MVP. Participant H and participant B claim that:

"This platform does not have the real data, the platform I use is completed by virtual demo data, when the real-life data is available in the service, I will get the better and original freeling of using this service." Participant H

"The Website is not fully ready, and I think this is the only negative things." Participant B

4.2.2 Challenges subjected to the process

As startups runs with limited resources and extreme uncertainty to deliver the valuable service in the market, it is essential to get to know the difficulties and challenges during the development of the first phase of the product version. In this section research will find the challenges subjected to the process when working with users.

Challenges related to environment settings

During conducting the interview and experimentation, most of the participants notice about the uncomfortableness which is subjected to the process. For instance, participants

voice was audio recorded by mobile phone and experimentation session was recorded in a video format. Participant F, Participant L, Participant B noticed that;

"I find the difficulties, when you are holding a microphone in front of me" Participant F

"Being in-front of camera was a little bit awkward me. I am not really comfortable to be in someone's screen, like to be recorded by someone. This is not something very comfortable for me." Participant L

"Yeah. I was a bit shy because, I wasn't prepared like that I came home with a T-shirt. I never prepared that I could have recorded by someone. I don't like!" Participant B

Other participants also claim the same that they were not comfortable using microphone during the interview, but they did not say anything in the interview session but personally.

Furthermore, Participant A and other few participants (note listed in the Table 1) were invited to the restaurant for conducting the interview and observation. However, the internet connection was not good enough to carry out the demonstration of MVP, as the internet was shared from a mobile device. As a result, those participants were not able to interact with MVP. Therefore, before the interview and demonstration, it is essential to check all the dependent variables such as internet connection, devices, place, and other settings.

Moreover, participant E and participant F were invited to other restaurants (public place) and encountered some environmental issues (i.e., noise) which are not good for producing good quality of voice recorded data. Which leads getting bad quality of data during transcription (voice to text) through such automated tools (i.e., sonix.com)

Challenges related to tools

Moreover, MacBook Pro has been used for interacting with MVP for all the participants which was not comfortable for all the users. Participant G stated that;

"About the overall session I do not have any negative opinion, but I feel little bit of difficulties to use your laptop as this laptop does not have any trackpad button. But other laptop has the button which I did not find. I think a familiar laptop would be good for me." Participant G

Challenges related to technical terms

On the other hand, often participant was not familiar with the technical term (i.e. UX), and not able to answer according to the question, but they just want to answer something which lead to get the bad quality of data. For instance, participant G and D were asked that do you think this product/service is useful, usable, and created a positive UX?

"Of course, this service is useful and usable, and it's created a positive thinking." Participant G

"Yes! It's created a positive UX. Because, people are busy with their task, and those who live alone they cannot make their food in timely and cannot maintain eating every day, actually health is wealth. For that reason, I think this platform can be useful if people get

those benefits. Because, they will not think about their food as they will get it in the doorsteps" Participant D.

The participants G and D were not clear enough about the term of UX, but he just explained what they think.

4.3 Benefits of collecting user's feedback

Collecting user feedback through MVP is very significant task for startup to understand what people think about the future product and idea validation, usability improvement, suggestions for new features and so on. The benefits of user feedback is analyzed in the following sections.

4.3.1 Approach to early product validation

According to Klein (2013), early product validation consists of problem validation, market validation, and product validation.

Problem validation

In order to understand the problem is valid, participants were asked several informal questions related to eating habits and the problem they face in daily life. For instance, do they prefer to eat outside or at home, do they encounter any situation that they get hungry and do not have any food at their home after study or work. Other relevant questions have been presented in Appendix 5. Participants explain their real-life experience related to eating habits and the problem they face.

"Back in the years, I have been working a lot. So, I remember there was a lot of times that I came home late at night and I didn't have any food at home, and I didn't have the energy to cook. Yeah, it was taking terrible time for me. I couldn't even sleep due to hungriness. I feel if someone can bring some food for me." Participant C

"Yes, recently I went to meet my ex-colleague and after coming back home at 11:00 p.m. I discovered that there is no food in my home. And that was a very bad situation for me." Participant F.

"This is a very common problem for me. For example, sometimes I feel that the outside food is not good, and I take initiative for cooking myself. But unfortunately, I do not cook due to tiredness after work and I had to stay hungry." Participant G

"It's happened, most of the time, even like last night as well. I was hungry and do not have any food at home, and then I was thinking of what to eat. Then I got some bread or something and a little bit of time. It's almost late at night, so I have no other option. I just took that food. But generally, it is good if I can cook something in advance and then I can keep it for the near future." Participant K

"Yes, I face this problem. Sometimes not regularly maybe once or twice in a month." Participant E

"Yes. Many times, I've been in this situation. Okay. I was hungry. I was studying. Then I feel hungry but no food at home" Participant I

To summarize, out of 12 participants, 9 participants have reported that they face this sort of eating problem and other 2 participant H and participant J said that they do not face this kind of situation because of most of the time they stay with their family. In this case, although it is not a huge number of respondents to identify the problem is valid, but still, we can consider more likely as a valid problem.

Market validation

Markets are always difficult for startups. Identifying the problem does not mean a lot of people will pay for the solution. Therefore, startups have to validate the market. Therefore, participants were asked about the existing food selling service that has a physical operation in the targeted population area. In order to understand the market is valid, participants were asked how they use the existing food selling service and try to figure out with a little comparison with the FOOODO application concept as a future product in the similar market segment. Two participants had used the exiting food selling platforms several times and they stated that;

"Well! Yes, I used the existing food selling service, two different things over here FOOODO are more focusing on homemade food and other stuff but for Foodpanda and Hungrynaki they are more sort of commercial types of companies, so they sell food from the restaurant. Whereas, FOOODO sale homemade food and that is the difference. So, as I said, I prefer homemade food. So, I would prefer this one over them." Participant E

"Yes! I Face this problem many times. And come outside to eat e.g. at a restaurant or shop." Participant *D*

Rest of the respondents were familiar with the existing food selling services but did not use in person for buying food.

Product validation

Validating the product takes much longer than problem validation and market validation as it is iterative process. In order to product validation, there are several ways to do that for instance, ethnographic studies (listen to your users), landing page testing, and prototype testing (Klein, 2013). This study utilized informal interview (semi-structured) and prototype testing methods in the form of informal interview and MVP experimentation. To get to know more about the user's voice, this study spent time with the user and asked several questions concerning the product validation. All the participants were asked that, if they are offered an online platform (web/app) to get home-made food from your near neighbors how they will consider it (details in Appendix 5)**.**

Most of the participants reported that it would be nice to have such kind of online service that allowed to find home-made food from near neighbors. Few of the participant's statements are following;

"*I think it's a promising idea and I think this type of application would be beneficial for people like us who wants to order food or who wants to have food from the neighbors.*" Participant C

"Of course, it's very good to have homemade food from near-neighbor after my work through an online service." Participant D

"I think this would be a good idea for bachelor people, people who are living alone not with their family especially for students but not me." Participant B

"Yeah that'd be great. I mean for people like me sometimes finding food to cook from home. Also, there are so many other professionals that are staying alone to help them." Participant E

"Yes, I am interested in using this type of product because sometimes we have no time and we are tired. Then we can buy food from our neighbors. I think it's good" Participant I

"Of course, I am very interested to use this service. I think job holder like me passes a very busy life and has to eat alone without family. In that case, this service is very useful to them." Participant G

According to the data, the concept of the early product is valid, although less amount of responses provided the necessary data regarding market validation. Nevertheless, the idea of the early product concept is more likely valid.

4.3.2 Usability improvement

Collecting user feedback through MVP by the potential user helps to improve the usability of the current system. Moreover, experts in a particular domain provide very insightful feedback from his/her expertise. Participant K was a professional UX designer and content marketing specialist, he suggests some usability improvement on current MVP. He mentions that during the interaction with the MVP he finds some lacking's of signifier or clue where to upload an image while he was acting as a seller to publish food item in the system.

"*Well, I think it should be something like a square box e.g. a camera icon or something or just plus sign whenever I can upload an image which should be easily understandable. So that I can understand, I can add pictures through that."* Participant K

Expert people see the product concept from very in-depth level, and they can recognize the issues and suggest for good usability improvement for early product version.

In contrast, participant D express his opinion related to the usability of the MVP.

"I think, both user like buyer and seller need to register with the system, which will be distinguishable and see who seller and buyer is." Participant D

4.3.3 New product feature and idea

Collecting user feedback from potential user also helps to bring the new ideas on board. For instance, participant C and participant F statements are following:

"*Probably you should make some documentation of our previous instructions. Maybe some kinds of visual onboard tutorials that people can see how to make an order or how to use this application. Also, as a site administrator, you should have to make sure that, seller doesn't sell some rotten food. More importantly, you should verify the user's profile. Either buyer or seller"* Participant C

"I do not see much more lacking in this system, but I told you that If you use location-based system instead of address. That may be good for the user and you may also add users' mobile number. So that, you can directly call user and get location. One the other hand, I think if you take less input from user then it might be helpful" Participant F

4.3.4 Insightful data towards fun activities

Fun activities are significantly important for users during conducting interview and experimentation of MVP. This research examines that when some funny discussion added during the interview and MVP experimentation users become more confident and comfortable to talk about. Even they response in more advance level than usual about the product/service which helps researcher to get to know more insightful information and makes the environment pleasurable.

For instance, we were talking about the concept of the product, at some point during the interview we talk in funny language to make environment more pleasurable. A little conversation is presented in the following paragraphs;

Researcher: *"The concept of this application is good for lazy people ha ha ha…"*

Participant F**:** *"ha ha… I have a question, how will you ensure the quality attributes of food from seller, or do you have any plan to keep a team for measuring the quality attributes? Before you bring a seller in your system will you measure them first"*

Researcher*: "that's good and important questions, that I was thinking about, there might have some options, for example, food sellers will be given a training regarding the quality food and proper hygienic food preparation. And ensure the good quality food for buyer. Hence, a team might work for train-up the seller."*

Participant F: *"Alright! For example, we eat food but the quality of the was not good hence, do you have any policy to refund the money?"*

Researcher*: "we did not think about the refund policy yet, But you can report to the seller about the food quality. However, if the food is really bad, we should take at least some responsibility."*

Participant F*: "Usually other platform does not take the responsibilities."*

Hence, funny and friendly environment helps user to provide insightful information during conducting interview and experimentation.

Many of the participants enjoyed the whole session and they stated in the following ways;

"The nice was the person who seating in front of me was very friendly and he explained me what I should do, and I didn't find any surprising questions. That was very nice because as it as it is I mean the interview. I don't want to face and against a question that I cannot give you the answer I did not find any negative thing or unpleasant thing I can mention right now everything was smooth and right" Participant C

"The questions are pretty straightforward. There was not something that unexpected. so. I'm happy for a deal in their process." Participant E

"It's Very good. Especially it's like a friendly interview okay. And I was able to Speak openly without any hesitation." Participant F

"I enjoyed the interview and the first part of the interview was so easy and I am comfortable to answer all the questions" Participant I

5. Summary of the Results

In this chapter, summary of the result of this thesis is presented in the following subsections to answer the three research questions. The answer of the RQ1 (*How to collect user feedback throughout the MVP to validate the initial product idea in a startup?*) presented in section 5.1. Then answer of the RQ2 (*What kinds of challenges are there when collecting user feedback?)* is represented in section 5.2. Finally, the answer of the RQ3 (*What are the benefits of collecting user feedback with MVP?*) is presented in section 5.3.

5.1 Collecting user feedback throughout the MVP to validate the initial product idea in a startup

Research with potential users is the core of UX research. Product development in real industries outsources the specialized research team to solve the problem. In some cases, research activities take place after or beginning of product development. Lean UX advocates creating by making research both continuous and collaborative ways. In the case of FOOODO I (author) involved with the design process and conducted the interview and experiment for collecting user feedback. The following necessary steps and initiatives has been taken into consideration to build first version of the product and collect feedback from the potential user to validate the product idea through MVP.

Create MVP

- Declare assumption with meaningful user stories that includes a list of features.
- Build a collaborative design team (if resources are available) for transforming user stories to paper sketch.
- Design wireframe with convenient tools (i.e., Balsamic), and it could be clickable as a low-fidelity prototype.
- Examine the wireframe with few users (domain experts are useful in this stage).
- According to the wireframe, create visual mock-ups with convenient tools (i.e., Adobe XD) respecting necessary brand guidelines.
- Now, time for building the MVP. It could be built through the latest frontend technology (i.e., HTML, CSS, SCSS, and JavaScript), but for a startup, it better to build with such third-party tools (i.e., InVision, marvel app) which are quick and inexpensive.

Collect user feedback

- Select the potential user according to the future audience of the product.
- Before the interview, conduct an introductory session to let the users know about the research and product idea.
- Send the questionnaire and describe other environment settings, including schedule.
- After that, set up an open discussion session with potential users to get to know about their insight concerning the hypothesis.

- Now, show them MVP and let them interact with it and observe. In the case of FOOODO we requested to buy an item and publish an item for selling in the platform, although the MVP was not fully functional but clickable.
- Next, ask friendly questions to the user to know about their beliefs and thought about future product.
- Note the most valuable comments for future improvements. In this study, we tried to collect the necessary feedback for FOOODO application for further iteration.
- A friendly environment works like magic to get more insightful data from users while collecting feedback.
- However, in order to collect feedback from potential users, an MVP plays an indispensable role in the new product development.

The above instructions are made with justification for small startups with limited resources. Those instructions will support to build the first version of the product in startups settings.

Hypothesis validation

A wide range of startups began with an inspiring idea for a business, and research shows that most of them fail. Most ideas are based on assumptions rather than solving a practical problem. Therefore, startups need to validate their first version of the product with potential users. This study agreed to validate the initial hypothesis with three different factors (adapted from Klein, 2013). The factors are problem validation, market validation, and product validation.

According to the data analysis, this study advocated that the case of FOOODO's hypothesis is valid. Out of 12 participants, 9 of them reported that they face a similar problem in their daily life. In that case, the idea of the product has a good co-relationship with the problem people face in their daily life. On the other hand, after experimenting with the MVP, all the participants agreed to use the service, and they find the context of use.

Therefore, in order to validate the first version of the product, experimenting MVP and feedback and research play an essential role for startups to avoid extreme uncertainty.

5.2 The challenges when collecting user feedback

Various challenges arise when MVP experimentation, and feedback and research were conducted through Lean UX process. The challenges are presented by various factors in Figure 11. The factors have been categorized into product-related challenges (future product concept, product idea and users, and MVP) and process-related challenges (environment settings, tools and technical terms).

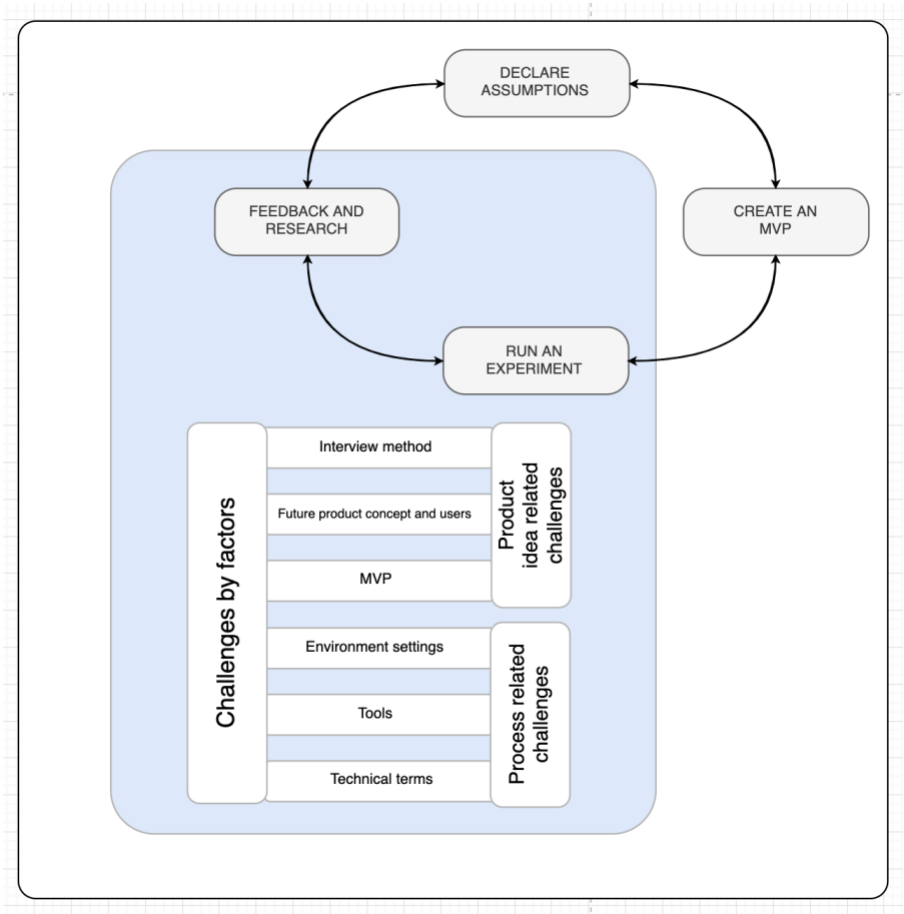

Figure 11. Challenges during experiment and feedback by various factors in the Lean UX process.

5.2.1 Product idea related challenges

Challenges subjected to the interview method

Many users were not able to assume the necessity of the future product or service, although they have a technical background with software development experience. However, when MVP was presented, they understand the necessity of it and understand the future need and show the interest of using it in the future. Hence, until seeing something in a visual form, many users are not able to understand the feature need.

Challenges subjected to future product concept and users

Sometimes it is difficult to get reliable data involving people in a personal relationship (i.e., friends, brothers, and family members). In personal contact, people felt shy if he/she is not familiar with the topic or context, but they prefer to keep talking, although the answer is not correct. In this case, there is a chance of getting the incorrect data that may not be good for the early version of the growing startups' products. Furthermore, People love to talk about the future concept of the product, although they do not have the background idea of similar existing products or services. The participants have to have background knowledge of any software product. If not, they may not be able to provide useful feedback with MVP. Often, they provide some unnecessary data that is not relevant to the topic.

Challenges subjected to the MVP

When participant interacts with the MVP, often they do not look into the details of the application to find the necessary information's. Nevertheless, they tend to complete the interaction during experimentation. More importantly, most users like to see fully functional MVP and ready product for experimentation, but which is not often possible for startups, and it is time and cost consuming.

I used the demo data in the MVP, but users expect to have the real data in the first version of the product, which may not be possible in startup settings. With MVP, users might face various difficulties related to usability. In this case of FOOODO, users face many problems to publish an item on the platform. Although it is a challenge, it can help us to know the lack of the current system to improve usability. In contrast, often, it relates to the negative word of mouth for future product concepts, which is not suitable for startups.

5.2.2 Process related challenges

Challenges subjected to the environment settings

The users do not want to talk willingly on a microphone during the interview and observation session. Many of the participants claimed during and after the interview; they feel uncomfortable on a microphone. In that case, note-taking would be the right way of collecting feedback from the targeted users instead of voice recording. On the other hand, people do not want to be recorded by a video camera during the observation session. Most of the participants claim not to be screened by a camera; some of the participants feel shy as well.

In this study, a few of the participants were invited to the restaurant for conducting an interview and MVP experimentation. Internet connection was shared from a mobile device, which was very slow and not able to load the MVP. Therefore, participants were not able to interact with MVP and face an embracing situation. Hence, it is essential to re-check the devices, internet connection, and other settings before conducting interviews and experimentation. There is a chance of getting extra noise while recording in a public place like a restaurant that effects transcribing through sonix (www.sonix.ai) that finally effect on encoding.

Challenges subjected to the tools

In order to collect feedback through the MVP, the tools or devices we use have to be familiar with participants. In this study, a MacBook Pro 2018 was used for MVP experiment, whereas most of the participants were not familiar with the commend of devices. They face complexity during the interaction with the MVP using MacBook Pro. Hence, it would be good to have a familiar and commonly used computer.

Challenges subjected to the technical terms

Some participants may not be familiar with the technical term (i.e., UX), and often skip the term. They were sent the questions before the interview and requested to inform if something is not clear enough. Most of the participants did not notice that they are not familiar with this kind of technical terms (i.e., UX) due to shyness.

5.3 The benefits of collecting user feedback with MVP

The benefits of user feedback through MVP is presented by various factors in Figure 12. The factors are categorized into early validation and early product improvement.

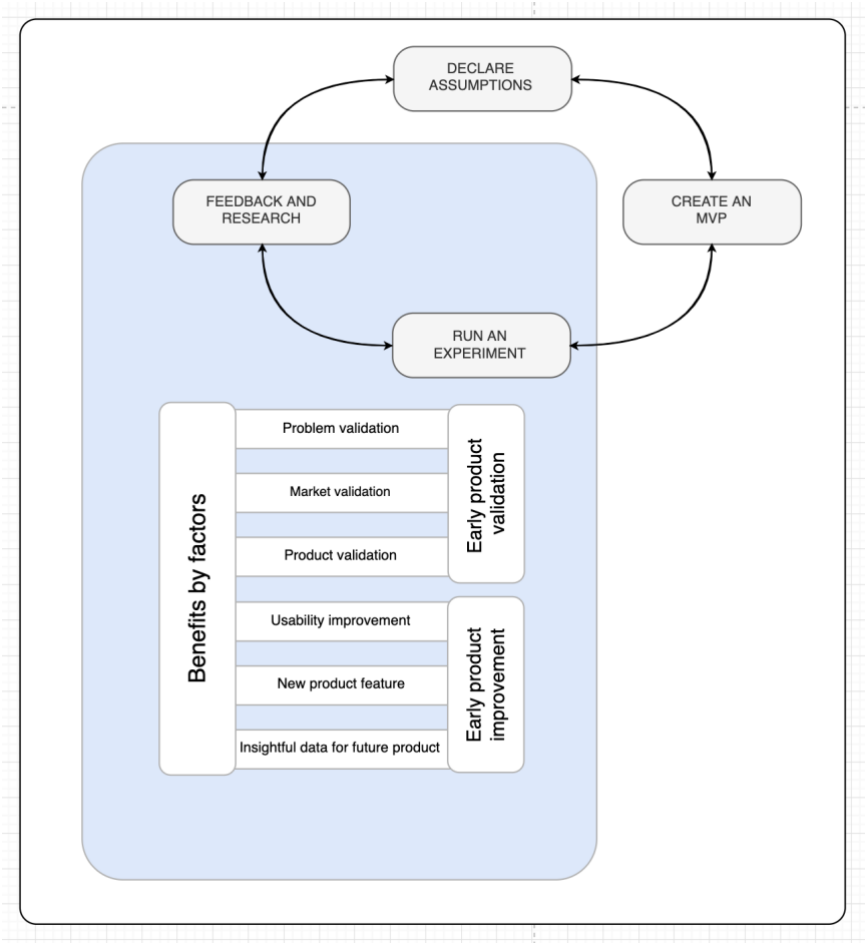

Figure 12. Benefits by various factors in the Lean UX process

5.3.1 Early product validation

Problem validation

Finding the problem is very important for every startup's product. The product should be built to solve the problem that faces numerous people. If the problem is not exiting, people will not use the product. Hence, spending time with the user helps us to know about the user's problem. Sometimes people do not know about the problems until someone points out the problem. In the case of FOOODO, we see few people did not notice the problem, but while MVP shows they like to use the product. Problem are sometimes invisible to the users, but it is our job to find the problem.

In the case of FOOODO the problem was valid as most of the participants face a similar problem. However, early problem validation may not prevent failure, but it may help avoid the uncertainty of the product.

Market validation

An MVP can identify that the market is valid or not. It helps narrow down the target users and discover how users are solving the problem currently. If they already use some product or service, it means that the market is valid. In the case of FOOODO, the relatively similar product concepts existed in the market; therefore, we assume people are already using the existing product that solves relatively similar problems.

Product validation

When the problem validation and market validation is identified, an MVP can support us in validating the product concept. It helps us to know users will use the product or not. Moreover, there are several ways of product validation such as landing page testing, ethnography research, and prototype testing.

5.3.2 Early product improvement

Usability improvement

While participants interact with the MVP, it is possible to observe empirically about the user journey. This means how people are interacting with the 1st version (future product) of the product and find if something is missing in the user journey. Moreover, it helps us to identify and resolve issues that refer to usability.

New product feature

A competent participant can evaluate the future concept of the product through MVP and provide meaningful feedback that improves future products of startups. More importantly, experimenting MVP and collecting feedback helps to find new and useful features

Insightful data for future product

Users can provide their real opinion about the product concept, i.e., what they like and what they do not like. In most cases mass users are not able to understand the future product, whereas MVP plays a crucial role in collecting feedback for startups context. Users can distinguish the differences among other relevant products and services which already exist in the market and provide a meaningful opinion regarding the MVP. Hence, to make a product-market fit for a startup, this type of feedback is very significant.

6. Discussion and Conclusions

In this chapter, a detailed discussion of theoretical contribution, implication of research, and the relationship with the previous literature concerning the result of the study is presented. Then, possible direction about future work, limitation, and finally, a concrete conclusion for this research are made.

6.1 Discussion

Theoretical contribution and practical implication of the research

This research contributes to scientific study and new business development in software startups. The result of this research points out the way of creating MVP, feedback collection from potential users. Besides, this research examines the concept of the Lean UX process and discover the challenges and benefits. The main contribution of the research is evaluation of the Lean UX process (Gothelf, 2013) and it contributes to the scientific literature by presenting a model related to the challenges factors and benefits that involve with Lean UX process cycle 2 and 3.

Klein (2014) and Gothelf (2013) presented the principles and practices of Lean UX. However, this research evaluates the Lean UX process in the form of complexity and benefits model. The complexity model points out various challenges with two different categories, such as the product idea and process. In contrast, the benefits model also pointed out several benefit factors of the Lean UX process that refer to the early hypothesis validation and improvement of the early product. Moreover, those complexity and benefits models can contribute to startup's product development strategies as a set of guidelines for reducing the challenges and receive a competitive advantage. More importantly, the result of the research connects to software engineering, especially HCI literature and new product development in startups.

MVP and Lean UX for startups

The UX aims to create good design, effective solutions, whereas Lean UX is the revolutionary product development strategy for startups. To create effective product participatory design allows to understand user need (Abras et al., 2004), and early product version with good UX spread positive word of mouth (Hokkanen et al., 2015). However, this research examines that while users are involved in the design process for experimenting first version of the product face many complexities, which may lead to already spread of negative word of mouth, which is not good for a new innovative product for the future market segment. Nevertheless, still, MVP needs to be experimented with potential users to enable testing of the hypothesis (Ries, 2011; Hokkanen et al., 2015) and justify the user needs, and measure the critical performance of the first version of the product.

This study also advocates that MVP should build with a minimum amount of effort (Ries, 2011) that contain main features to receive faster feedback (Blank, 2013; Grama, 2016) to validate the hypothesis and reduce the risk. Gothelf (2013) suggested to build MVP without code; it could be made of paper (Abras et al., 2004; Gothelf, 2013), sometimes it could be a user interface that provides the feeling of the actual product (Nguyen-Duc et

al., 2017). However, users like to see the full version of the product instead of a small version that contains limited features, interaction, and demo data.

Experiment, Feedback and research

Klein's (2013) early validation process (problem validation, market validation, product validation) is very notable for new product development in startups. Klein (2013) shows several ways of product validation, such as Ethnographic study, Landing page testing, Prototype testing, and pain-driven design. This research evaluates the prototype testing for product validation. However, this study showed that prototype testing has some limitations as it requires to arrange various settings such as participant recruitment, environment settings, schedule, and sometimes it may not be possible to find the right users.

Challenges towards MVP, feedback and research in Lean UX

This study indicates that people sometimes are not able to distinguish the necessity of future products concept. Sometimes what people say and what people want is entirely different. Therefore, we need to observe the people what they do, not just what they say. This finding of the research is significantly linked with the previous study of (Garrett, 2010; Norman, 2013; Gothelf, 2013).

In contrast, the objective of Lean UX is to build a rapid product with limited resources (Hokkanen, 2017), Gothelf (2013) suggest bringing multiple disciplinary people on board for the collaborative design process. This study argues that as startups run with extreme uncertainty with minimum resources, even sometimes by one person, it might not be possible for all startups to conduct UX research with a research team, including designers, developers, and marketers. However, other guidelines of the Lean UX process by Gothelf (2013) are significantly crucial for developing the first version of the product.

6.2 Limitation and future research

This research focuses on Lean UX method for startups MVP product. However, for experimenting with the MVP, we utilize semi structured interview to spend time with potential users and evaluate an MVP prototype. It would be great if I could use the landing page testing for experimenting and collecting the data from a wide range of real-time users. Whereas, in this research, only 11 users out of 12 were involved in the experimentation and feedback session, and most of them were within the known contact. It is always more satisfying to involve wide range of unknown users through online and observe utilizing various analytical tools to collect statistical data and understand the real-time user activity to improve the user experience and understand the user demand. It could be exciting to apply findings to the MVP to develop the real product and rotating the idea to make product marketable and analyze.

In the hypothesis validation point of view, it would be great to have more reliable data to say the product idea is valid. In contrast, the research presented the challenges and benefits factors based on collecting user feedback and research with MVP considering a single case (FOOODO). Hence, it would be nice to examine more cases to discover further unknown challenges and highlight more enhanced benefits for startups communities and academic research area.

6.3 Conclusions

Lean UX design process widely uses as a revolutionary product design methodology that advocated to build the first version of the product called MVP for experiment and feedback and research for a startup. Lean UX suggested becoming closer to users during the experimentation of MVP for collecting meaningful feedback, which increases the probability of business for startups. Most startups want to develop and test the first version of the product without wasting time and money. This research provides new knowledge of collecting feedback through the MVP by the Lean UX approach to validate the product idea in startups settings. Along with that, research presented two different models related to the complexity and benefits of Lean UX cycle 3, and 4.

To conduct the research, a case of FOOODO was considered as a startup product in Bangladesh. The data was collected from 12 participants in the target population area in Bangladesh. According to the data from the interview, experimentation (observation), and feedback and research, the case of FOOODO product concept is valid according to market demands and user interest. However, still the social desirability bias might be there; in this kind of situation, people can be more positive about the product idea. So, as a researcher, I have a little bit of suspicion, although I receive a positive result from users. Who knows, sometimes people tend to be, or people do not want to criticize in this type of situation.

Moreover, the main contribution of this research is to guide startups by introducing various challenging factors when experimenting with MVP to validate the idea. Besides, the finding of this research will address startups to know about the challenges so that they may become aware beforehand to build their first version of the product. Both academics and practitioners can get a better perception of creating MVP, how to collect user feedback through MVP, challenging factors and benefits of Lean UX process cycle 3 & 4 (Run an experiment and feedback and research).

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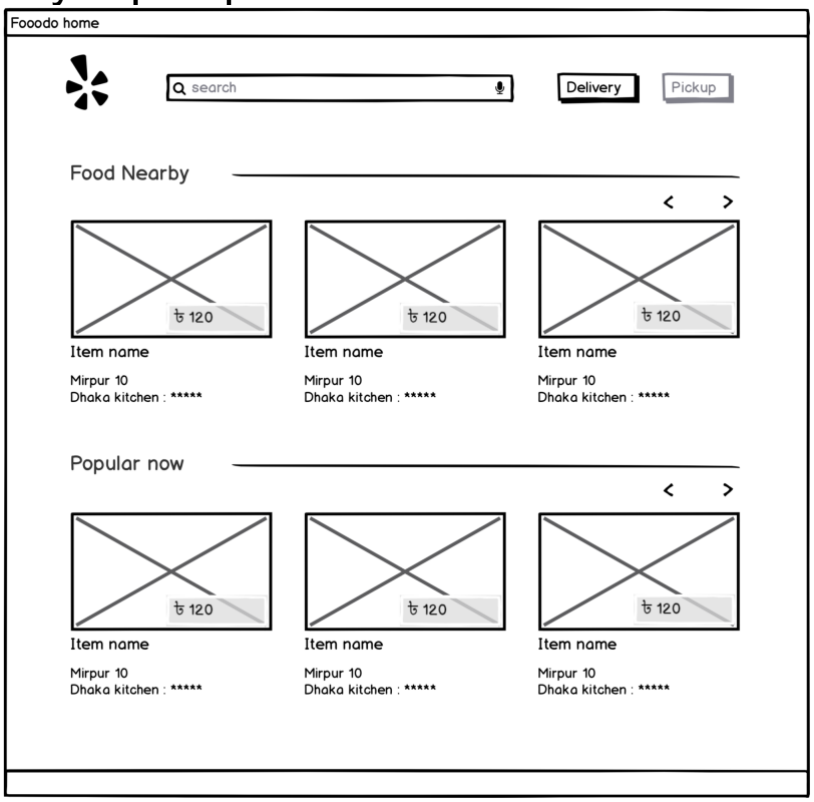
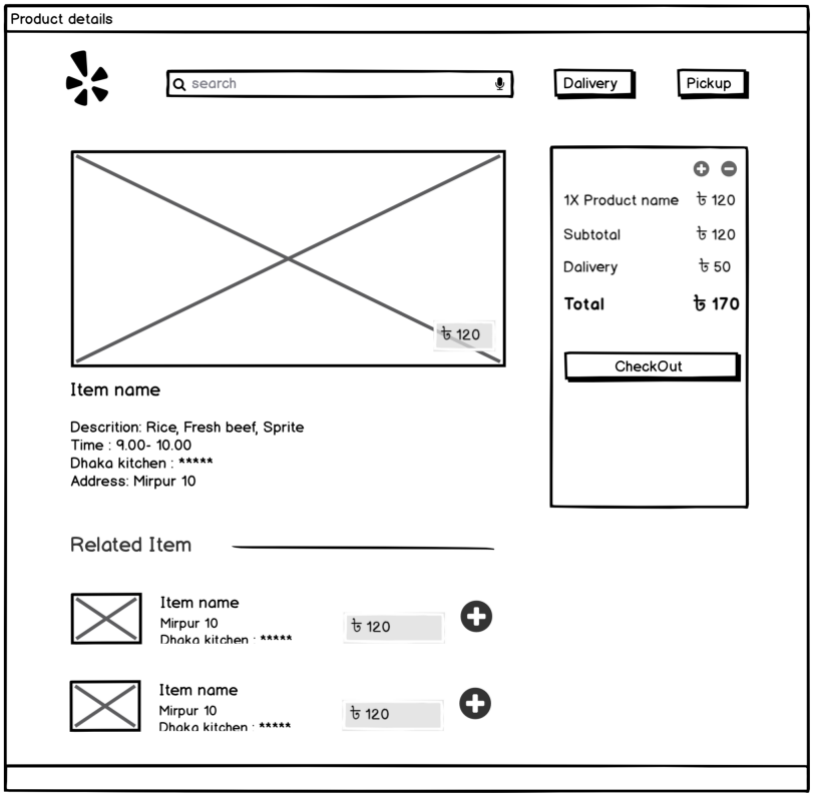
Appendices

Appendix 1: Initial idea of FOOODO application for seller perspective in the form of wireframe
Appendix 2: Initial idea of FOOODO application for buyer perspective in the form of wireframe
Appendix 3: User interface of FOOODO application as buyer
Appendix 4: User interface of FOOODO application as seller
Appendix 5: Questionnaire about the semi-structured interview

Appendix 1: Initial idea of FOOODO application for buyer perspective in the form of wireframe

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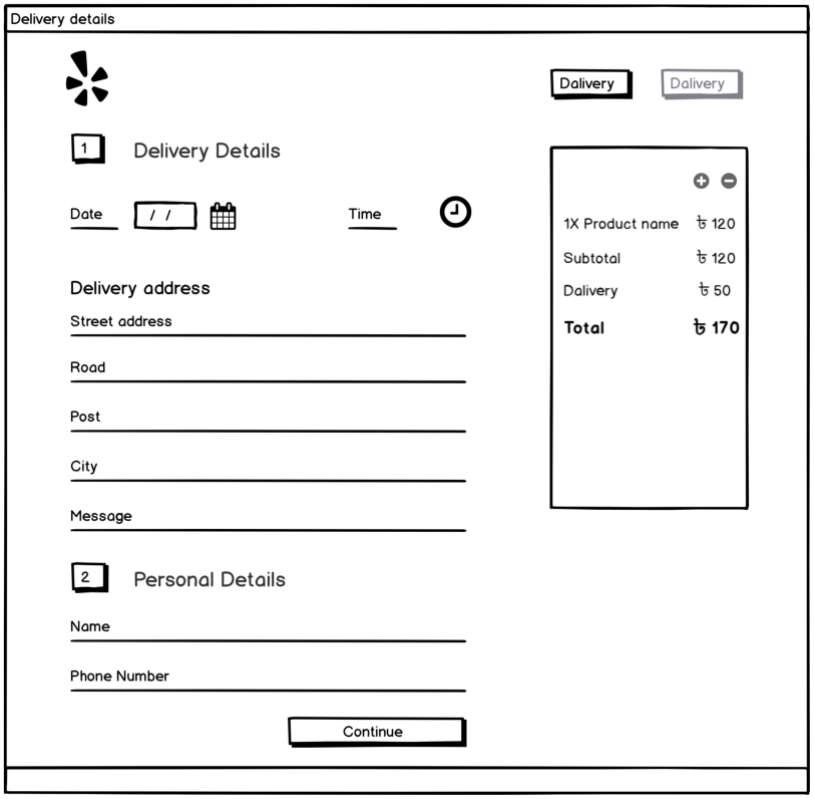
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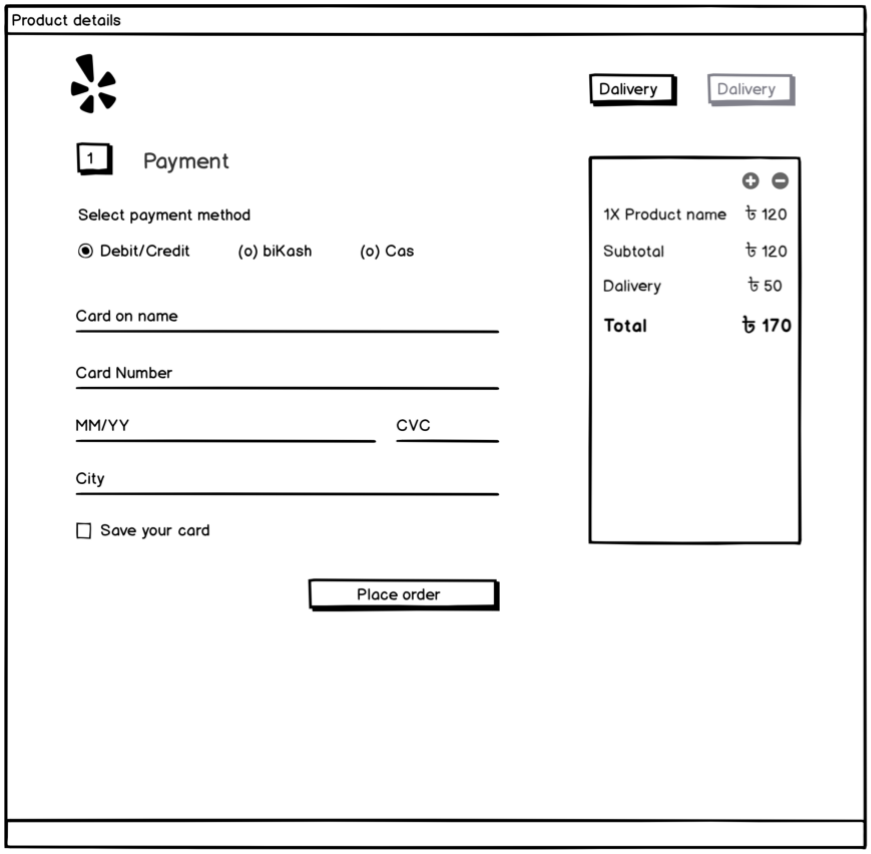
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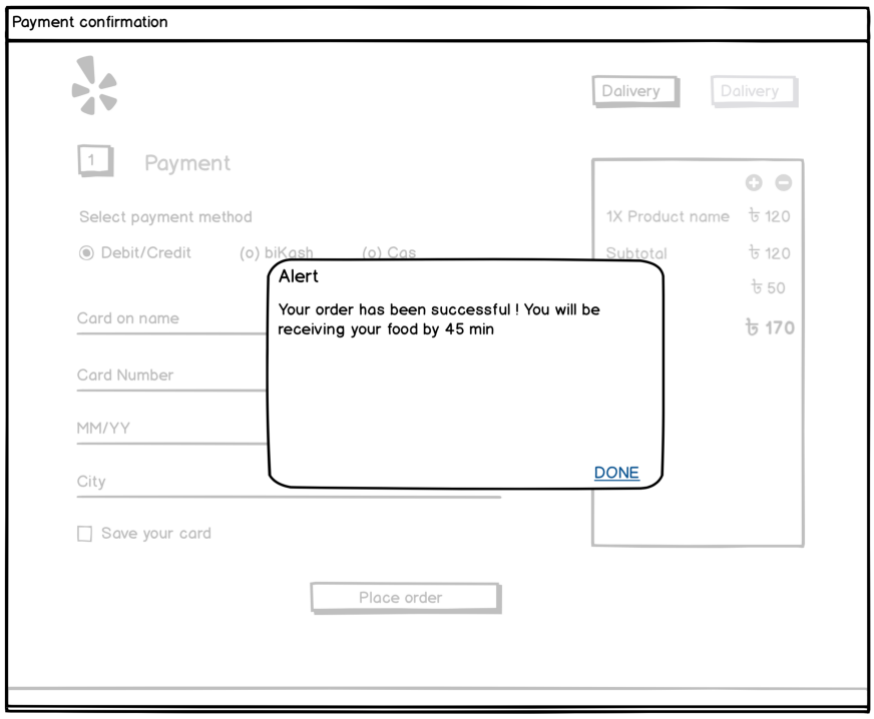
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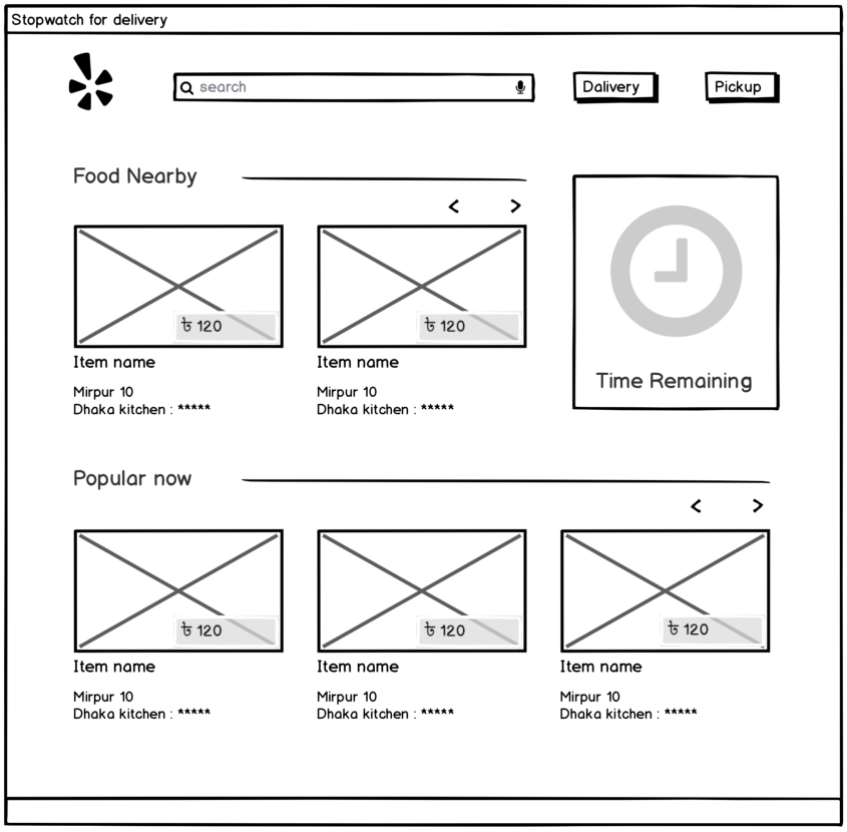
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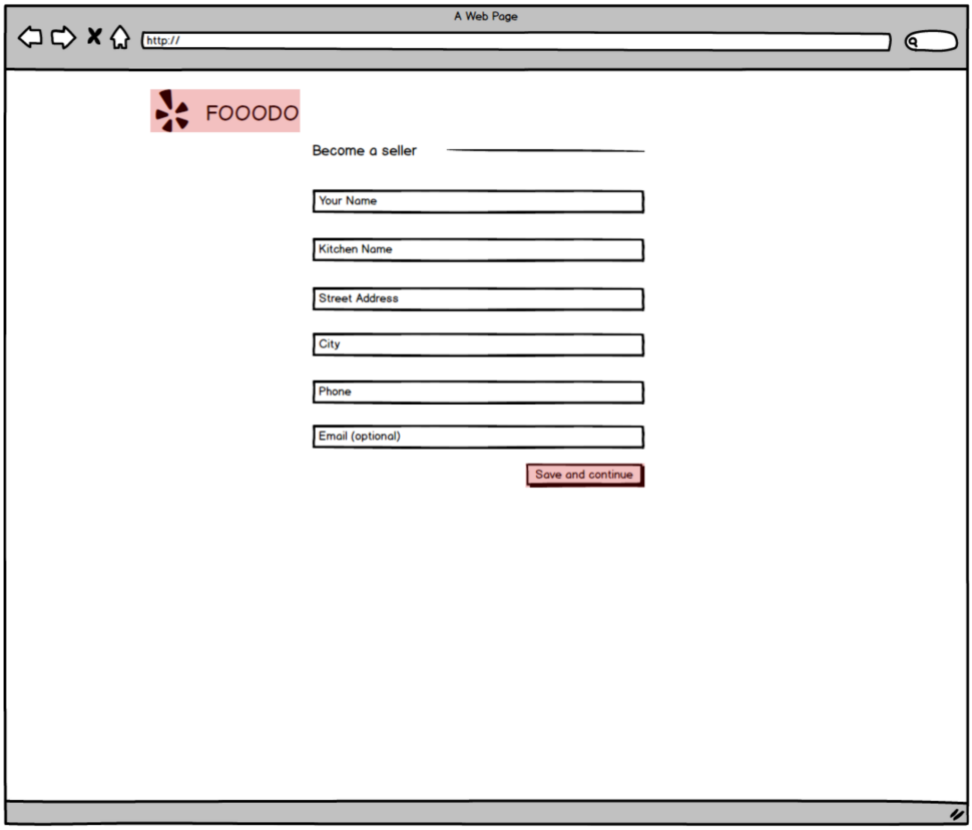
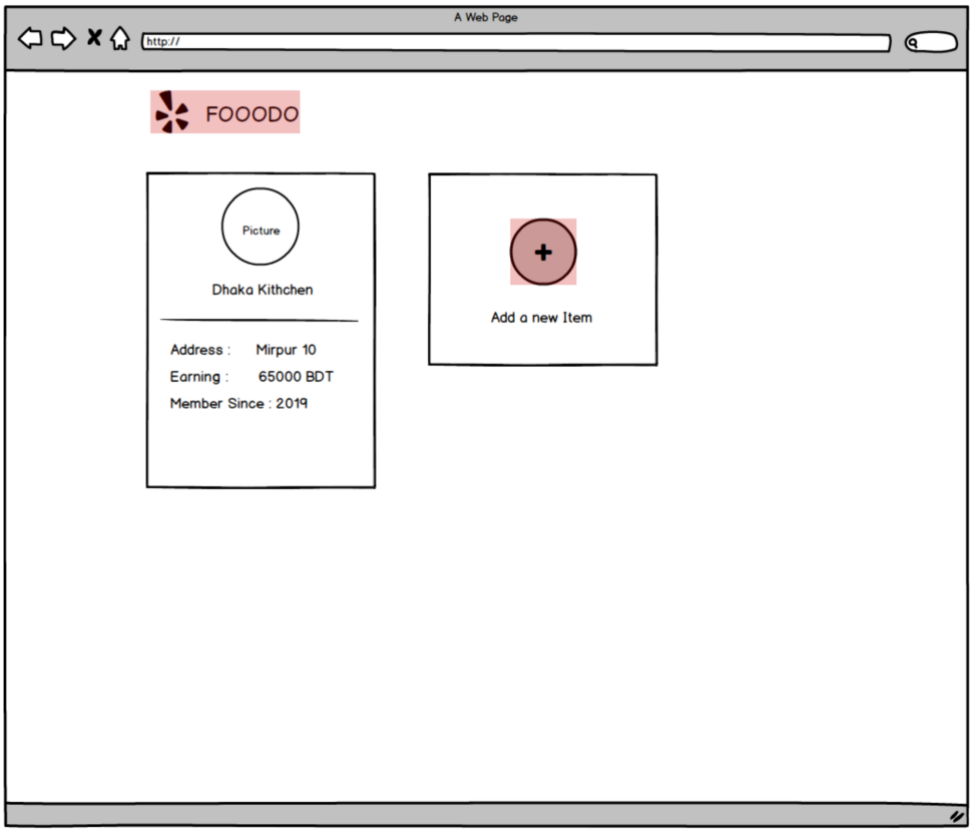
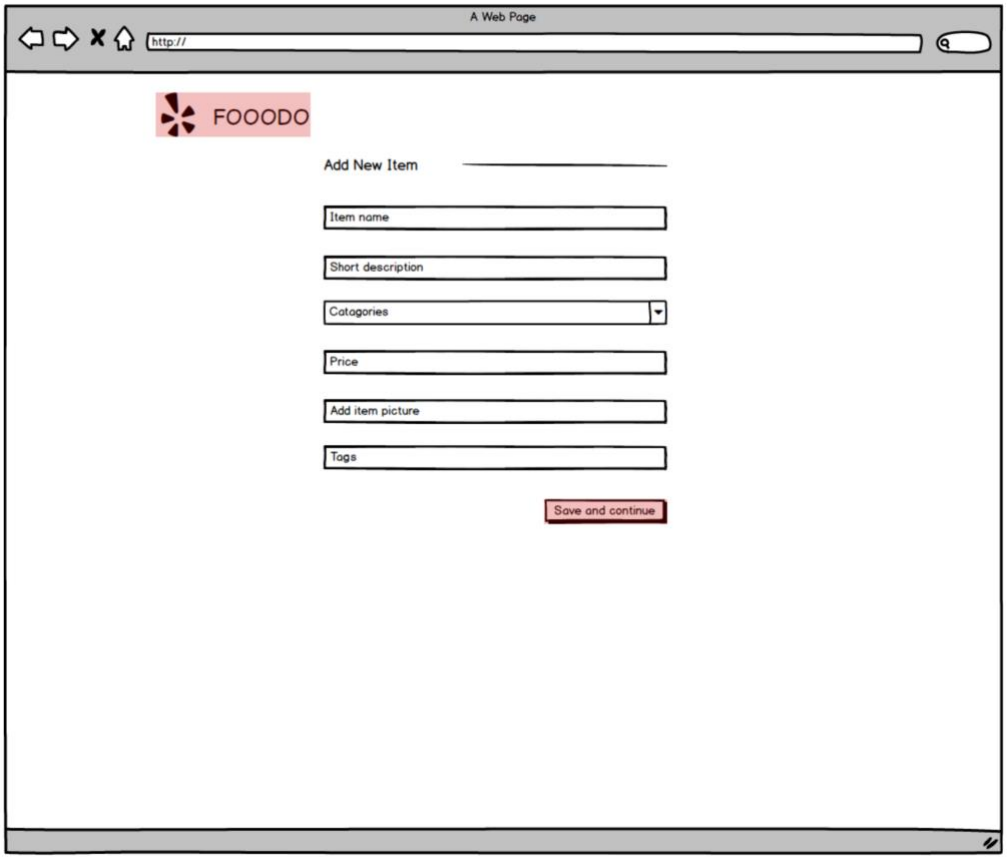
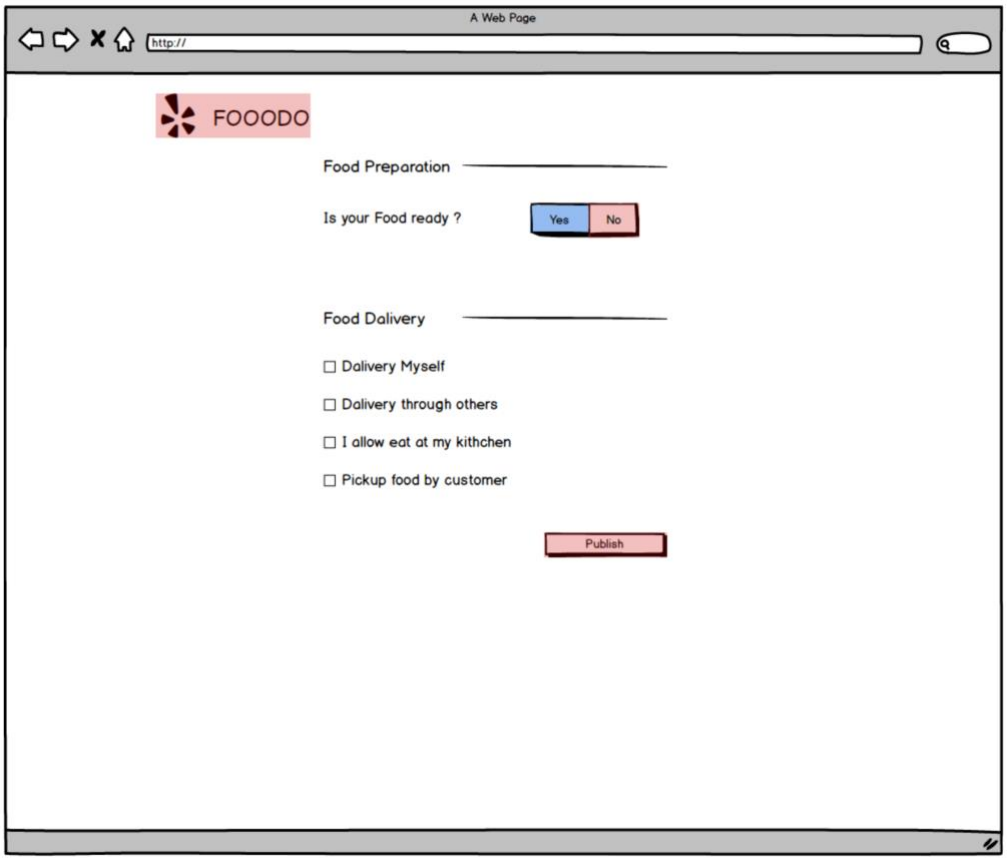
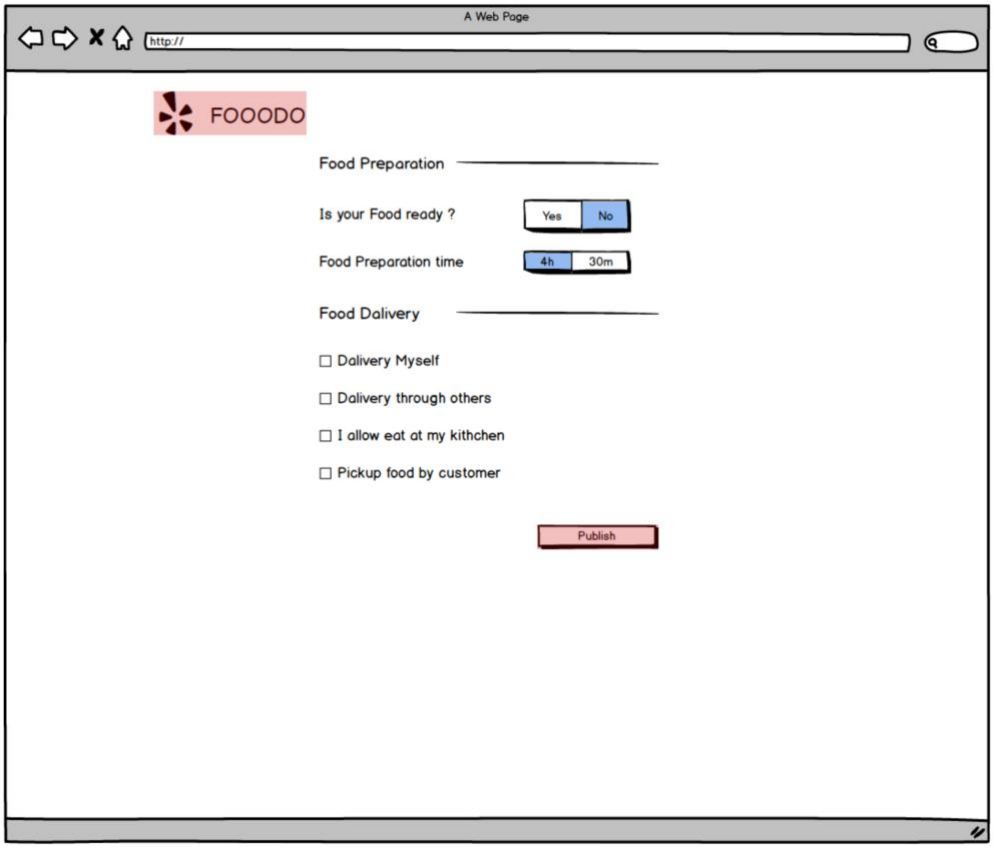
Appendix 2: Initial idea of FOOODO application for seller perspective in the form of wireframe

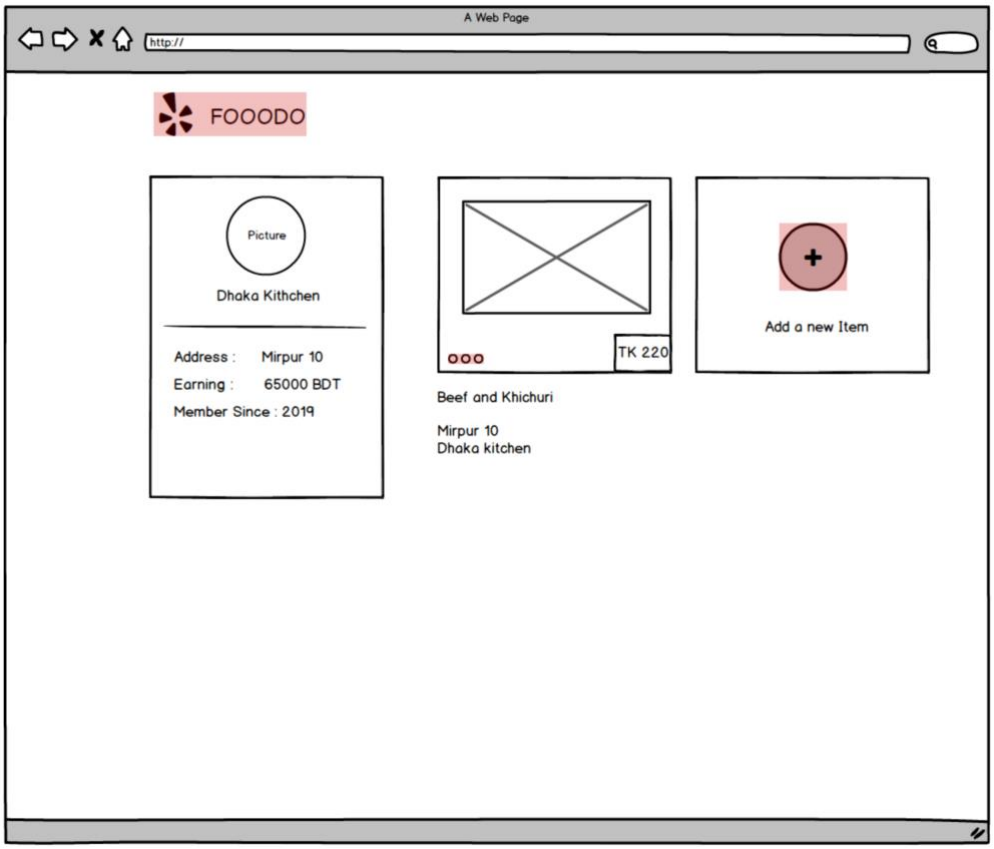




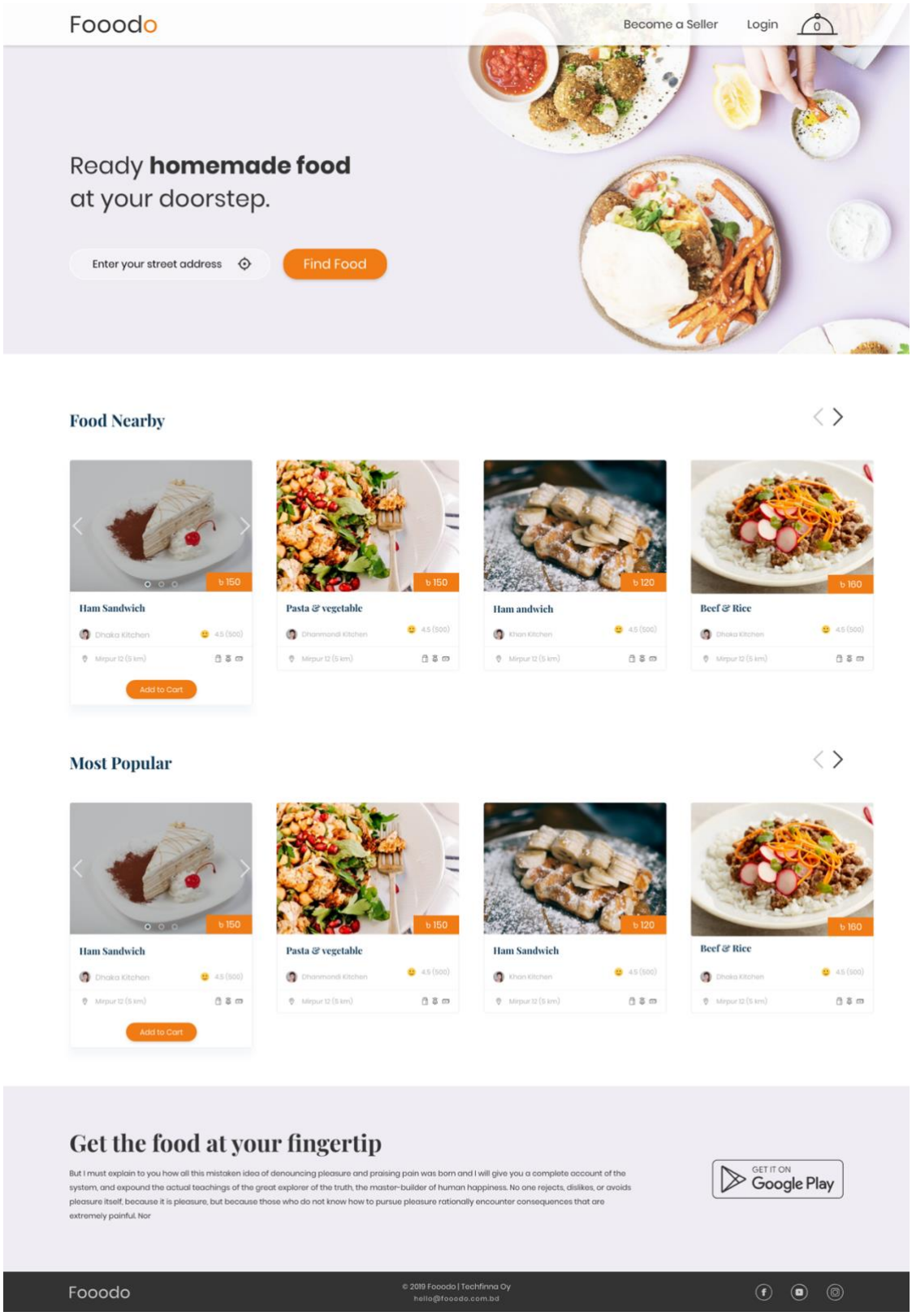

A Web Page
http://
FOOODO
Add New Item
Item name
Short description
Catagories
Price
Add item picture
Tags
Save and continue

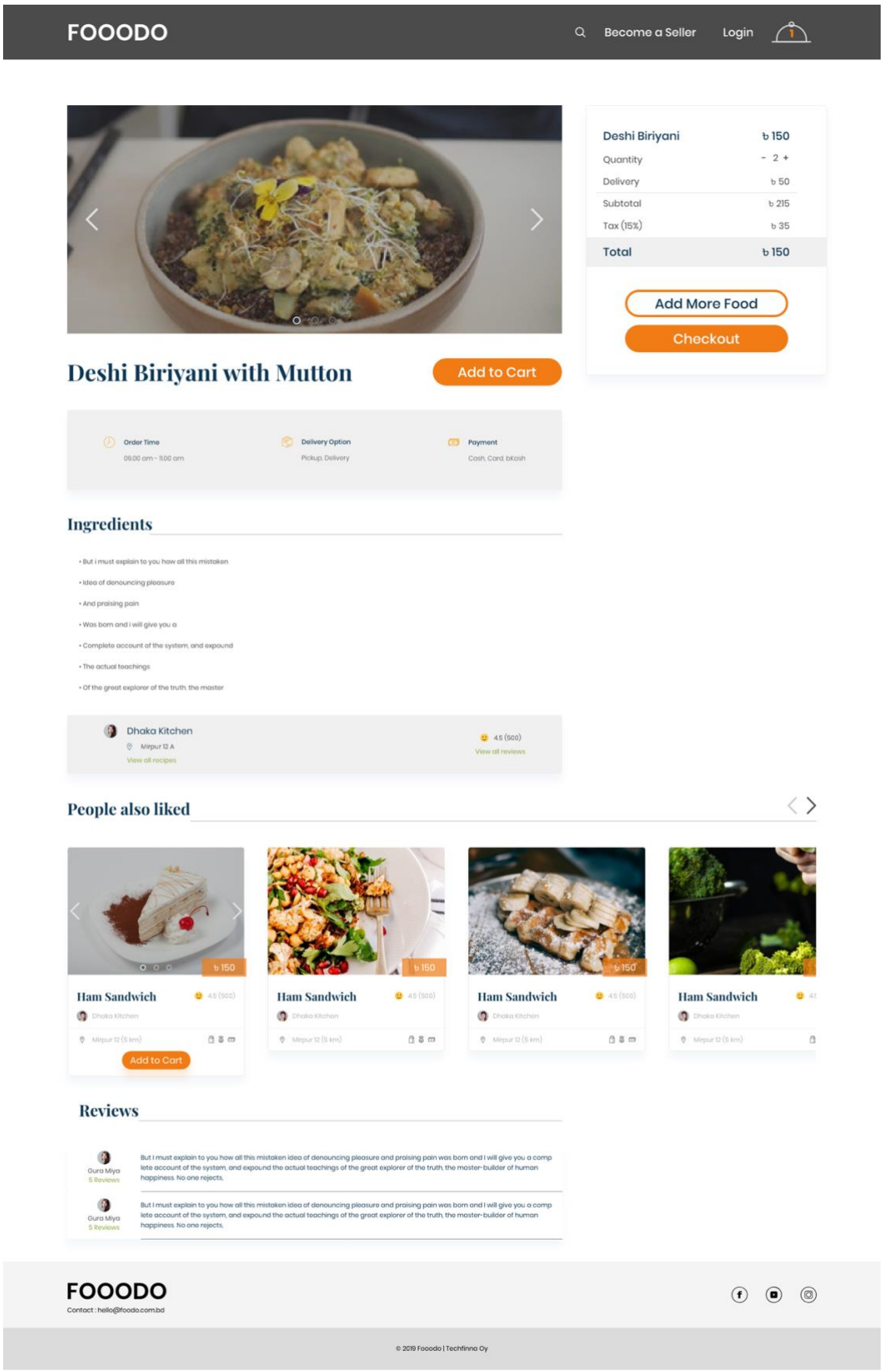

A Web Page
http://
FOOODO
Food Preparation
Is your Food ready ?
Yes
No
Food Dalivery
Dalivery Myself
Dalivery through others
I allow eat at my kithchen
Pickup food by customer
Publish

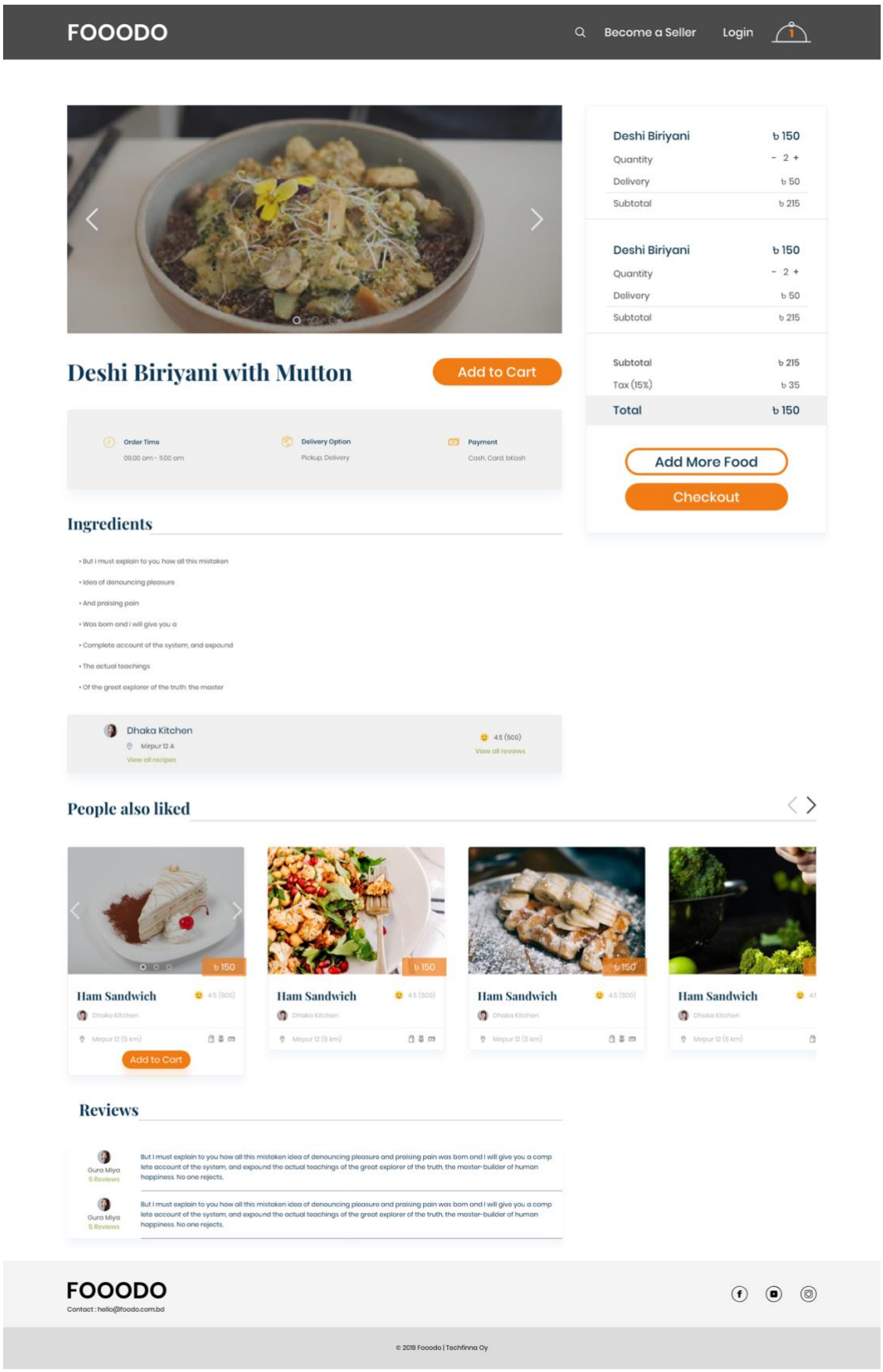

A Web Page
http://
FOOODO
Food Preparation
Is your Food ready ?
Yes
No
Food Preparation time
4h
30m
Food Dalivery
Dalivery Myself
Dalivery through others
I allow eat at my kithchen
Pickup food by customer
Publish

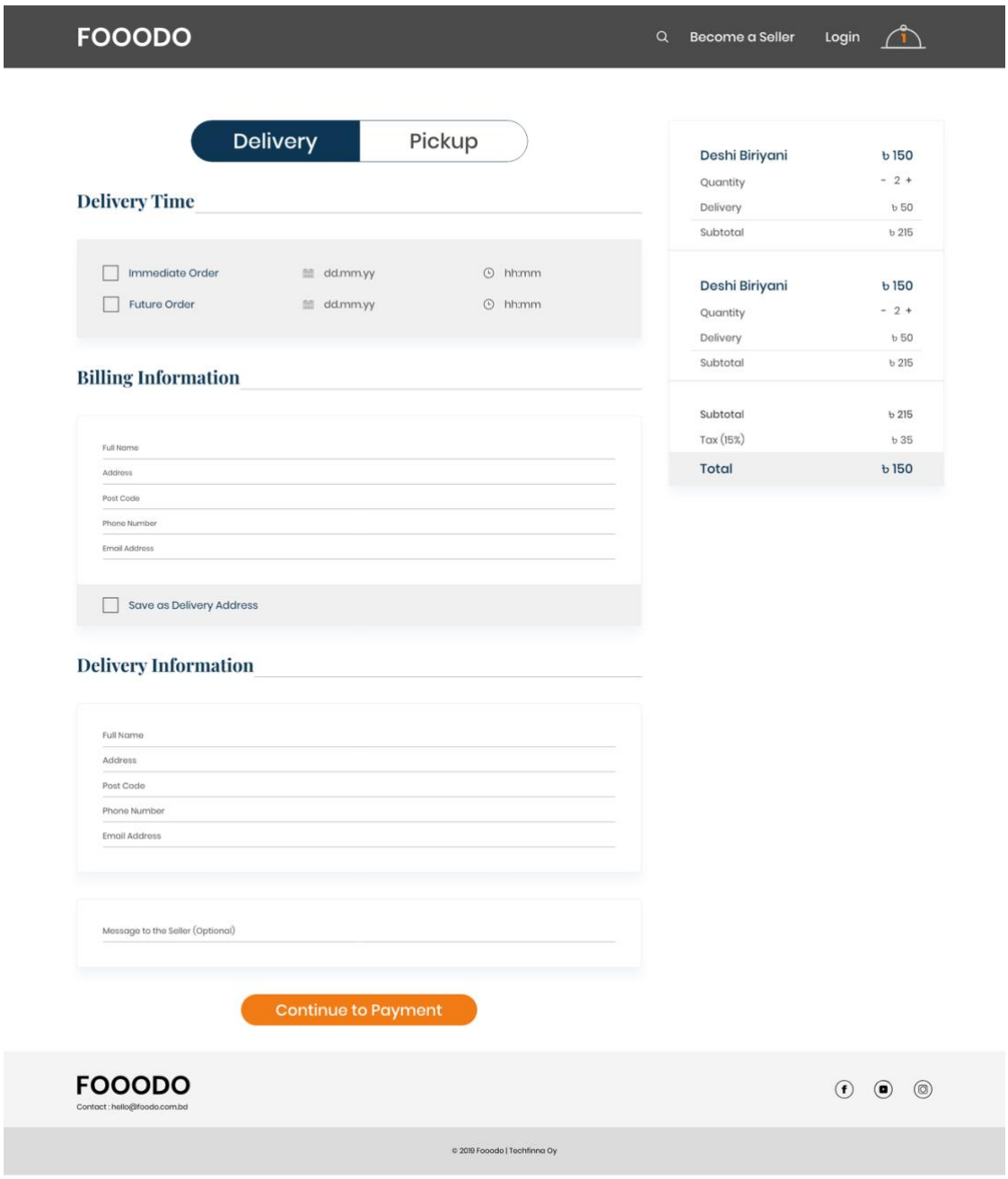

A Web Page
http://
FOOODO
Picture
Dhaka Kithchen
Address : Mirpur 10
Earning : 65000 BDT
Member Since : 2019
TK 220
Beef and Khichuri
Mirpur 10
Dhaka kitchen
Add a new Item

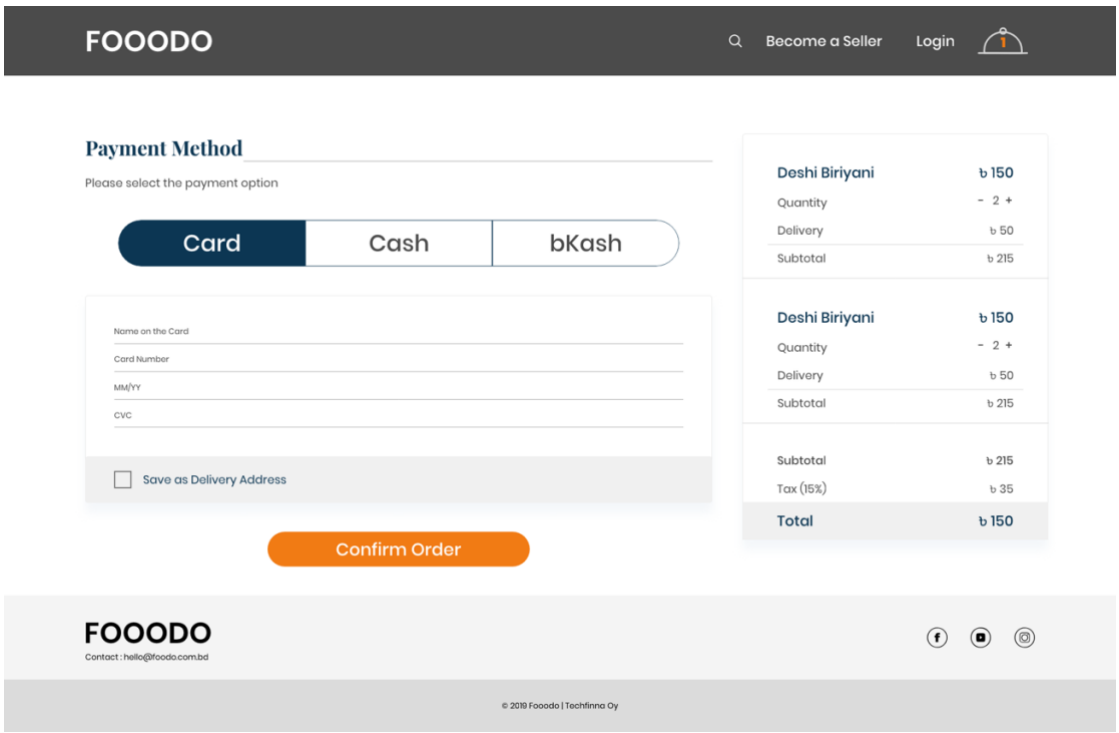
Appendix 3: User interface of FOOODO application as buyer

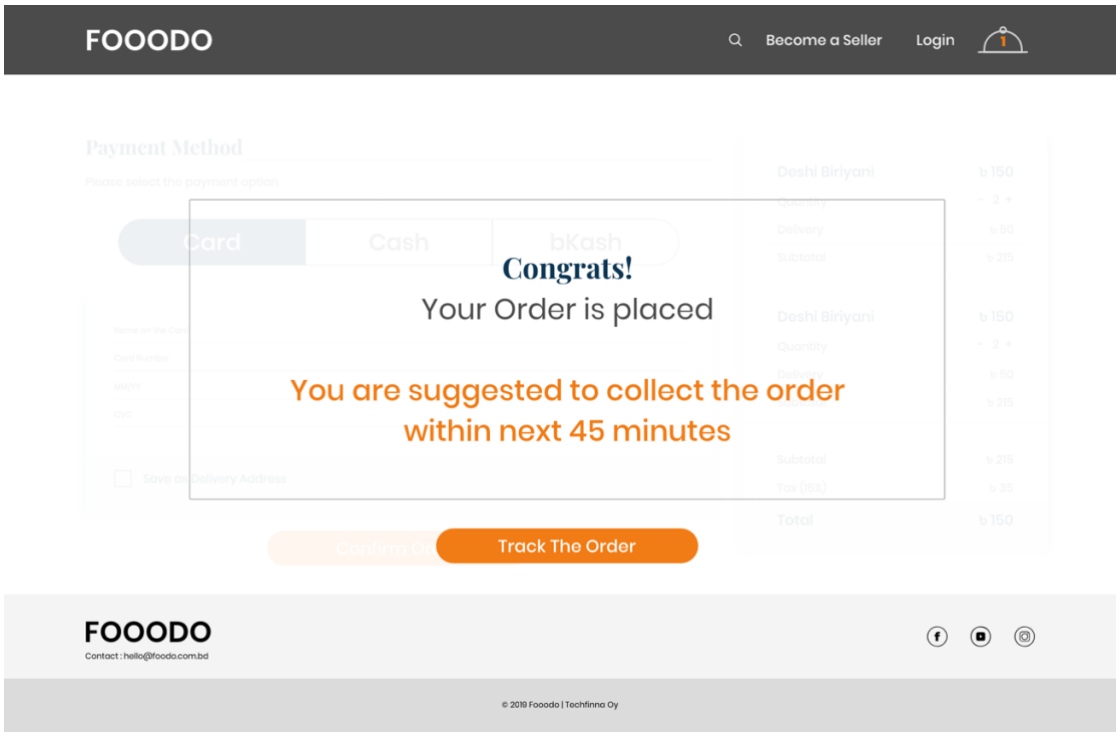



FOOODO
Become a Seller
Login
Deshi Biriyani ৳ 150
Quantity - 2 +
Delivery ৳ 50
Subtotal ৳ 215
Tax (15%) ৳ 35
Total ৳ 150
Add More Food
Checkout
Deshi Biriyani with Mutton
Add to Cart
Order Time
09.00 am - 11.00 am
Delivery Option
Pickup, Delivery
Payment
Cash, Card, bKash
Ingredients
• But i must explain to you how all this mistaken
• Idea of denouncing pleasure
• And praising pain
• Was born and i will give you a
• Complete account of the system, and expound
• The actual teachings
• Of the great explorer of the truth, the master
Dhaka Kitchen
Mirpur 12 A
View all recipes
4.5 (500)
View all reviews
People also liked
Ham Sandwich
Add to Cart
Reviews
Gura Miya
5 Reviews
But I must explain to you how all this mistaken idea of denouncing pleasure and praising pain was born and I will give you a comp lete account of the system, and expound the actual teachings of the great explorer of the truth, the master-builder of human happiness. No one rejects,
Gura Miya
5 Reviews
But I must explain to you how all this mistaken idea of denouncing pleasure and praising pain was born and I will give you a comp lete account of the system, and expound the actual teachings of the great explorer of the truth, the master-builder of human happiness. No one rejects,
FOOODO
Contact : hello@foodo.com.bd
© 2019 Fooodo | Techfinna Oy

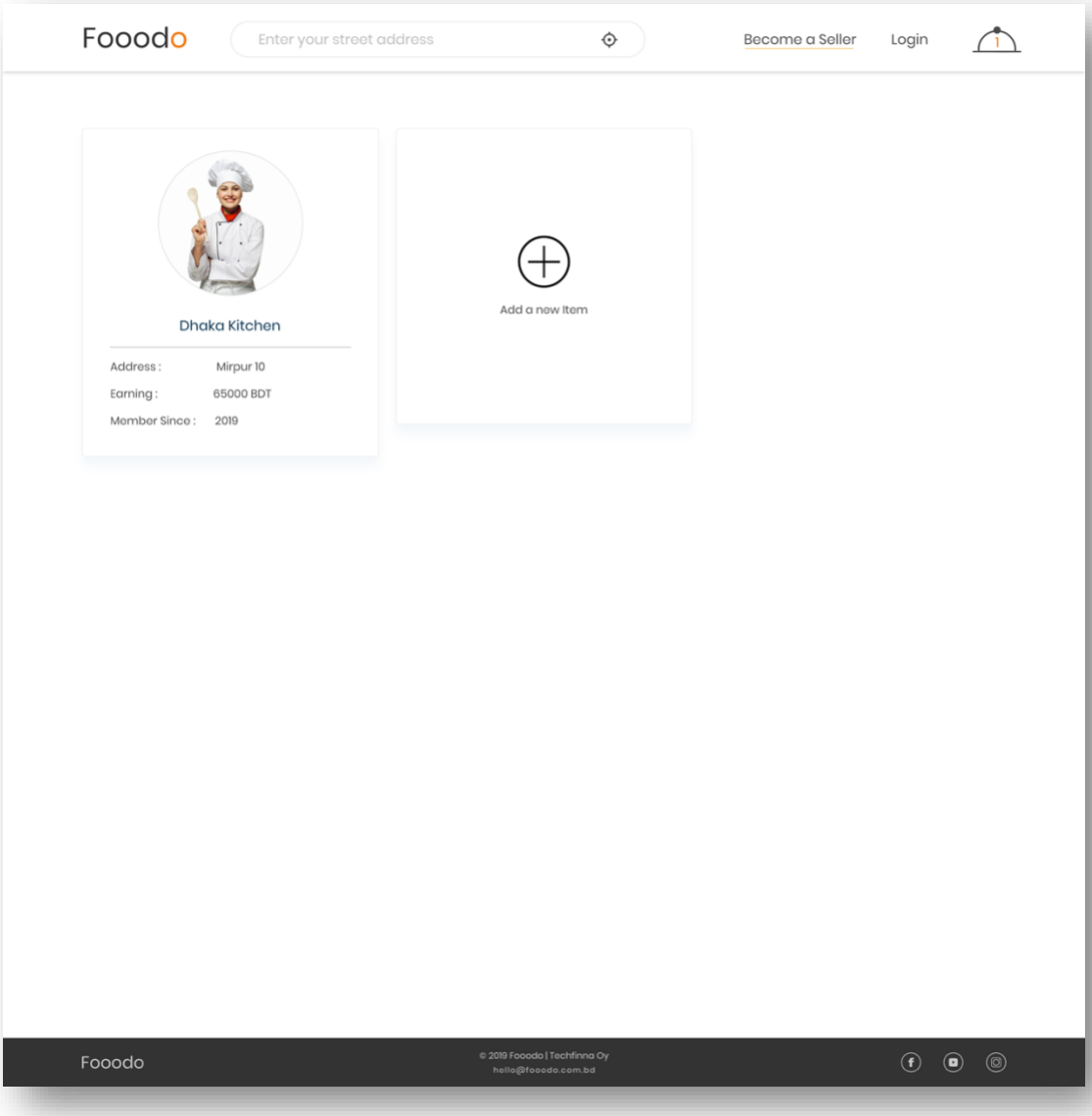

FOOODO
Become a Seller
Login
Deshi Biriyani with Mutton
Add to Cart
Order Time
09.00 am - 11.00 am
Delivery Option
Pickup, Delivery
Payment
Cash, Card, bKash
Ingredients
• But I must explain to you how all this mistaken
• Idea of denouncing pleasure
• And praising pain
• Was born and I will give you a
• Complete account of the system, and expound
• The actual teachings
• Of the great explorer of the truth, the master
Dhaka Kitchen
Mirpur 12 A
View all recipes
4.5 (500)
View all reviews
Deshi Biriyani ৳ 150
Quantity - 2 +
Delivery ৳ 50
Subtotal ৳ 215
Deshi Biriyani ৳ 150
Quantity - 2 +
Delivery ৳ 50
Subtotal ৳ 215
Subtotal ৳ 215
Tax (15%) ৳ 35
Total ৳ 150
Add More Food
Checkout
People also liked
৳ 150
Ham Sandwich
Dhaka Kitchen
Mirpur 12 (5 km)
Add to Cart
Reviews
Gura Miya
5 Reviews
But I must explain to you how all this mistaken idea of denouncing pleasure and praising pain was born and I will give you a comp lete account of the system, and expound the actual teachings of the great explorer of the truth, the master-builder of human happiness. No one rejects,
FOOODO
Contact : hello@foodo.com.bd
© 2019 Fooodo | Techfinna Oy

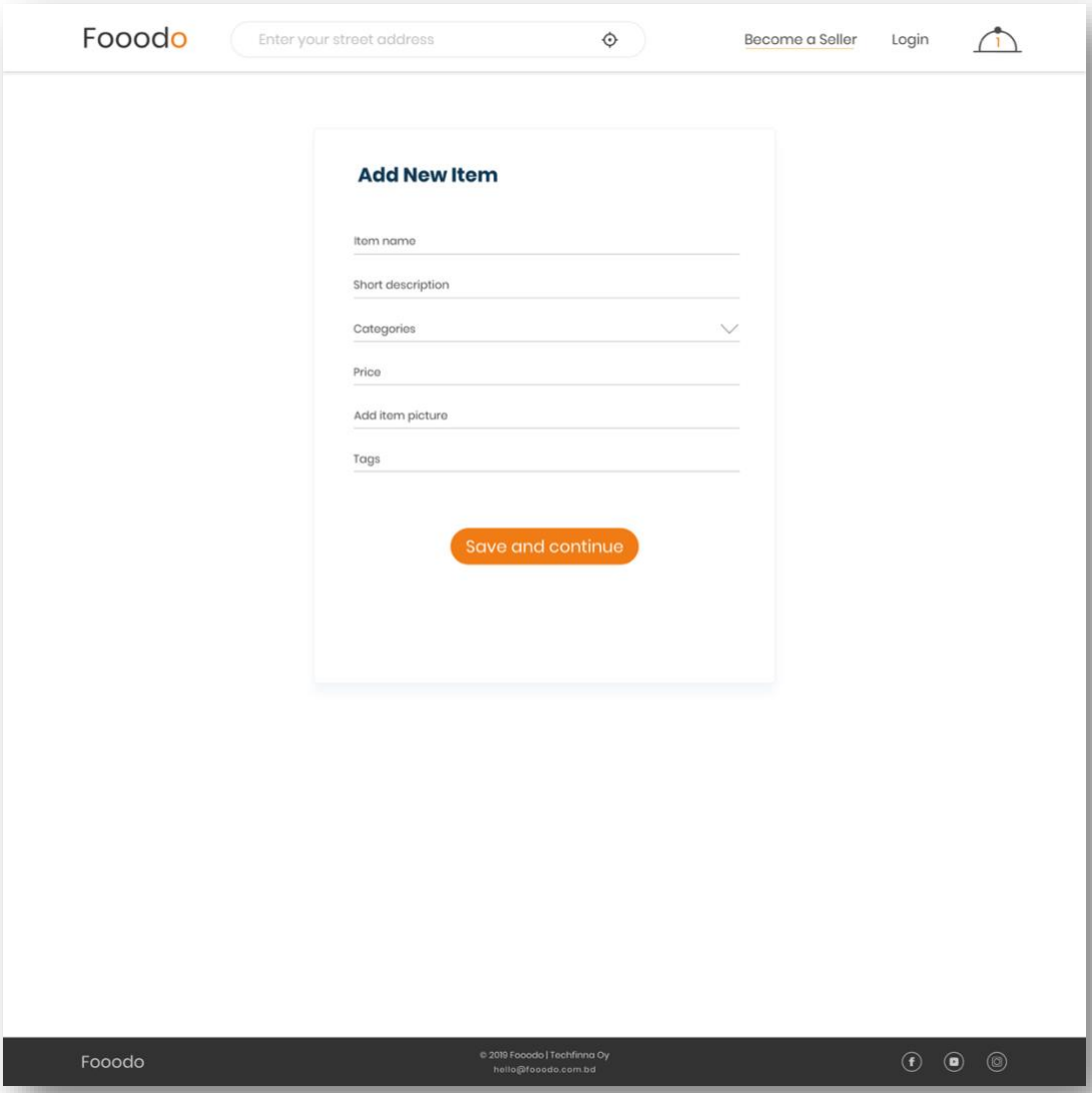

FOOODO
Become a Seller
Login
1
Delivery
Pickup
Delivery Time
Immediate Order
dd.mm.yy
hh:mm
Future Order
dd.mm.yy
hh:mm
Billing Information
Full Name
Address
Post Code
Phone Number
Email Address
Save as Delivery Address
Delivery Information
Full Name
Address
Post Code
Phone Number
Email Address
Message to the Seller (Optional)
Continue to Payment
Deshi Biriyani ৳ 150
Quantity - 2 +
Delivery ৳ 50
Subtotal ৳ 215
Deshi Biriyani ৳ 150
Quantity - 2 +
Delivery ৳ 50
Subtotal ৳ 215
Subtotal ৳ 215
Tax (15%) ৳ 35
Total ৳ 150
FOOODO
Contact : hello@foodo.com.bd
© 2019 Foooda | Techfinna Oy

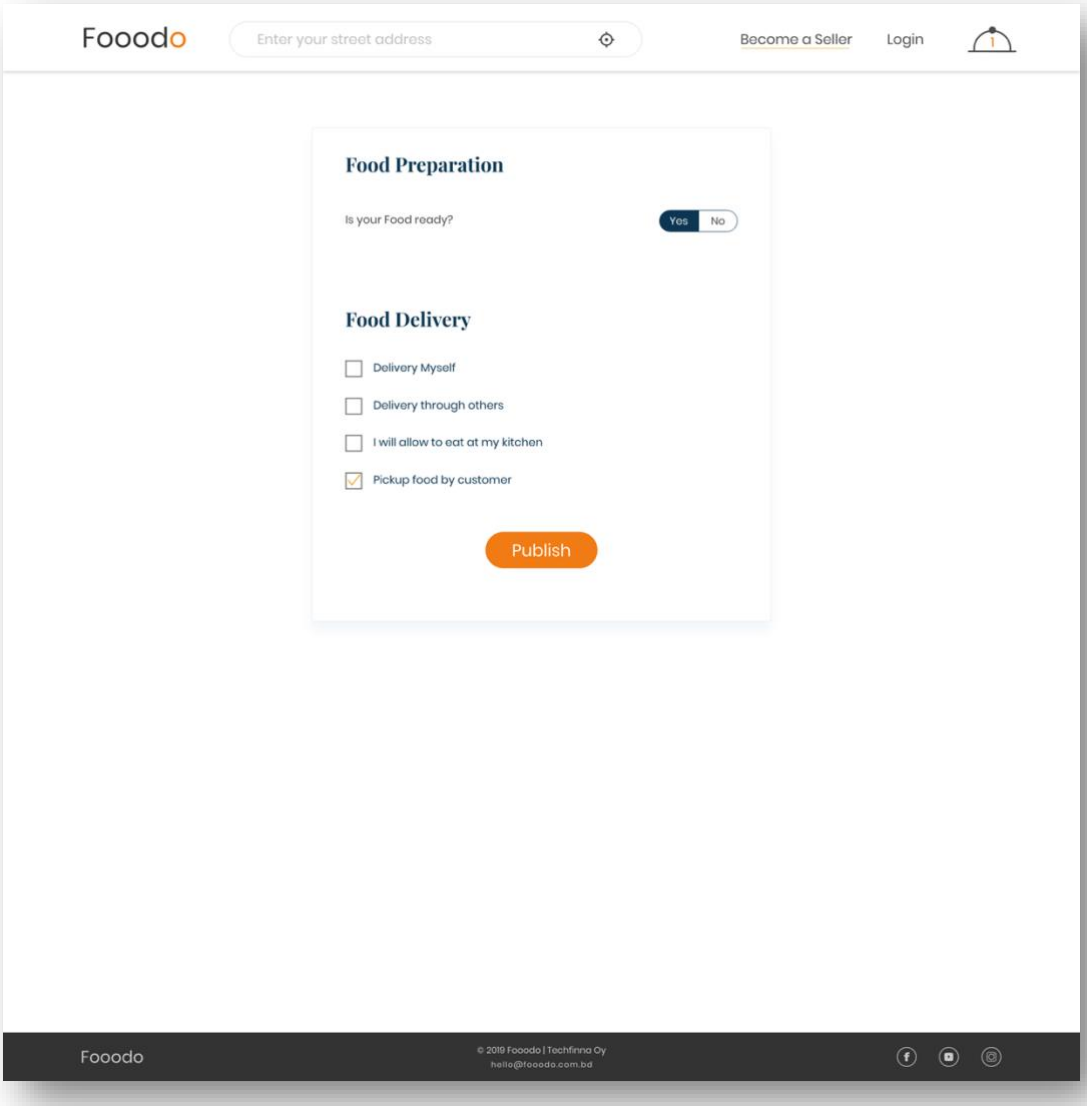

FOOODO
Become a Seller
Login
Payment Method
Please select the payment option
Card
Cash
bKash
Name on the Card
Card Number
MM/YY
CVC
Save as Delivery Address
Confirm Order
Deshi Biriyani ৳ 150
Quantity - 2 +
Delivery ৳ 50
Subtotal ৳ 215
Deshi Biriyani ৳ 150
Quantity - 2 +
Delivery ৳ 50
Subtotal ৳ 215
Subtotal ৳ 215
Tax (15%) ৳ 35
Total ৳ 150
FOOODO
Contact : hello@foodo.com.bd
© 2019 Fooodo | Techfinna Oy

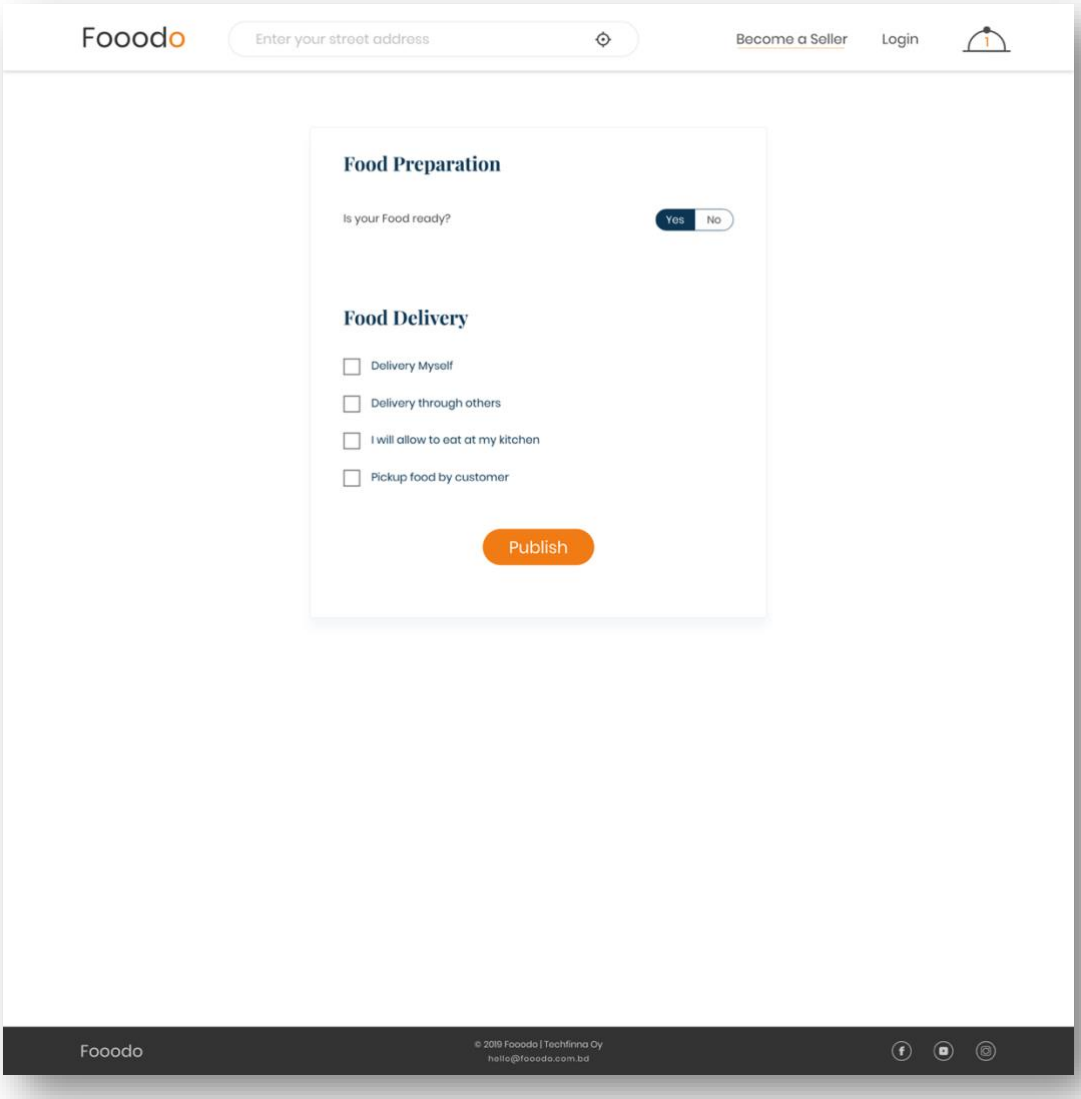

FOOODO
Become a Seller
Login
Congrats!
Your Order is placed
You are suggested to collect the order within next 45 minutes
Track The Order
FOOODO
Contact : hello@foodo.com.bd
© 2019 Fooodo | Techfinna Oy

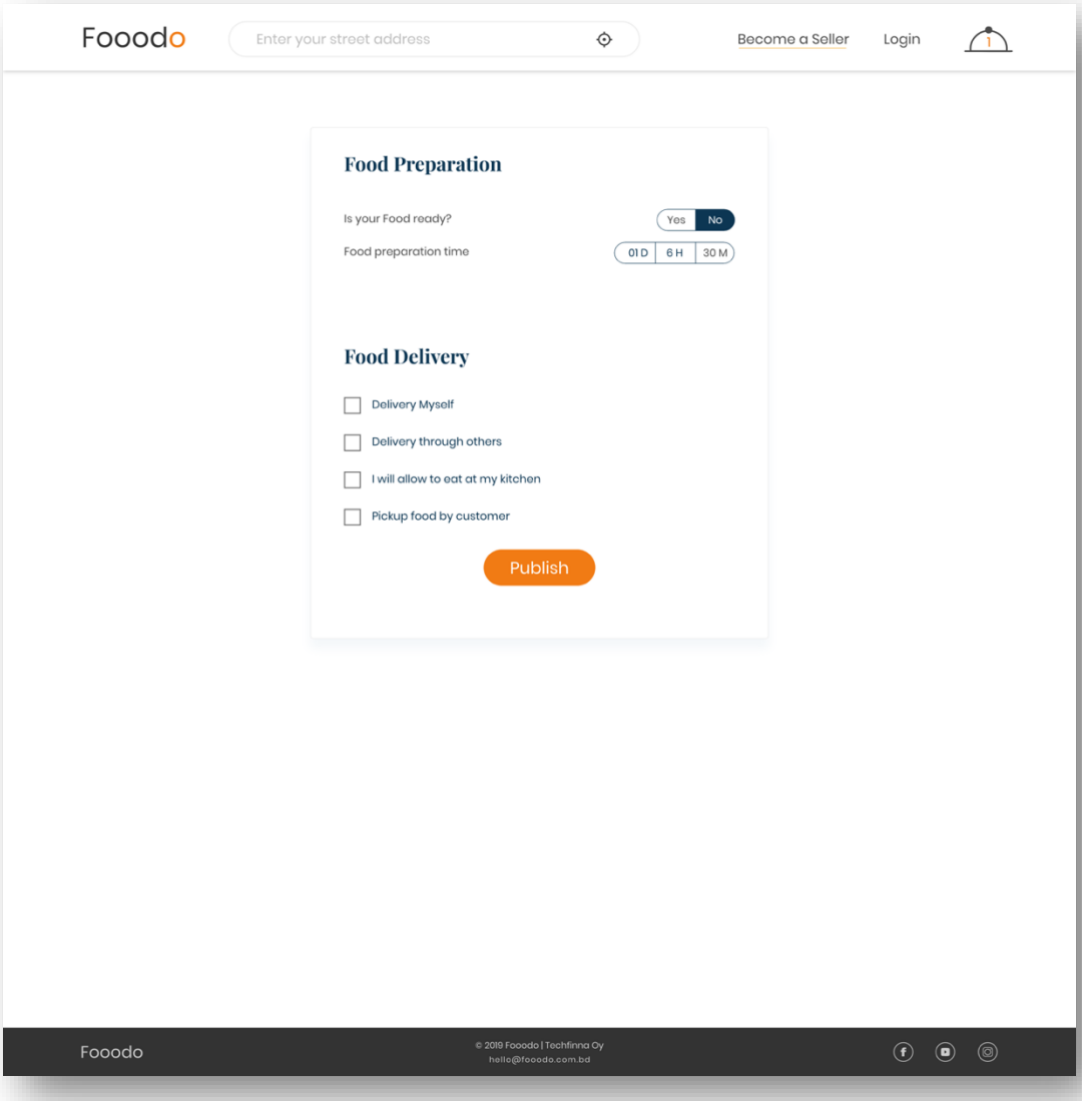
Appendix 4: User interface of FOOODO application as seller

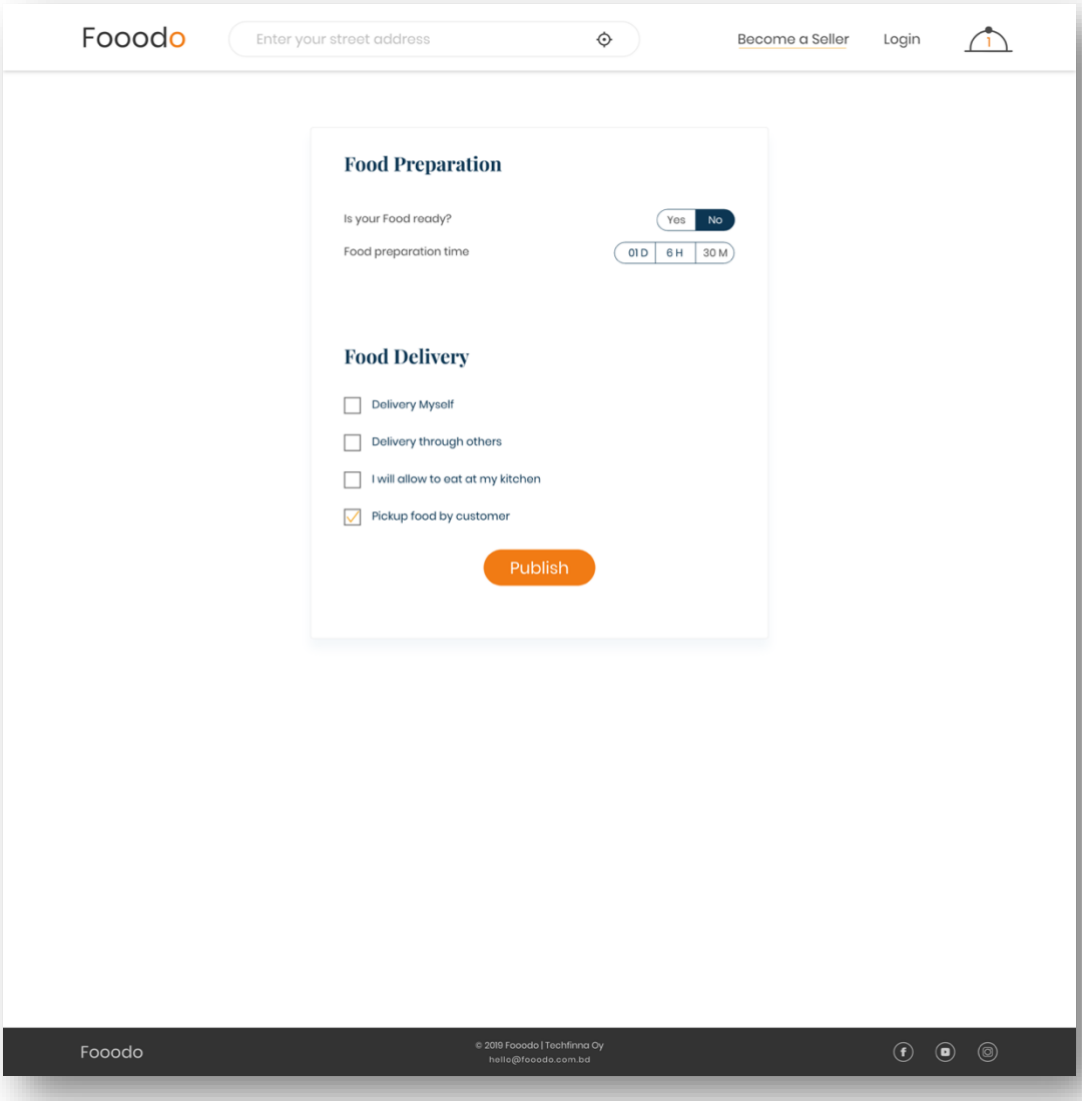


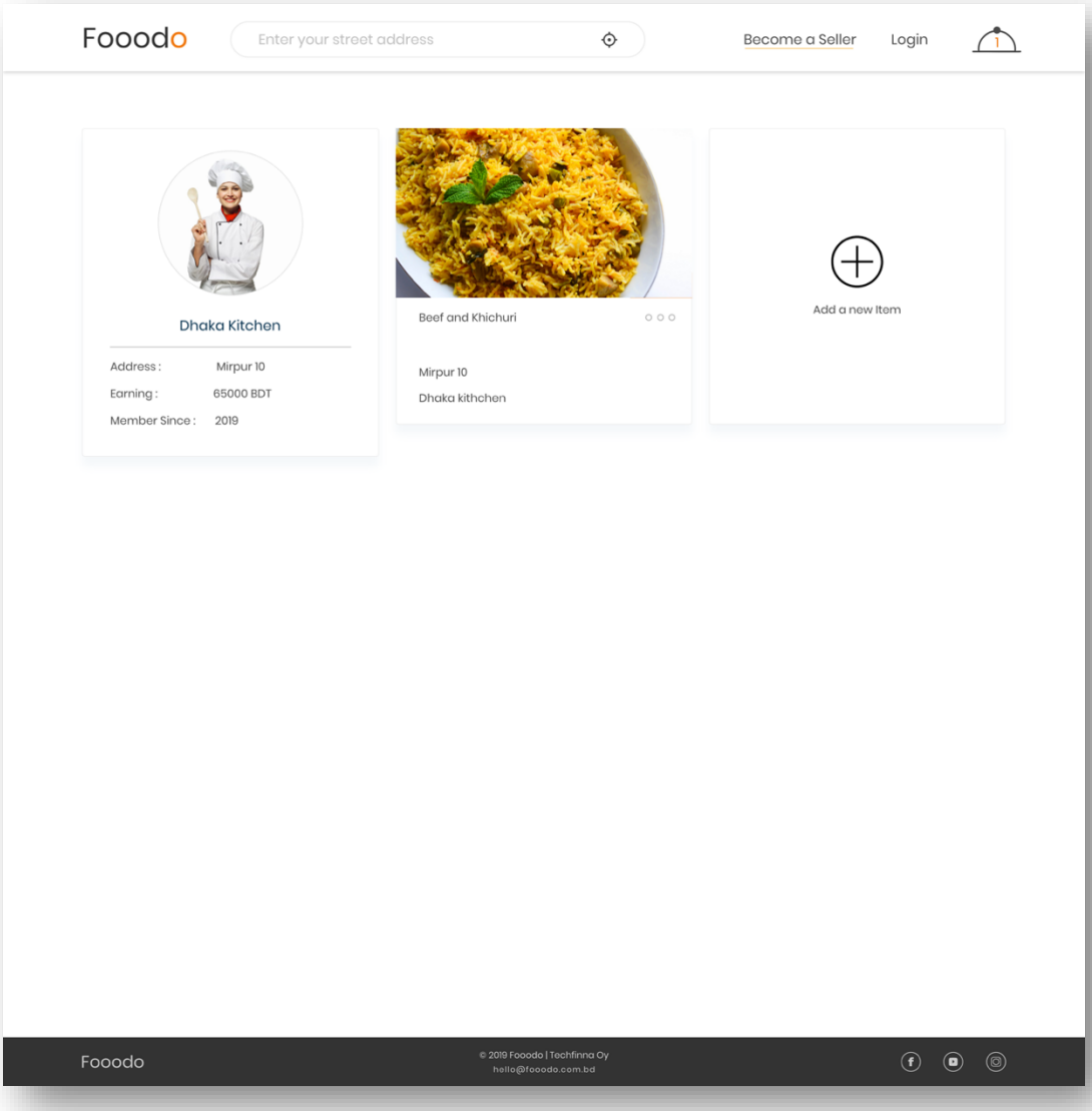

Fooodo
Enter your street address
Become a Seller
Login
Add New Item
Item name
Short description
Categories
Price
Add item picture
Tags
Save and continue
Fooodo
© 2019 Fooodo | Techfinna Oy
hello@fooodo.com.bd


Fooodo
Enter your street address
Become a Seller
Login
Food Preparation
Is your Food ready?
Yes
No
Food Delivery
Delivery Myself
Delivery through others
I will allow to eat at my kitchen
Pickup food by customer
Publish
Fooodo
© 2019 Fooodo | Techfinna Oy
hello@fooodo.com.bd


Fooodo
Enter your street address
Become a Seller
Login
Food Preparation
Is your Food ready?
Yes
No
Food Delivery
Delivery Myself
Delivery through others
I will allow to eat at my kitchen
Pickup food by customer
Publish
Fooodo
© 2019 Fooodo | Techfinna Oy
hello@fooodo.com.bd


Fooodo
Enter your street address
Become a Seller
Login
Food Preparation
Is your Food ready?
Yes
No
Food preparation time
01 D
6 H
30 M
Food Delivery
Delivery Myself
Delivery through others
I will allow to eat at my kitchen
Pickup food by customer
Publish
Fooodo
© 2019 Fooodo | Techfinna Oy
hello@fooodo.com.bd


Fooodo
Enter your street address
Become a Seller
Login
Food Preparation
Is your Food ready?
Yes
No
Food preparation time
01 D
6 H
30 M
Food Delivery
Delivery Myself
Delivery through others
I will allow to eat at my kitchen
Pickup food by customer
Publish
Fooodo
© 2019 Fooodo | Techfinna Oy
hello@fooodo.com.bd


Fooodo
Enter your street address
Become a Seller
Login
Dhaka Kitchen
Address : Mirpur 10
Earning : 65000 BDT
Member Since : 2019
Beef and Khichuri
Mirpur 10
Dhaka kithchen
Add a new Item
Fooodo
© 2019 Fooodo | Techfinna Oy
hello@fooodo.com.bd

Appendix 5: Questionnaire about the semi-structured interview for FOOODO application

Before the interview I will do the following things

a. Introduction about myself
b. Explain about the study, settings, place and time
c. Ask the participant if they want to participate in my study

Part 1: Understand the user need (Semi-structured Interview)

1. Could you tell me a little about yourself? (age, occupation, education, gender will be noted)
2. Do you eat alone or with family or friends?
3. Dou you eat often out?
4. Do you prefer to eat out or at home?
    a. At out, how often do go out?
    b. At home, do you eat take away food or cook yourself?
5. Have you ever encountered any situation that, you get hungry and do not have any food at your home after your work/study?
6. Do you ever hope If someone can cook for you when you get tired after your work or study?
7. What do you think if you are offered an online service (web/app) to get home-made food from your near neighbor?
8. When your neighbour offers you to buy food what are the factors will you consider before eating? (e.g. halal, haram, quality, hygiene, price of the food etc.)
9. How do you want to pay for the food? (cash, online payment, bKash or others)
10. What communication media do you prefer to contact seller (direct call, online chat or other media)?
11. Do you prefer delivery from your neighbor, or do you want to pick-up yourself?
12. If your neighbor offers you to eat at his/her home, are you comfortable to eat there?
13. If the quality of the food is good/bad how do you want to notify in the system? (e.g. review, comments, like/dislike, phone call)

Part 2: Experimenting MVP with potential user (Observation)

1. User are requested to buy an item (home-made food) through *FOOODO* website and observe how they interact with the MVP.
2. User are requested to publish an item (food) for selling food through FOOODO website and observe how they interact with the MVP as food seller.

Part 3: User feedback in the current system (Semi-structured Interview)

1. Are you interested in using this type of product / service?
2. In which role are you interested in (seller / buyer) or both role?
    a. If buyer, do you think this application is helpful to find food nearby you in daily life?
    b. If seller, do you think this platform can help you to earn extra money in your leisure time?

    c. Would you use this application to sell/buy food (why / why not)?
3. Do you think this product / service is useful, usable, and created a positive UX?
4. Is this product/ service is better than any other food selling platform (e.g. foodpanda, hangrinaki etc.)?
5. What positive things you experienced with this product/service?
6. What negative things…?
7. Did you find any missing features or functionality in the product/service?
8. Do you have any suggestions for improving the usability?
9. What is your opinion about the positive and negative consequences of such solution in social aspect in neighbourhood?

Additional Questions related to the research questions

1. What was nice or easy during this interview or observation?
2. What was difficult or unpleasant?