

Application of the Lean Start-Up Technique in Commercialisation of Business Ideas and Innovations

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ABSTRACT

Presently, there is a need for development of new companies and growth of existing enterprises. Likewise, there is an academic interest in Lean start-up concept. Hence, this paper investigates how potential entrepreneurs, small business owners and innovators can test and commercialise their business ideas by applying the Lean start-up technique. The main goals of this paper are to present the application of the Lean start-up method in real-life situations and show how the method can be applied by the entrepreneurs. Four small companies were observed for 3 to 5 months and five serial entrepreneurs were interviewed. Similarly, 18 best Finnish start-ups (in 2014) were surveyed. The research results showed that the technique can be used for idea and innovation testing. It was revealed that the technique could be applied to different industries though it was more applicable to technological oriented industries. Similarly, it was noted that the stages of applying the technique depend on the nature and type of product or service, the stage of start-up development and the type of start-up team. Application processes of the technique were summarised and a new process was developed. One of the authors applied the new process and it was proved that the technique could be used to commercialise business ideas.

Keywords-Lean start-up, Stages of Lean start-up, Application process of Lean start-up.

1. INTRODUCTION

Lean start-up is gaining ground in the academic field and it needs more studies especially on its application (Shaughnessy, 2014 and Blank, 2013). It is essential that there are many studies on its application, most importantly, for case study analyses and such studies should be done over a certain period of time. Therefore, it seems sensible to have a study on how the technique can be applied by both individuals and organisations especially for speeding-up company development (Hakin, 2014). In contribution, this paper tries to add to the topic by investigating how the technique can be used for testing of business ideas or innovations.

The theory of Lean start-up is an important tool for commercialisation of innovations. It facilitates customer-oriented products or services with a minimum cost. It

prevents companies in wasting their resources (Shaughnessy, 2014). Some people affirm that it is an essential pillar for success of any start-up while others regard it as a cornerstone of new generation start-up (Donelan, 2013). The theory potential is not yet utilised; it still remains as a buzzword because by the time its practices are widely employed, its wisdom would spread across the field of entrepreneurship. New businesses are currently applying it, purposely to improve their chance of success as well as existing companies (including large enterprises) mainly to sustain themselves (Blank, 2013).

The main theme of the technique is to improve efficiency and effectiveness of new businesses. New venture, here, refers to any business that is created under uncertain conditions or any start-up which aims to offer something new under uncertainty. The theme bases on validated learning and it uses *build-measure-learn feedback loop*. It allows entrepreneur or company to build and test its idea or innovation, measure the outcomes of the test and learn from it by adjusting. It is like a scientific experimentation of an idea. It reduces new product development life cycle as well as reduces resource wastages. It can be applied to any size of company and it allows entrepreneurs to test their vision and adjust it accordingly as they learn from their test results (Ries, 2011 and Hartman, 2014). Additionally, its principles are simple – creation of a *minimum viable product (MVP)*, using of a continuous delivery model, testing of different version of MVP on different market segments, collecting and analyzing the data, and acting on the measurement result. MVP is a semi-final product with has all necessary features (Donelan, 2013).

From the above explanation, it can be deduced that the Lean start-up is relevant in promoting successful new businesses as well as in fast-tracking commercialisation of innovations in Small and Medium-sized Enterprises (SMEs). Hence, the technique seems to be important purposely to reduce the number of new business failures which is increasing on yearly basis. For instance, Statistics Finland published that 6,047 companies were closed in the first quarter of 2014 and when this number was compared to the previous year at the same quarter, there was an increase of 15.7%. The number of closure in 2014 represented 1.8%, which means that Finland lost 1.8% of its entire stock. In another view, when a person tried to establish a business many times and he/she kept

failing, logically such person would stop entrepreneurial activity either because of low motivation or loss of resources. However, if such a person used minimum resources to try his/her idea before investing large resource, he/she might be more motivated even if he or she failed because he/she did not lose much resources and he/she learned a lesson on how to do the business better. In order to reduce the number of failures, it is important for the entrepreneurs and potential entrepreneurs to understand how they can test and commercialise their ideas and innovations. Similarly, it is very useful for SMEs to test their new products or services before investing much resource on them

Therefore, *this paper aims to present how the Lean start-up technique can be used to test business idea or innovation by the entrepreneurs and enterprises. It presents stages and application process of the technique. It also provides advices for entrepreneurs, innovators and potential entrepreneurs on how they can use the technique.* The paper focuses on commercialisation of business ideas and new products and services from case study companies and it crosschecks observations with serial entrepreneurs and successful Finnish start-ups.

In order to achieve the above goals, it is important to have a research question because Rojon & Saunders (2012) state that formulating of proper research questions adds values to a study and it ensures that quality of such study is maintained. These scholars explain that it is important that the answers to the research questions offer value for the audience or interest group of the study. In addition, Rajasekar et al (2006) explain that the research question depends on nature of research problem and its research area. Due to the goals of this paper, the research question is:

“How can Lean start-up technique be applied by entrepreneurs and business owners to test their business ideas?”

In order to facilitate simplification and mutual understanding, this paper is structured as follows: literature review, methodology, results, discussion, conclusion and recommendations.

2. LITERATURE REVIEW

Before discussing the theory of Lean start-up and its related studies, some key terms of the technique need to be explained because their meaning will facilitate the understanding of this paper. The terms include hypotheses, MVP, build-measure-learn feedback loop, pivot or preserve, metrics, innovation accounting, continuous deployment and validated learning. They are briefly described below:

Hypotheses are assumptions that entrepreneurs make about their start-up. They are predictions that the entrepreneurs expect to happen. There are two types of hypothesis - value and growth. The value hypothesis is an assumption that a product or service will solve the problems of the customers or satisfy the needs of the

customer. On the other hand, growth hypothesis is an assumption that the product or service will continue to be beneficial to the customers (Ries, 2011). Additionally, hypotheses regard as leap-of-faith assumptions (Ries, 2011; Hartman, 2014 and Adams & Loomis, 2014). In short words, the hypotheses are goals which the start-up tries to achieve especially by satisfying its customer needs and sustaining its business.

Build-Measure-Learn Feedback Loop shows how a start-up can be built using a Lean start-up model. Therefore, it is the main theme of Lean start-up model. It consists of three phases. The first phase is building of a MVP. Building MVP must be attained with fewer resources so that the main goal of Lean Start-up, elimination of wastes, can be achieved. The second phase is measuring of progress. The start-up needs to determine its progress and this can be achieved by using innovation accounting. This stage makes use of quantitative information in which the start-up collects and analyses their feedback from testing of its MVP. The last stage is learning. After analysing their data from previous stage, the start-up needs to make use of the results; it needs to identify its learning milestone (Ries, 2011 and Hart, 2013). Summarily, the loop depicts how the Lean start-up concept works and how it can be repeated.

MVP is a product version that enables the start-up to pass through Build-Measure-Learn Loop. It uses minimum resources. It is a beta prototype with essential characteristics in which end-users can use and give feedback. It is a semi-finished product or service in which start-up can experiment with its customers. It assists the start-up to know important features for its customers after MVP testing. It also helps the start-up to make iterations for final product (Ries, 2011; Donelan, 2013; Munch et al., 2013 and Järvinen et al., 2014). To sum up, MVP is a semi-ready product which start-up uses to test its market potential as well as to get feedback from the initial users.

Pivot and preserve are a situation when the start-up needs to change its ideal hypotheses. It is when the start-up has to re-start its process. It is a problematic situation in which many start-ups fail. Due to the main theme of Lean Start-up: fail fast and move forward, **pivot** is necessary because it makes the starts-up learn from its trials and re-establishes its new baseline. When the start-up pivots, new hypothesis needs to be set and its engine needs to be tuned. On the other hand, **preserve** means that the start-up keeps its current hypotheses and it continues with its process. Notably, pivoting does mean that the start-up does not benefit from its first attempt but it only enables the start-up to unlock opportunities and to use the experience gotten from the first attempt so that the new hypotheses can be successful. If the start-up has to do many pivots, such start-up can be successful in its subsequent attempts because it learns from each attempt. Therefore, the start-up needs to examine its process and decide either to pivot or preserve. To summarise, pivot means that start-up needs to make necessary changes which may include changing of its initial hypotheses while preserve means that the start-up keeps its initial

hypotheses. Both decisions are good for the start-up provided that its mission and vision can be successfully reached (Ries, 2011; Hart, 2013 and Hartman, 2014).

Innovation accounting is a systematic and quantitative approach for determining the situation of start-up process. It reveals the progress of the start-up and it shows how the start-up has achieved its validated learning. It examines hypotheses or leap-of-faith assumptions quantitatively. It has three steps. Its first step is making use of a MVP to get real data via testing of MVP; these data will show the present situation of the start-up. Its second step is making use of analysed data so that the start-up can adjust its activities towards realisation of its ideal hypotheses (tune the engine) and this involves iterations. Its last step is making decision on either to pivot or preserve the ideal hypotheses. Therefore, innovation accounting enables the start-up to examine its direction and decide on the next course of action. In summary, innovation accounting is a quantitative analysis of MVP test result purposely to tune the engine or to adjust towards achieving the hypotheses (Ries, 2011; Hart, 2013 and Hartman, 2014).

Innovation accounting depends on **Metrics**. According to Ries (2011), Hart (2013) and Hartman (2014) metrics are yardsticks that start-up use to measure its progress. Metrics are used to examine validated learning. They are determined by hypotheses, nature and goals of the start-up. There are three features of metrics- actionable, accessible and auditable. Hence, metric can be described as quantitative parameters that enable the start-up to measure its progress as well as validate its learning experience.

The last terms are continuous deployment and validated learning. Ries (2011) and Hart (2013) explain that **continuous deployment** is a systematic framework or method of producing and testing of small batches of MVP purposely to adjust the production processes or system. In other words, it is iteration. It is an approach of detecting MVP problems and improving it in relating to the feedback from the customer. While, **validated learning** is an empirical demonstration of a start-up to establish truth about its business idea or concept. It reveals the business prospects. It consists of facts and figures collected and analysed from the potential customers. It answers a question about sustainability of products or services of the start-up.

The above-discussed terms are used in this paper and their meanings are the same with the above definitions. Whenever their meaning is different from the above, their contextual definition is stated.

2.1 Lean start-up Technique

Traditionally, people start their business by writing a business plan, connecting to investors, organising a team, launching their products or services and market the products or services. Along this process, they face many challenges. However, a new approach has been developed to reduce risks for a new start-up. This approach is termed as Lean start-up. It has advantages over traditional methods: it employs experimentation instead of planning,

it embraces customer feedback instead of intuition, and it uses iterative design instead of traditional big-design-up-front development. Because of its principles, failing fast and moves forward, Lean start-up approach is now widely used by many entrepreneurs and many tertiary institutions inculcate it into their curricula (Blank, 2013).

Notably, the Lean start-up technique is different from traditional approach because its strategy leads to a business model development while the traditional approach leads to implementation of a business plan. Its new product development is also different because it focuses on customer development instead of product development. It tests hypotheses of the entrepreneur instead of following linear product development processes. It employs agile development method by building product or service interactively. Hence, its organisation consists of customer and agile development team. It makes use of metrics - numbers and figures. It expects failure because it learns from the failure so that it fixes the problems and adjusts them. Therefore, its progress is fast (Blank, 2013 and Järvinen et al., 2014).

In addition to the above, Lean start-up emanates from lean thinking. Lean thinking is making use of knowledge and creativity of individual employees, reducing batch sizes, using just-in-time technique, and increasing cycle of times. Hence, the Lean start-up technique measures progress via validated learning. The technique focuses on manufacturing according to needs and wants of the customers unlike traditional techniques which produced on probability or guessing needs. Therefore, the approach uses “build-measure-learn feedback loop”. With this method, an entrepreneur knows what to produce, how to improve the product or service and when to pivot it (Ries, 2011; Lalic et al., 2012 and Hartman, 2014).

In similar view, the Lean start-up technique develops from the lean production principle. It emerges due to the unfavourable business conditions. This technique was initially developed for technical oriented sectors but it is now widely applied to almost every sector. The technique is flexible and it can be applied to every industry. It centres on experimentation of innovation cycle. It continues to evaluate the cycle by learning. It ensures that the organisation goals are achieved by measuring the outcomes of the experimentation. When the results are validated, the hypotheses of the new product or service are also validated. Therefore, the technique enables the start-up to systematically and cost-effectively discover important parts of its business vision and reject unnecessary parts (Lalic et al., 2012).

The above scholars seem to be agreed that the technique is useful and it can be applied especially by the start-ups. They also mention that the technique is useful for innovation development and commercialisation of the innovations. Therefore, it is important to know application process of the technique which is presented in the next subsection.

2.2 Stages of the Lean Start-up Technique

The Lean start-up bases on these concepts – development of MVP and pivoting. It has three key principles (stages): (a) writing of summary of hypotheses - development of business model canvas, (b) testing of business hypotheses – customer development, and (c) developing the business – agile development. The technique begins with having a business idea which is termed as hypothesis by an entrepreneur and the entrepreneur will try to develop how his or her business will generate revenue; this refers to business model canvas. After that, the entrepreneur will search for customers and present his or her idea to the potential customers purposely to get their feedback; this refers to customer development and at this stage, the entrepreneur is expected to have MVP that makes his or her product or service presentable to the customers. Lastly, the entrepreneur creates customer and starts sales and marketing activities; this is business development stage. These are simple stages of the technique (Blank, 2013).

Similarly, the Lean start-up technique centres on implementation of Build-Measure-Learn loop iteratively. It iterates development process by building a prototype, test it and use the test results to redesign the prototype. Precisely, there are four stages in this approach – customer discovery, customer validation, customer creation and company building. Customer discovery investigates the need of the potential customers and it tests the problems and hypotheses of the start-up. Customer validation confirms the needs and wants of the potential customers; it shows how the start-up can make sales and it creates a roadmap for future sales. Importantly, the start-up can iterate between these first-two stages. After iteration, the start-up can proceed to the next stages. Hence, customer creation, third stage, is when a planned product is manufactured and the traditional marketing activities are done. Likewise, company building, last stage, is when the start-up formally establishes its organisation. In the Lean start-up method, there is no need for a definite process but there is only need for minimisation of resources for building MVP. Similarly, this approach requires for certain metrics in which the results can be measured (Blank, 2013 and Järvinen et al., 2014).

Furthermore, there are five principles in the Lean start-up technique. One of the principles is “Build-Measure-Learn”. This principle states that a start-up needs to build a product or service by transforming ideas and sending a prototype to its potential customers, measure the customer response, learn from the customer responses and decide either to pivot or preserve its hypotheses. This principle continues until the start-up succeeds (Ries, 2011). In relation to the theorist, Ries (2011), the Build-Measure-Learn refers to the stages of the technique in which most of the scholars focus on (for instance, Blank, 2013 and Järvinen et al., 2014). Therefore, Build-Measure-Learn Feedback Loop seems to be the main stages of the technique. The loop of Lean start-up method starts from an idea. Then, the idea is built into a product or service which will be tested with the potential customers. After

the test, results will be measured and lessons will be learned. Thus, both categories of the stages of the technique were observed in the empirical study. The first stage category includes customer discovery, customer validation, customer creation and company building while the second consists of idea, build, product, measure, analyse and learn.

In order to have more knowledge about its stages and application process, it is essential to examine previous similar studies. Thus, the next subsection presents previous studies on the technique and their outcomes.

2.3 Empirical Studies on Lean start-up Technique

Creating value for the customer is an important goal for companies. Therefore, it is necessary for the start-ups and existing companies to grow properly. Software industry is always influenced by their customers and they also depend on the customers’ feedback to improve their products or services. In view of this, creating MVP is important because it allows the producers to improve their products/services in relation to the needs and preferences of their customers. MVP uses Lean start-up approach. Based on importance of MVP, a project from Software Factory laboratory at the University of Helsinki was used to experiment how MVP could be created from academia-industrial collaborations. This project aimed to test a cloud service and its MVP was a game that generates metadata from cloud storage in which the users got fun and valuable metadata. With the help of project team, MVP was developed and tested. Seven weeks were planned to develop and test the MVP but within 3 weeks, the team was able to complete their tasks. Meanwhile, within the first 2 weeks, “fail fast” was noted from the MVP in which the team was able to fix. When the “initial” MVP was delivered, the team observed functionality and the goal of the project was achieved (Munch et al., 2013).

In relation to the above study, Järvinen et al (2014) develop new business framework, called Mercury Business (MB). The authors explain that due to the need for high potential start-ups, a new business model needs to be developed. Hence, they develop MB which is based on the Lean start-up technique. According to the authors, MB is an application of Lean start-up technique but in an industrial setting. Although MB is based Lean Start-up, it is different from the Lean Start-up; for instance, MB centres on existing businesses; it aims to transform and develop the existing companies while Lean start-up focuses on new business creation. In order to test the new concept in relation with Lean Start-up, 26 companies were studied, the outcomes revealed that Lean start-up technique played important roles in software development start-ups; it enabled them to deliver the product for their customers (Järvinen et al., 2014).

Apart from the above empirical studies, Lalic et al (2012) conducted a study on Croatian start-ups. The main object of their study was to present how the Croatian start-ups

have been using the Lean start-up technique. Twenty-three companies were sampled. The result of their survey revealed that most of them were aware of Lean start-up technique and they used “Talk to your customer” and “build a MVP” principles. Their finding also revealed that there were some companies which had problems with building of MVP but they had positive experience in using “metrics” in determining level of customer satisfaction. Furthermore, the sampled companies followed the experts of Lean start-up like Eric Ries, Dave McClure and Steve Blank through their blogs and social media. The scholars concluded that Croatian start-ups implemented the Lean start-up.

Furthermore, Hakin (2014) conducted a study on a study on how the Lean start-up technique can be applied in large enterprises. The author investigated professional definition of the technique, benefits of technique to the big organisations, the challenges of its application and how the application problem can be solved. The outcomes of the study showed that there was difference in the definition Lean start-up but the study participants agreed that the technique needs to be adapted to each situation. Similarly, the participants agreed that the main benefit of the technique is that it focuses on solving the problems of the customer and it facilitates rapid new product development. Meanwhile, the author states that in large companies, organisational culture affect the application of the technique and they worry also that MVP could damage their products because their customers might think that it is their final product.

From the about empirical studies, it can be agreed that there are literary works on the Lean start-up technique. Likewise, it can be agreed that the technique has been used by ICT or technological oriented enterprises though other industries can apply it. Therefore, it can be briefly concluded that application of Lean start-up technique needs case-by-case analysis and combination of different Industries. Like Hakin (2014) mentioned, studying the techniques application for a certain period of time will make an empirical study on the technique reasonable.

Therefore, empirical study was conducted for this paper and it employed a theoretical framework which was developed based on the theory and previous literary works. The theoretical framework starts from the source of the literature review which include the technique (theory) propounded by Ries (2011), scholarly works on the theory and previous empirical studies. Based on the literature review, variables were identified in relation to the goals of the research and research questions. The variables consist of level of knowledge about the technique and its theme, its stages and its application. The variables were examined in the empirical study which consists of case study (observed companies), serial entrepreneurs and Finnish start-ups as well as the research instruments which include observation, interview and online survey. The following figure shows the theoretical framework.

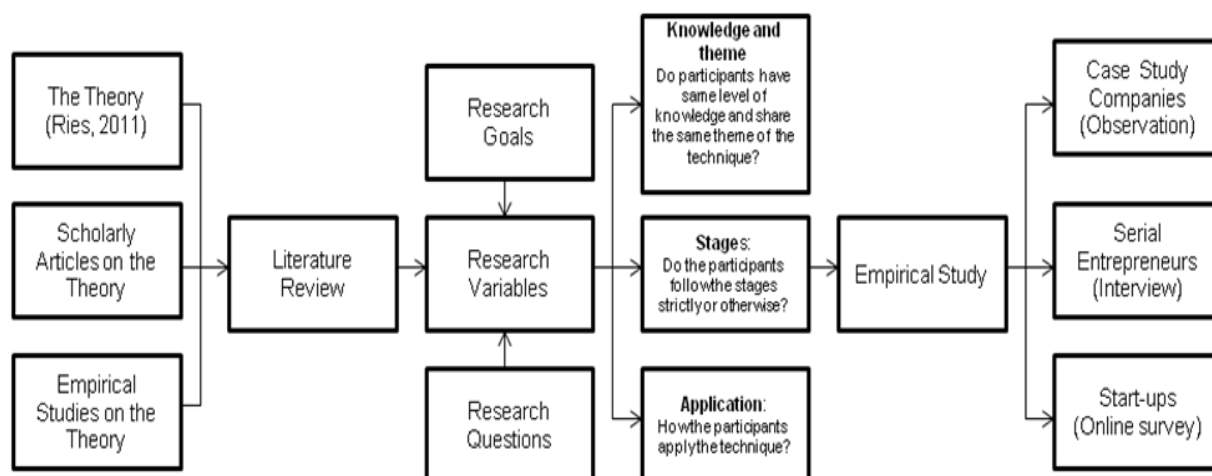


Figure 1: Paper Theoretical Framework

This theoretical framework was used but how it was employed. The answer to the research question is given in the following subsections.

3. METHODOLOGY

Formulation of proper research questions adds values to a study and it ensures that quality of such study is

maintained. It is important that the answers to the research questions offer value for the audience or interest group of the study. There are two types of research questions in term of insight – descriptive and explanatory. The descriptive question usually begins with interrogative pronouns like what, where, when and how; while, the explanatory question starts with “why”. Usually, the

descriptive question is often providing insight on a phenomenon (Rojon & Saunders, 2012). In addition, the research question depends on nature of research problem and its research area (Rajasekar et al., 2006). Due to the purpose of this paper, the research question is: “*How can Lean start-up technique be applied by entrepreneurs and business owners to test their business ideas?*”

Similarly, one of the most challenging tasks for researchers is selecting the proper research method for their studies. Therefore, the researchers are advised to understand the problem they want to investigate, to familiarise with related theory(ies) and to find out the options for collecting data. Likewise, the researchers are advised to check previous empirical studies in order to identify similar approaches and it would be wise for them to understand underpins terms (Ellis & Levy, 2009). Hence, research method is a collection of different processes or activities employed in a study. It includes theoretical procedures, experimental guidelines and statistical methods. It assists researchers to collect to data, analyse them and derive results (Rajasekar et al., 2006).

In relation to the above scholars (Rojon & Saunders, 2012; Ellis & Levy, 2009 and Rajasekar et al., 2006) and due to the objectives of this paper, qualitative and quantitative research methods were employed. A qualitative research method is useful when an issue is being studied in its natural environment. It allows the researchers to understand the issue deeply because they can analyse it with its real condition. The method assists the researchers to interpret their findings as well as to replicate their study (Denzin & Lincoln, 2000) which is highly relevant for empirical studies (Creswell, 2009). It suits a research question of “how” and it can be used when a specific problem needs to be solved (Yin, 2003), It is very relevant when research theme bases on experience or awareness and its research question starts with “how” (Shank, 2002). Its strength is that it makes use of many evidences such as documents, observations, interviews and artefacts (Yin, 2003). Additionally, the method is cost-effective because available information can be used and other methods can be used together with it (Koskinen et al., 2005). However, a systematic procedure must be used when apply the method (Creswell, 2009; Shank, 2002 and Yin, 1994)

Furthermore, a quantitative research method is where an evidence can be evaluated and validated. It gives answers to the research questions which start with “what”, “where” and “when”. Its data are often analysed by statistical or mathematical techniques and its results are usually presented in tables and graphs (Rajasekar et al., 2006). It is also useful for a quantitative description of a phenomenon like attitude, trends, and opinions (Creswell, 2009). It is highly relevant for theory testing or revising. It suits experimental, developmental, causal-comparative and correlation studies (Ellis & Levy, 2009). The main benefits of this method are that it is very useful for evaluation and validation of evidence. It also facilitates decision making (Rajasekar et al., 2006).

Using of both methods is described as mixed-method (Creswell, 2009) and it is regarded as triangulation (Gary, 2013; Creswell, 2009; Zawawi, 2007; Olsen 2004; Shank, 2002 and Yin, 1994). Triangulation makes an issue well-understood and it widens the knowledge of the researchers about the issue (Gary, 2013; Creswell, 2009; Zawawi, 2007; Olsen 2004; Shank, 2002 and Yin, 1994). In brief, it is a mixing of both qualitative and quantitative research methods purposely to get various points of view as well as to validate a specific claim (Olsen, 2004).

In relation to the above scholars, both methods were used; simply put, triangulation was employed in the empirical study of this paper. Additionally, observation and interview were used as research instruments for the qualitative method they were suggested by Gary (2013), Creswell (2009), Rajasekar, et al (2006), Shank (2002) and Yin (1994). An online survey was used for the quantitative method as it is recommended by the above-mentioned scholars.

Having formulated the research question, selected relevant and suitable research methods and instruments, the following subsections present the research participants, data collection and data analysis.

3.1 Research participants

There are three groups of participants. The first category is a group of case study companies which were observed between 3 and 5 months. The main reason for selecting this participant category is that they would provide in-depth information about the technique because they operate in the real-life business environment. Their selection criteria are: (a) having a new business idea or product or service, (b) ready to commercialise the idea or new product /service (c) ready to register as a start-up or a registered company with less than 5 employees and less than 5 years old, (d) ready to collaborate by using the Lean start-up technique, and (e) ready to provide information on its commercialisation activities weekly or monthly.

Furthermore, the second category consists of serial entrepreneurs who have more than a company and who have been entrepreneurs for more than 5 years. This group was selected purposely to provide more information on the technique and to reveal how well the entrepreneurs are aware of or applied the technique. Their selection was based on the number of companies they founded, number of employees, number of years of entrepreneurial experience, and level of education. The last category comprises of 100 best start-ups in Finland in 2014. This group was selected mainly to have information about popularity of the Lean start-up technique among emerging companies. The details of the participants are presented below.

(a) Case study companies: four small companies were studied. The companies are operating in the service and product industries and they are innovative. They are registered in Finland. Their name is anonymous and they are represented as follow: C1- Mobile phone application,

C2- Sport management, C3- Cleantech and C4- Consulting. C1 was registered in 2014 in Finland and it tried to create mobile phone applications; its first product was studied for 5 months, between October 2014 and March 2015. C2 is also a Finnish small company which was registered in 2013; its new service was studied for this paper. Its product was studied for 5 months. C3 was established in 2010 and its new product was studied for 3 months which was between January 2015 and March 2015. Last, but not the least, C4 was established in 2012 and its new product was studied between January and March 2015.

(b) Serial entrepreneurs: ten entrepreneurs were contacted but five of them were able to participate in the study. Each of them lives in different city in Finland. Three of them were contacted through a Facebook page on Lean start-up and remaining two were contacted via interpersonal network. These entrepreneurs have more than a company and they have more than 5 years entrepreneurial experience. They are denoted in this paper as “E”. E1 has 3 businesses and he employs 25 people for his companies. He holds MSc in Mechanical Engineering. E2 has 2 companies in the service industry. His number of employee is 17 and he holds Bachelor of Business Administration. E3 has 4 businesses which operate in cleantech, finance and service industries. He employs 45 people. He holds MSc and e-MBA. E4 has 2 firms in service industry. She holds PhD. She employs 10 people. Lastly, E5 has 2 businesses and they operate in ICT. He employs 8 people and he holds Bachelor of Science. Their interviews were conducted in June and July, 2015.

(c) Finnish best start-ups in 2014: the list consists of one hundred start-ups but 78 were contacted because they had working emails, phone numbers and website contact form. Remaining 22 companies were acquired, merged, moved out Finland or had problem with their contact information. Out 78 active start-ups, 18 (23%) of them participated in the research. Representatives of the participated companies are founder/co-founder (66.7%), manager/CEO (22.7%) and other which represent 11.1%. Most of the respondents hold Master’s degree (67.7%) while 2 of them hold Bachelor’s degree. One of them holds certificate or diploma and this person only went to High school/vocational school. Likewise, 12 of them went to University and 5 of them went to University of Applied Sciences. Respondents’ companies operate in ICT, medical, cleantech, media and communication, consulting, and service industries. They offer games, gamification, human resources services, medical services, consulting services, market research services, fitness services, software and hardware development and B-2-B services. Their survey was online between June and September, 2015.

3.3 Data Collection

It was mentioned above that observation and interview were used for the qualitative method while online questionnaire was used for the quantitative. Hence, these instruments were used to collect data from the participants.

The detail of data collection is presented in the following paragraphs:

- (a) **Case studies companies:** their data were collected weekly and sometimes, fortnightly. There was also a monthly review when, at least, one of the authors crosschecked observation with the participants. A Microsoft Excel sheet was used to save the record. At the end of observation method, an interview was conducted to get final opinion on the Lean start-up technique and the next action plan of the participants on their product or service.
- (b) **Serial entrepreneurs:** interview was used to get data from this group of participant. Telephone was used due to the distance and limited time of the participants. On average, their interview duration was 40 minutes. Their interview was summarised immediately they were completed.
- (c) **Finnish best start-ups in 2014:** online survey was used for their data collection. Their list was firstly compiled and their contact detail were used, especially email and web-contact form, to reach them. Their data was saved online.

Although interview and survey were used to collect data, each category of participants had different interview and survey questions. For the case study companies (henceforth, they will be called “observed companies”), their interview questions were not structured because of regular communication with the investigator (one of the authors). The main theme of their interview was to validate collected data and to get their final opinion about the technique as well as their future plans. For the serial entrepreneurs, their interview questions were semi-structured because there was a need for further information from the interviewees. They also had open-end questions so that they could share their experience and opinion freely. The main theme of their interview consisted of knowledge about Lean start-up technique and application of the technique. Furthermore, for the Finnish best start-ups group, their survey had both close-end and open-end questions. Their questions were grouped into background information, knowledge about Lean start-up and application of Lean start-up technique. Altogether, there were 20 questions.

3.3 Data Analysis

A content analysis is a suitable method for analysing quantitative data. It is a systematic characterisation of qualitative data so that valuable or meaningful information could be derived from a set of data (Franzosi, 2011). On the other hand, statistical descriptive method is good for synthesising quantitative data. This method facilitates data interpretation and it shows precise information about a phenomenon. Its analysis consists of numerical counts or frequencies, percentages, measures of central tendency (i.e., mean, median, and mode), and measures of variability which includes range, standard deviation, and variance (Taylor-Powell, 2001).

Both content analysis and statistical descriptive methods were used in the empirical study because there were two forms of collected data (due to the type of questions) – qualitative and quantitative data. Interview data and survey open-end responses made of qualitative data while close-end responses made up the quantitative data. With the help of online software, open-end answers were presented in tables for the survey and close-end responses were presented in pictorial charts. Thus, the data analysis for the survey was easier for the quantitative data more than interview data analysis. Furthermore, the data analysis of this paper was done according to the participant groups and the theoretical framework. The analysis is presented below:

- (a) **Observed companies:** in the beginning, the owners of these companies had little knowledge about the Lean start-up. When the investigator explained the model to them, they were happy to try it, most especially, C1 and C2. Companies C3 and C4 were also enthusiastic about the technique but they did not believe in it much. Due to their low level of knowledge about the technique, their view about the theme of technique was about development of acceptable and sustainable products and services. Meanwhile, after their experience with the technique, their view about its theme changed to creation of sustainable business. During their final interview, one of the owners explained that:

“To be honest with you, I didn’t believe it in the beginning despite that there are some information on it online and I’d heard about it from different people. Right now, I believe that it works. It enables me to think beyond sales. It helped me to consider sustainability of my products, services and company itself. I should thank you for your effort for making me understand the model deeply.”

From their interview summary, it was deduced that few participants had information on the technique but they did not have sufficient knowledge on it especially on how it works. In addition, one of the participants recommended that:

“I’d advise teachers and lecturers to offer a course or a workshop on how this technique works because this will facilitate mutual understanding and application of the concept.”

Hence, it seems that there is a need for further information on how the technique works and it can be applied for the potential entrepreneurs. When the observed owners were asked on how they followed stages of Lean start-up technique, all of them affirmed that they firstly focused on the customer discovery and validation. After these stages, C1 and C2 moved to customer creation because they planned to have company development in the future. On the other hand, C3 and C4 were still on the customer validation and they did not plan to have any new organisation because they have an organisation already. It can be noted that there is a difference between the ways these owners followed the stages. Observed reasons are

the owners of C1 and C2 are young entrepreneurs (sole proprietors) while C3 and C4 have a team. Likewise, C1 and C2 tested their first product or service whereas C3 and C4 have existing products and services, they were just testing new products. Therefore, it was synthesised that customer discovery and validation are the first important stages of the technique and the other stages depend on the nature of the new product or service (if such product or service is a first or an additional to existing ones), type of entrepreneur (solo or team) and level of organisation (new or existing).

Furthermore, these owners were able to apply the technique for their products and services and the outcomes were impressing. They added that application of the technique was effective. When they were asked if the technique is mainly appropriate for technological oriented products, all of them replied “no”. One of them said that:

“From my personal experience with the Lean start-up concept, it can be applied to any product or service because its main theme is to try a new product or service in a real life situation. So, it doesn’t mean which industry such product or service belongs to.”

Therefore, it was summarised that the technique can be applied and it can be applied to any industry because these observed companies are operating in different industries and each of them was able to apply the technique effectively. In concluding data analysis of the observed companies, it was observed that the owners were able to have deep knowledge of the technique when they started using it. It was also observed that they were able to get feedback on their ideas and they were able to save money because they got instant feedback. Similarly, it was observed that they had series of problem in the beginning such as:

- (i) Inability to develop MVP in a short time.
- (ii) Insufficient time to focus on the new product development.
- (iii) Disappointments from supplier (subcontractor) e.g. late delivery
- (iv) Lack of trust from initial customers to try the product and service.

- (b) **Serial entrepreneurs:** first and foremost, these participants have high level knowledge on the Lean start-up. One of the reasons for their high level knowledge is their level of education, exposure and entrepreneurial experience. This group mentioned that they heard about the technique through online forums, new business development seminars, Facebook, friends and business courses. They also mentioned that they read some articles on the technique and two of them have read the book (Ries, 2011).

Concerning stages of the technique, the members of this group said that there are no strict stages in applying Lean start-up because there are many factors surrounding the new product or service. They expressed that any stage can

be done but they pinpointed that customer discovery and customer validation are very essential. They recommended that the user of the technique should try to firstly discover and validate their customers. In short words, these experienced entrepreneurs agreed that any other stage can be followed provided that customer discovery and validation are done.

For the technique application, participants of this group confirmed that they had used the technique more than 3 times since they became an entrepreneur. They shared that they used the technique on different business ideas and research and development (R&D) projects. They stated that the technique can be used to any field or any industry. For example, one of them said:

"I'm an engineer but I have investment in service industry. I used the technique to test several service lines. I used it to see if people would accept our offers or not. What were the outcomes? We tested 15 services, but people accepted 3!"

Although all of these serial entrepreneurs agreed that the technique can be applied to any industry, they also mentioned that the technique is more suitable for the technologies than services. Above entrepreneur continued his points as follows:

"Yes, it can be applied to any industry or any idea but from my personal experience, Lean start-up is more applicable to technologies than services. The reason is simple, with technologies, one could see how it's going and developing but in service, it is hard to see its growth. You know, service is invisible. It can only be felt."

Furthermore, these entrepreneurs were asked about application of other technique. All of them said that they had used several techniques either before Lean start-up or in parallel. They gave examples of New Product Development model (common NPD model), Focus group testing, Core benefit testing and personal intuition. They insisted that there is no best techniques in developing goods and services. Meanwhile, they agreed that Lean start-up technique is very good and is recommended to be used in relation to other methods so that the best outcome can be got. In summary, the data analysis of this group showed that these participants have high level knowledge about the technique. It also showed that: progressive feedback, cost reduction (saving cost) and little investment are the main theme of the technique. Customer discovery and validation are the main first steps of the technique.

- (c) **Finnish best start-ups in 2014:** Almost of the participating start-ups have heard and applied the technique; 15 of them said yes while 3 said no. Those who have not heard about it hold marketing manager and co-founder positions in their start-up. They did not know the technique because they engage in marketing and administrative tasks rather than engineering activities. Most of them agreed that the technique is all about smart new product or business development, cost minimisation,

development of customer acceptable products and fast-to-market products development. One of them wrote:

"Wise productisation, customer views before big investments, agile decision making, flexible product creation, fast decision making"

Likewise, most of these respondents agreed that theme of the technique is on building and testing a new idea or innovation (68.8%), improving efficiency and effectiveness of a new business (56.3%), measuring the outcomes of a new idea or innovation (56.3%), and implementation of build-measure-learn loop iteratively (56.3%). It is noted that none of the participants agreed that the technique does not focus on any of the above-listed theme. Therefore, it was deduced that this group has knowledge about the technique and they think that testing of new idea or innovation, developing efficient and effective product/service/company and cost minimisation as the main theme of the technique.

On stage of the Lean start-up technique, these respondents said that customer validation and customer creation are the main problematic stages of the Lean start-up technique. They explained further that it is difficult to understand and provide exact goods and services for the customers. They also stated that finding proper market segmentation is not easy as well as it is *"hard to know the product fills the need for larger group of customers."* Some participants also mentioned that company building, product design and "no feedback" are serious problem facing the stages of Lean start-up technique. On the company building, a participant wrote:

"Choosing the right people to the team and organizing the team well is difficult when the company is growing fast."

Therefore, it was analysed that the customer validation and the customer creation are the main obstacles in the Lean start-up stages according to these start-up.

On the application of the technique, 81.3% of this group have applied it. They said that they used the technique to create new company, test new products and test new ideas. They also said that they used it to improve their product. These respondents were asked if this technique is only for technological oriented companies. Their response shows that 23.5% were strongly disagreed and 47.1% were disagreed; hence, majority of them expressed that the technique can apply to any industry. Still on the application, there was mixed-feeling on a notion which says that *"Lean start-up is mainly for bootstrapped start-ups and it replaces company's vision with customer feedback"*. Half of these respondents agreed while rest half disagreed. In a nutshell, it was deduced that this group have used the technique for different purposes and they agreed that the technique can be used by any industry. They, even, said that they would like to use the technique in their future activities.

The respondents showed interest to continue to the techniques as well as to get more information on it. The

reasons for their continuation of applying the techniques are:

- To continue improving our product in line with customer / market needs.
- It's cheaper, faster and more productive.
- To stay agile and learn.
- Existing framework for new business development.
- Quicker outcome.

In finalising this group data analysis, it was summarised that the group has high level knowledge about the technique because they engage in engineering or new product/service development. Likewise, this group believes that customer and company development are their main principles as well as customer validation and customer creation are the main problematic stages for the Lean start-up technique. Most of them have applied the technique and they planned to use it in the future. Their main benefit of the technique is offering goods and services which the customer wants and need.

Before concluding this section, data validity and reliability are essential part of any empirical study. Data validity has two phases which are internal and external. The internal phase is selecting of right tools and managing of the tools to measure correctly. The external validity is possibility for applying of research results (Last, 2001). Triangulation and engagement are among widely used data validity strategies. Engagement is a strategy where

researchers gather their data for long period of time or partake in study process. This strategy enables them to have sufficient knowledge or mutual understanding of their study or a phenomenon. On the other hand; data reliability is repeatability of a study; triangulation and audit trail are its common strategies. Audit trail is a strategy where the researcher provides detailed information on how his or her study was conducted. His or her information consists of targeted population, population characteristic, sample selection procedure, research methodology, data collection and analysis methods, result summaries and interpretation of the results (Merriam, 1995).

Therefore, data were validated through triangulation method and engagement of the investigator. In the beginning of this paper, it has stated that the research methodology is triangulated because it used both qualitative and quantitative research methods as well as both qualitative and quantitative data were collected and analysed. Additionally, the data were collected for some months (3-5 months for observed companies and 3 months for survey) and one of the author was involved in the observation; thus, engagement was used to validate data. Apart from the above strategies, the authors had sufficient knowledge about the topic, selected the right population, sampling method and tools, conducted the study with sufficient time and analysed the data with the right methods and tools.

For repeatability of the empirical study, the following figure 2 presents audit trail of the study. It depicts how the study was conducted.

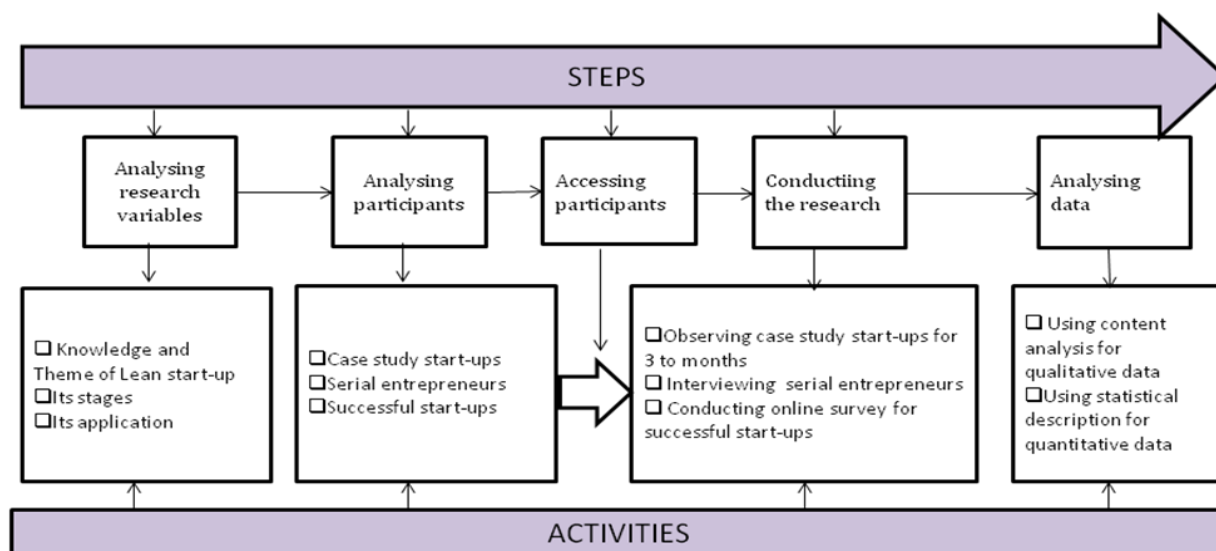


Figure 2: Empirical Study Audit Trail

So far, the participants explained their opinion and experience about the technique have been presented. Observations from the authors have also stated but the conclusion cannot be drawn until the next section is presented.

4. EMPIRICAL STUDY RESULTS

Based on the analysed data, the results of the empirical study are presented in the following paragraphs. They are

presented in relation to the theoretical framework and the purposes of the paper.

(a) Knowledge and Theme of the Lean start-up

The observed companies had low level knowledge about the technique in the beginning but after applying it, their level of knowledge improved. The serial entrepreneurs had sufficient knowledge on the Lean start-up technique due to their high level of education, exposure and entrepreneurial experience. Similarly, the Finnish start-ups had a high level knowledge of the technique because of their level of education and entrepreneurial experience. Meanwhile, those who lack the Lean start-up knowledge showed interest in learning it.

On the theme, the observed companies and serial entrepreneurs - believe that the technique centres on the creation of sustainable business, creation of sustainable business, cost minimisation, using of little resources and progressive feedback. While, the Finnish start-ups and potential entrepreneurs- state that it focuses on testing of new idea or innovation, developing efficient and effective product/service/company and cost minimisation. When their opinions compared and contrasted on the theme, it was deduced that the technique is for:

- (a) Testing of ideas, new features and new product/service.

- (b) Developing of acceptable products and services.
- (c) Minimising cost and utilising resources.
- (d) Establishing sustainable businesses.

(b) The Stages

Most of the participants agreed that customer discovery and validation are the first main steps in the Lean start-up technique; while, those who have existing companies focus on the customer validation and customer development. The Finnish start-ups state that customer validation and customer creation are the main problematic stages of the Lean start-up technique. Furthermore, observation revealed that the nature and type of offer, stage of start-up development, type of start-up team, determine the stage of the Lean start-up technique.

(c) Application of Lean Start-up

The participants affirm that the technique can be applied and it can be applied to any industry. They state further that the technique can be used to test ideas, new products and services. However, they warn that the technique might be problematic in the beginning. Likewise, they noted that the application of Lean start-up technique is more suitable for technologies than services. The following table shows the summary of the results.

Table 1: Results' Summary

<i>Group</i>	<i>Participants</i>	<i>Important Stages</i>	<i>Technique Application</i>	<i>Observations</i>
Observed companies	C1,C3 & C4 (technological products and services)	Customer discovery and creation	Applied for the 1 st time and agreed that it can be applied to any product or service or industry	(a) Low level knowledge of the technique. (b) Nature and type of offer, stage of start-up development, type of start-up team, determine principles and stages to be used. (c) Lean start-up might be problematic in the beginning.
	C2 (services)	Customer validation		
Serial entrepreneurs	E1, E2, E3, E4 & E5	Customer discovery and customer validation	Applied the technique more than 3 times. Agreed that it can be applied to any industry.	(a) High level knowledge about the technique through online and seminars. (b) Application of Lean start-up is more suitable for technologies than services. (c) Other business models used or used together with Lean start-up are NPD model, Focus group testing, Core benefit testing and personal intuition.
Best Finnish Start-up in 2014	18 start-ups	Customer validation and customer creation are the main problematic stages of the Lean start-up technique	Applied to create new company, test new products and test new ideas and it can be applied to any industry.	(a) High level knowledge about the technique especially among technical people. (b) Company development is important this group due to their growth demands. (c) creation of and testing of MVP are important supporting principles of the Lean start-up

Apart from the above results, there is an important result from the observed companies on how the technique was used by them using Build-Measure-Learn feedback loop. The following diagrams show how these participants applied it in relation to the theory of the technique.



Figure 3: Application of Lean start-up in C1

This company, during the final interview, had plans to develop a new mobile application while continuously improving its first application. Hence, it did follow the theoretical steps of the technique but its case study product will start from the second after pivoting while its new product will start afresh. Thus, it can be agreed that if a company uses the Lean start-up technique, new product may be emerged at the end of first round and the company's old product will just go to second stage of the second round. However, critical analysis of customer feedback and honesty of the product first users determine the need for new product or new features.

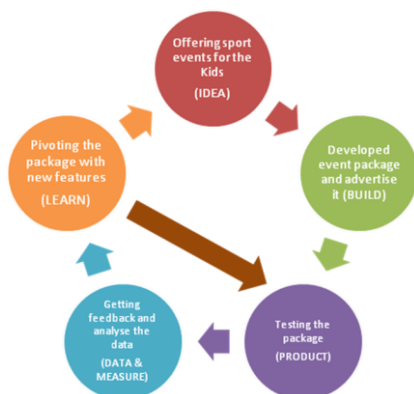


Figure 4: Application of Lean start-up in C2

C2 followed the theoretical stages of the technique but its future plan (shown by brown arrow) indicates that the company would not start from the beginning again because it just needed to modify its current package and offer it again to its target customers. Thus, it can be agreed that if a company does not have new product, it just needs to pivot and re-present its offer to its customers.

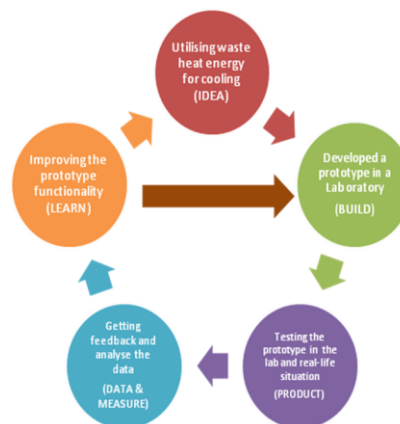


Figure 5: Application of Lean start-up in C3

The company C3 also followed the theory and it mentioned that the feedback from the field testing demanded the company to improve its product. After the improvement, it plans to do laboratory test and field testing again. This company expressed further that it may follow this process several times because the product is of high level technology. Therefore, it can be assumed that if a high level technological company is using the Lean start-up technique, such company may repeat the Lean start-up technique several times.

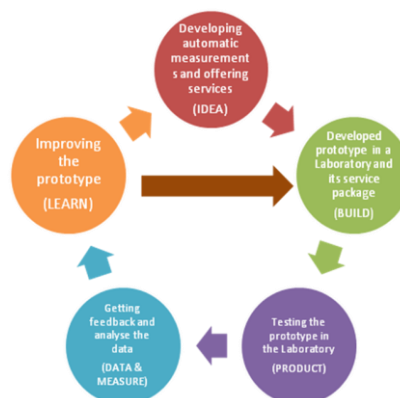


Figure 6: Application of the Lean start-up in C4

The case of C4 seems to be quite similar to C3. The product and service of the C4 were under improvement during the final interview of this thesis. The company plans to take new prototype and it hopes that the second would be its MVP.

To round-off the research results, the above diagrams showed that following the theoretical process of the technique depends on the type and nature of product/service. The diagram also revealed that the high level technological products may repeat the process several time while the service follow the process once and develop new product. Thus, application of the technique depends on many factors which may be highly different from one industry to another as well as from one company to another.

Having presented the results in relation the research variables, it is reasonable to test if these results can be summarised and its core knowledge could be applied. Hence, the next paragraphs present the how the results were applied by one of the authors.

New model for application of Lean start-up technique

Firstly, as it was noticed that the technique worked well with the observed companies, a “core knowledge – new

model” was derived about application of the technique. One of the authors decided to try it. That author is termed “investigator”. The investigator tried the new model for testing one of his business ideas. His idea is to assemble solar powered mobile phone charger and electricity generator. He aimed to sell them at affordable prices for lower or middle class people in the developing countries, specifically African countries with inadequate electricity supplies. He followed the following diagram

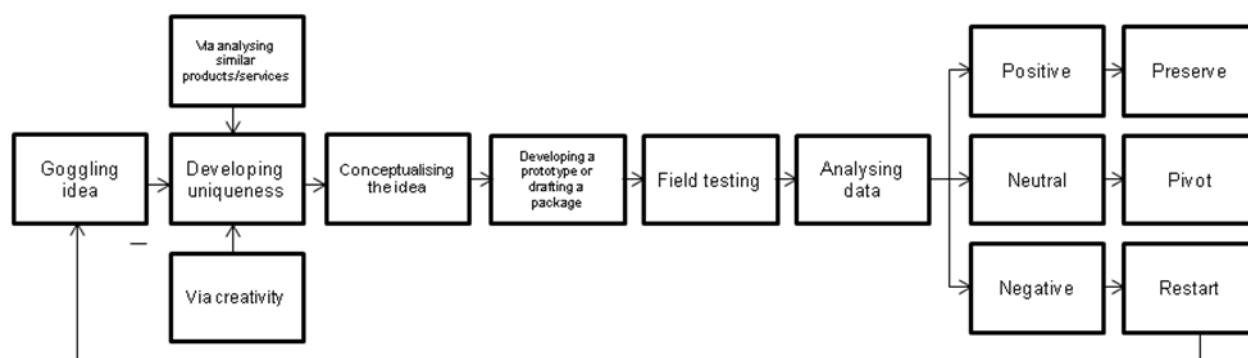


Figure 7: New model for application of Lean Start-up Technique Application

Based on the above figure, he drafted a specification list for his proposed products. After that, he searched for his idea online (*goggling idea*). Not surprisingly, he found many similar products. He examined about 50 similar products and he found that none of them had 2 features which his market needed. Then, he outlined the parts he needed to assemble his prototype so that those 2 features can be inculcated (*developing uniqueness*). He also drafted or sketched his product with the help of PowerPoint presentation purposely to serve as a guide during prototyping (*conceptualising idea*). He moved forward to search for suppliers and order the parts. After few weeks, he got his order which included similar products and he assembled his prototype (*prototyping*). When he finished the prototype, he tested it and he gave other friends to test it (*field testing*). During the test, he noticed some things to be improved and he also got some insights from his friends (*analysing data*).

In order to improve his prototype, he contacted a couple of suppliers in China who have similar product to manufacture 2 samples that has almost all features except 1 feature which he decided to add it to later. Two companies tried to manufacture it but the price was very high. This situation was like this till he travelled to United Arab Emirates (UAE). He met a supplier and they sign Non Disclosure Agreement (NDA). With two days, they a made seminal prototype and he tested it for 2 days (*pivoting*). Then, he decided to produce 30 pieces to test it in the real market. These 30 sets regarded as MVP.

He shipped his MVP and it was sold in August 2015 in his target market, Nigeria. After 2 weeks, he started to get feedback and eventually, 3 retailers ordered 300 pieces.

This order made him to collaborate with UAE supplier for a bigger production (*preserving*).

From the above story, it can be confirmed that knowledge derived from the empirical study of the paper was applied and it also shows that the Lean start-up can be applied to test ideas or to commercialise an idea. In order to attest this assertion, the following section presents further information on the results and its theoretical framework.

5. DISCUSSION

The results also showed that the theme of the technique among the participants of the research consists of testing of ideas or new products/service, facilitating of development of customer acceptable products and services, cost minimisation and creation of sustainable start-up; these opinions correspond to the claims of the theorist, Ries (2011) and scholars like Järvinen et al (2014), Shaughnessy (2014), Blank (2013), Munch et al (2013), Doneland (2013) and Lalic et al (2012). Ries (2011) emphatically states that the technique, if well employed, would enable a start-up to be sustainable.

Likewise, it was confirmed from the results that the technique can be applied and it can be used to test ideas, new products/services and features. This is relating to the explanation of the theorist, Eric Ries and some scholars like Hartman (2014) and Adams & Loomis (2014) who state that the technique focuses in testing hypotheses.

Furthermore, the participants, though followed the stages of the technique in different ways, confirmed that the customer validation and customer development are the most important stage of the technique. Their confirmation

is similar to the works of Blank (2013) and Munch et al (2013) which state that these stages are difficult and essential for any sustainable start-up.

The scholars, Järvinen et al (2014), Hakin (2014), Shaughnessy (2014), Blank (2013), Munch et al (2013), Doneland (2013) and Lalic et al (2012) claimed and show that the technique can be applied. The results of this study also confirm their claim and reveal that the technique is gaining ground among the entrepreneurs and potential entrepreneurs because the participants of this research showed interest in applying it in the future as well as to get more knowledge on the technique.

The above paragraphs show relationship between the empirical study and theoretical framework of the paper. However, the paper is not yet completed because it is important to know if its goals were achieved and if there is any pieces of advices or any area for further studies. Therefore, the next section concludes the paper.

6. CONCLUSION

In concluding this paper, the results are compared with the objectives and the outcome is presented below:

- (a) **Testing of the Lean start-up in the real-life situations:** the results revealed that the technique has been applied in the real-situations. The observed companies proved that the technique can be applied. Likewise, experiences shared by the serial entrepreneurs showed that the technique is practicable. Similarly, research result application by the investigator also support that the technique can be applied. Those, who used the technique, employed it to test their ideas and to introduce their new products/services. Therefore, it can be agreed that this goal of the paper was achieved.
- (b) **How the technique was applied:** figure 3- 6 show that the different application of the technique by the observed companies. Similarly, results from the research variable “application” confirmed that the technique was applied by following its stages and considering other factors like nature of product/service, stage of start-up development, number of entrepreneurs, and experience of the entrepreneur (s). Therefore, this objective was also achieved.

Achievement of the above goals shows that this thesis has contributed to existing knowledge of the Lean start-up and it also reveals that the technique can be used to commercialise business ideas or commercialise innovation by the SMEs. Furthermore, application of the core knowledge of the research results, new model, is a benefit because it was presented in such way that the potential entrepreneurs and business owners can use it; hence, it will assist many companies. Therefore, it can be concluded that this study contributes to the society.

6.1 Recommendations

Although it was confirmed that the technique can be applied, there are certain factors to be considered during application. Therefore, the following paragraphs provide recommendations for the potential users of the technique.

- (a) **Sufficient knowledge:** it is essential that the user of the technique should try to study and have mutual understanding of the concept. Sufficient knowledge will assist the user to apply it rightly. Hence, the user is advised to read Ries (2011) or its summarised versions like Hart (2013) and Hartman (2014).
- (b) **Initial challenges:** it is important the user is aware of initial problems of the techniques. Examples of the initial problems were stated in the chapter 4 of this thesis. These initial challenges are vary from one user to another. Therefore, the user should try to prepare his/her mind for some problems in the beginning. Recommended preparation is to have a long duration for the application, for instance months, so that any challenge can be easily handled. Likewise, the user can have many suppliers or subcontractors as well as many technologies for his/her idea testing in case of any disappointment or wrong technology. Lastly, the user is advised to be patient because the technique application does not work miraculously.
- (c) **Clarification of MVP:** the user needs to inform his/her potential or initial consumers that his/her prototype is an MVP not a final product and their feedback will be highly appreciated. This clarification is important for the large companies (technique users) so that their existing customers will not mix MVP with the final product (in case of any failure of the MVP). Therefore, the user should try to provide sufficient information for the first-testers.
- (d) **Having plan for further expansion:** sometimes, MVP may be accepted by the testers and in this situation, problem emerges for mass production. An example for this situation is investigator’s solar mobile phone charger which was ordered more than expected; investigator had problem for production capacity because he had limited time to supply the order. In order to avoid this problematic situation, the user is advised to have a plan for further expansion.
- (e) **Other factors:** factors like nature and type of offer, stage of start-up development, type of start-up team need to be considered so that the relevant principles and stages can be selected and followed. These factors will assist the user to do the right thing at the right. Therefore, the user is advised to familiarise with the aforementioned factors and other factors used.

6.2 Proposal for Future Studies

This paper has investigated how the Lean start-up technique can be used to test and commercialise business idea and innovation. It also presented the level of awareness of the technique in Finland but with a small sample. It is also presented how the technique can be applied. Yet, the paper has a limitation on the number of business ideas to be tested using the technique. Likewise, it has a limitation on type of the innovation to be commercialised with the technique. The paper also has a limitation of sample because number of participants is very small if compared with the main population; for instance, there are hundreds thousands of small companies in Finland. Therefore, these limitations do not make the paper to be generalised. However, the new model can be applied.

Due to the above limitations, it would be good to have further researches on this topic. It would be good to have a study which will have many samples (similar participant group but with large number); similarly, a study which tests many best ideas or innovations within the same group of this research participants. Likewise, it would be good if there would be a study that investigates commercialisation of new products and services using the technique. It would be also good if there is a study that which using the technique for several months or years. If these kinds of studies can be conducted, an in-depth knowledge about the technique can be ascertained. Lastly, despite the above limitations, this paper has provided useful information for the potential entrepreneurs, small business owners, entrepreneurship educators, SMEs and large companies on how they can use the Lean start-up technique.

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