Portland State University

PDXScholar

Engineering and Technology Management Student Projects

Engineering and Technology Management

Fall 2017

Assessment of Minimum Viable Product Techniques: A Literature Review

Mohammadsaleh Saadatmand
Portland State University

Follow this and additional works at: https://pdxscholar.library.pdx.edu/etm_studentprojects

🎨 Part of the Business Administration, Management, and Operations Commons, and the Strategic Management Policy Commons

Let us know how access to this document benefits you.

Title: Assessment of Minimum Viable Product Techniques: A Literature Review

Course: ETM 543/643 Front End Management of New Product Development

Year: Fall 2017

Author(s): Mohammadsaleh Saadatmand

Report No.: 1

Abstract

Although the minimum viable product (MVP) concept provides a means to test ideas and hypothesis at early stages, it does not indicate that it is easy to build. MVP tests whether your idea solves a real problem that customers are willing to pay for. In order to reach the stage of building a product that people want to use and pay for, we need to make sure product passes certain tests. In turn, MVP techniques/methods are designed not only to test technical questions about the product, but also to assess the viability of business model hypothesis. Once the hypothesis that needs to be tested with MVP is determined, there are some methods that can be used to get reliable data from actual users and utilize it. In this article I do a comprehensive review of literature to figure out which methods and techniques are used in MVP. My goal is to identify range of methods while providing strengths and weaknesses of such methods. Finally, I conclude the research by providing some suggestions for future research.

Keywords: minimum viable product, lean startup, techniques, entrepreneurship

Assessment of Minimum Viable Product Techniques: A Literature Review

Numerous definitions and techniques have been proposed for MVP and methods of MVP testing focusing on its nature, features, purposes, and domains which are used in. However, it is crystal clear from diverse range of definitions for MVP that there is not a unique and mainly accepted definition for MVP. Also, these proposed definitions are sometimes contradictory. For instance, Lenatduzzi and Taibi (2016) in their systematic study on proposed definitions of MVP show that there are approximately 22 explanations in defining MVP. They depict some proposed definitions which are close and similar, while others are completely different and somehow contradictory. Additionally, MVP provides a mean to start a process of learning, but it does not imply that it is easy to build. Different kinds of MVP techniques can be used in testing which its complexity depends on the complexity of product or business hypothesis. It ranges from vague ad-words to early prototypes. To understand which MVP techniques are available to utilize, all forms of such techniques and their features should be studied. This paper suggests a definition for MVP which is a new and based on prior definitions. Furthermore, by reviewing different techniques of MVP testing this research suggests some criteria for the assessment of MVP techniques that shows additional research is needed to better understand features of MVP testing techniques. This paper is structured as follows. In section 2, I show the background of this study, briefly explaining the Lean startup methodology, and MVP definitions. In section 3, I describe the research questions and the procedure used to gather information. In section 4, I review over different MVP testing techniques and define criteria for the assessment of MVP testing techniques. In section 5, I compare two MVP techniques and explain them in more detail. Finally, in section 6, I show results, depict conclusions, and sketch future work.

2. Background

In this section, I will introduce the background. First, I will present the domain of Lean Startup methodology. Second, I will depict different definitions of MVP. Finally, I will provide a brief explanation of different MVP testing techniques.

A. Lean Startup

In the literature of entrepreneurship several definitions are proposed by researchers for the startup. Eric Ries (2009) defines a startup as 'an organizations dedicated to creating something new under conditions of extreme uncertainty.' According to Ries, entrepreneurs act under uncertainty and there is not a clear before start of learning from customers. Blank (2010) completely distinguishes a startup from a company. In his definition a startup is an organization formed to 'search' for a business models which are 'repeatable' and 'scalable', while a company is an organization that 'execute' those business models. Any startup in the process of searching tries to discover customers and validate business hypothesis through their ideas and information. (figure 2-1)

Figure 2-1

https://steveblank.com/
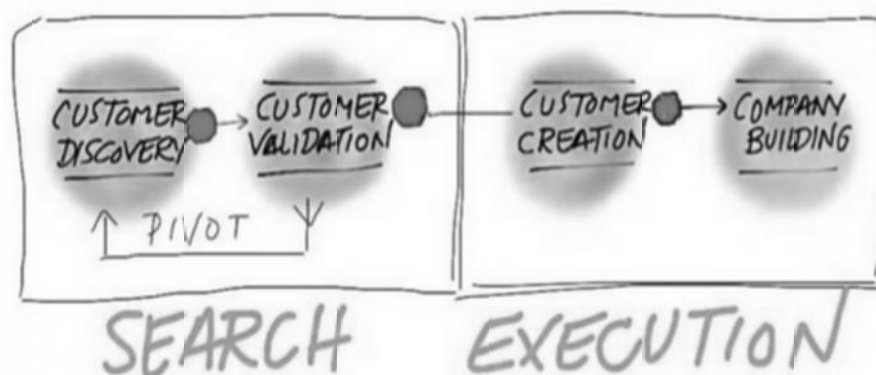
Eric Ries (2009) first suggested the concept of 'Lean Startup' for developing new products and business hypotheses. According to Ries, lean startup is a 'methodology' for developing businesses and products. Aim of this methodology is to shorten product development cycles. Based on this methodology building a product iteratively based on the needs of early adopters could lead to reduced market risks such as exorbitant product launches and failures. The lean startup method teaches how to drive a startup, how to steer, understanding turning points, and when to maintain and growth a business with maximum acceleration. Three building blocks of leas startup method are business-hypothesis-driven experimentation, iterative product releases, and validated learning. (figure 2-2) In addition, the lean startup is based on the following five core and fundamental principles:

- Entrepreneurs are everywhere

- Entrepreneurship is management

- Validated learning

- Innovation accounting

- Build-measure-learn

Lean Startup Process (figure 2-2)

http://theleanstartup.com/principles
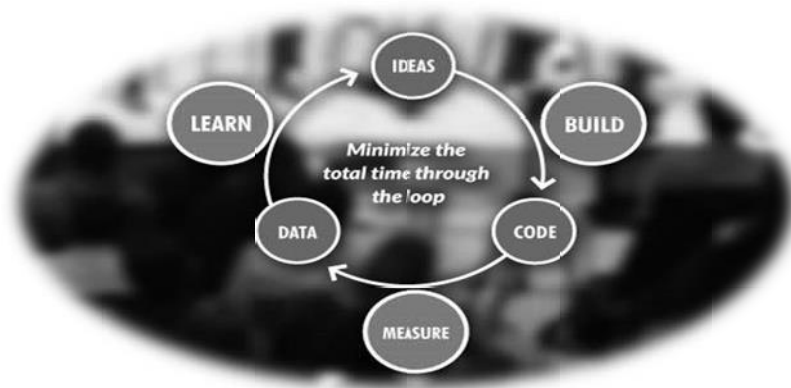
Build-measure-learn is an essential part of lean startup where entrepreneurial teams turn ideas

into products, measure how market responds, and then learn whether to pivot or preserve.

Fundamental aspect of this cycle is MVP. Several definitions have been suggested for MVP, and

practitioners and scholars usually encounter a problem of selecting the most appropriate

definition of MVP.

<div align="center">B. Definitions of MVP</div>

In Lenatduzzi and Taibi (2016) a systematic and chronological mapping study on the

definition of minimum viable product, it was found that, the first definition of MVP was

suggested by Frank Robinson in 2001, with the strong concentration on risk, return, and

economic perspective. Robinson (2001) explains MVP in this way: 'MVP is a *mindset* of the

management and development-team. It says, think big for the long term but small for the short

term. Think big enough that the first product is a sound launching pad for it and its next

generation and the roadmap that follows, but not so small that you leave room for a competitor to

get the jump on you.' Furthermore, from 22 reviewed studies (figure 2-3) in their paper they

report that only 15 works clearly state the meaning of minimum in the MVP definition, and other

remaining studies just show the purpose of MVP. Moreover, considering the definition of

Minimum, "minimum features" is the most recurring phrase in MVP definitions and based on the

key factors that characterize the MVP definition "maximum customer validated learning" and

"customer feedback/evaluation" is considered as relevant in multiple studies.

Following the definition of Robinson for MVP, Eric Ries proposed a new definition for

MVP in 2009. He defines MVP as a 'new version of a product which allows collecting the

maximum amount of validated learning about customers with the least effort'. In this definition

MVP is an iterative process of idea generation, prototyping, presentation, data collection,

analysis and learning. It seems this definition is in line with Robinson's description; however, here MVP is defined as a new version of product which is in contrast with Robinson's idea of MVP as a mindset. In contrary, Blank (2010) defines MVP as a minimum set of features which does not have any means of process or strategy at all.

Year	Study ID	Definition
2001	[S1]	MVP is not a minimal product, it is a strategy and process directed toward making and selling a product to customers.
2009	[S2]	MVP is a version of a new product, which allows a team to collect the maximum amount of validated learning about customers with the least effort. It is an iterative process of idea generation, prototyping, presentation, data collection, analysis and learning.
2010	[S3]	A MVP has just those features (and no more) that allow the product to be deployed.
2011	[S4]	[S1] + [S2] + [S3]
2012	[S5]	MVP means releasing early and often, and validated learning means using metrics and A/B testing to find out what really works and what doesn't.
2013	[S6]	MVP is a product with a minimum feature set targeting market opportunities while profitably solving customer pain points.
2012	[S7]	A MVP is an offer that generates revenue for the company and that motivates customers to provide feedback and recommend it to other potential customers.
2013	[S8]	MVP is the minimum value organization to accelerate sales to first customers.
2013	[S9]	A MVP is typically the first version of a product released to customers, and should contain only the absolute minimum in terms of features and design for it to become viable to the customer.
2013	[S10]	MVP represents the minimum functionality or set of features within the product, allowing the firm to test the product in the market and gather customer feedback, consistent with the second principle.
2013	[S11]	MVP is a product with a minimum feature set targeting market opportunities and validate its value and growth hypotheses as soon as possible.
2014	[S12]	MVP is a set of "minimal requirements," which meet the needs of the core group of early adopters or users.
2014	[S13]	MVP starts the learning and building process quickly. It allows the start-up team to collect as maximum validated learning about customers with least effort. The goal is to test the fundamental business hypothesis. It is not meant to be perfect-meant for Early Adopters.
2014	[S14]	MVP aims at defining the smallest possible implementation that brings added value to customers.
2014	[S15]	MVP is a product capable of being deployed to a subset of customers for evaluation.
2014	[S16]	MVP is an experimental object that allows for empirical testing of value hypotheses.
2014	[S17]	[S1] + [S2] + MVP is a product that includes just enough features to allow useful feedback from early adopters.
2014	[S18]	MVP is a key concept. The goal is to identify the most valuable features by iteratively experimenting the market.
2015	[S19]	MVP is used to test the business model by gathering and measuring customer feedback. Create a viable product with minimum effort. Requires the generation and testing of numerous ideas
2015	[S20]	MVP is a tool to collect customer feedback on the product in order to improve the product.
2015	[S21]	MVP is a product with low quality, early prototype.
2015	[S22]	[S3] + allow to reason with early adopters; some of whom will pay you money or give you feedback.

(Lenarduzzi & Taibi, 2016) (Figure 2-3)

Comparative y, Moogk (2012) propose somehow contradictory definition for MVP in comparison with Robinson (2001) meaning of MVP. In this definition, MVP is a product with a 'minimum feature set' targeting market opportunities while profitably solving customer pain points. In contrast, Robinson suggests that MVP is not minimal set of features, but a strategy and process directed toward making and selling a product to customers. His idea of MVP is a mindset, way of thinking, strategy, and process not a minimal version of a product.

Hence, according to 22 proposed definitions for MVP and all of their features, I define MVP as follow: 'The MVP is a minimal and sufficient representation of new product idea or business hypothesis which allows starting the process of learning from customers through running experiments that can be validated scientifically". Similar to some of prior definitions I assume that MVP is a minimal set of features which sparkles the process of experimental learning. One more consideration in this definition is that there is clear distinction between MVP as a minimum set of features and the process of validated learning. So accordingly, MVP testing techniques are experiments designed to test MVP and are not MVPs themselves.

3. Study design

In this section, I will explain the study design, defining the research question(s), and the method used to retrieve data. I selected the bibliographic sources, the keywords, and the selection criteria so as to retrieve the most relevant papers.

A. Research Question(s)

In this step of research process, I have formulated a research question(s) so that I can define the protocol to be followed. Based on the existing gap, I structured my main and subsequent question as follows:

Main Question: what methods and techniques are used to test MVP?

According to my main question I defined a sub-question as follows:

Sub-question: what are the strengths and weaknesses of those techniques?

B. Protocol

In this stage of this research process, I defined the bibliographic sources, the keywords used, and the selection criteria for identifying the relevant papers. (figure 3-1)

```
┌─────────────────────────────────────────┐
│     Bibliographic Sources Identification  │
└─────────────────────────────────────────┘
                    │
                    ▼
          ┌───────────────────┐
          │   Keywords Used    │
          └───────────────────┘
                    │
                    ▼
     ┌──────────────────────────────┐
     │  Selection Criteria Definition │
     └──────────────────────────────┘
```
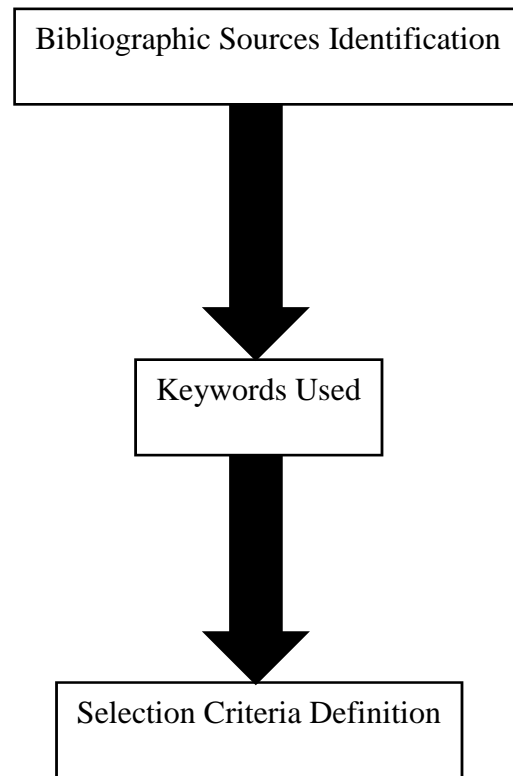
(Figure 3-1)

1. Identification of bibliographic sources

The search process in finding relevant sources can be conducted amongst specific journals and conferences. In order to better address this step, I decided to search among selected source engines as follows:

Academic Databases Selected:

- Science Direct

- Google Scholar

- IEEEXplor Digital Library

- Wiley Library

- ACM Digital Library

- Springer Link

General Sources:

- Google Entrepreneurship Websites/Blogs/Communities

2. Keywords used

I defined the keywords used based on the terms of my research question. I identified different acronyms as keywords as shown below to retrieve the relevant papers from the chosen source engines.

Keywords Used:

- Minimum viable product

- Lean startup

- MVP testing techniques

3. Selection criteria

The search was conducted after characterizing the selection criteria in order to identify those papers in the bibliographic sources that are closest to my research questions. I conducted a search over title, abstract, and keywords. After retrieving the results, I applied the selection criteria to refine the identified articles. Selection criteria are as follows:

- Only papers published in journals and conferences in academic search

- Sources only written in English

- Considered the contribution of blogs and websites so as to consider possible opinions reported and issued in non-scientific papers/articles.

- All papers that do not provide methods of MVP testing are removed

- Those papers that do not correctly satisfy research question are removed

4. MVP testing techniques and assessment criteria

A. review of MVP testing techniques

The complexity of your MVP relies upon the sort of item you are building, and various types of

MVPs can range from ambiguous AdWords test to early prototypes and customer interviews.

Once you have decided the hypothesis you need to test with your MVP, there are several testing

strategies we can put to use to get reliable data from actual customers and utilize it.

Bank (2014) proposed fifteen ways and techniques to test MVP as follows: customer interview,

landing page, A/B testing, ad campaign, crowdfunding, explainer video, piecemeal MVP, SaaS

and PaaS, blogs, wizard of Oz, concierge MVP, digital prototype, paper prototype, single-feature

MVP, pre-order pages. He asserts it's critical to understand that when testing a hypothesis it

might be good to consider using multiple MVP testing techniques. The one that fits your

business model and market best will undoubtedly vary. He also states that think about the biggest

assumption your product or business idea is making and build MVP and test it in the market

accordingly.

Additionally, Parker (2017) depicted six ways of MVP testing methods which are customer

interviews, landing page, explainer videos, ad campaigns, digital prototypes, and A/B testing. He

says whenever we it comes to MVP testing, we have plenty of options. However, before

selection and using each one of them we have to be aware of the technique. So, before investing

huge amount of money and time on any MVP, it should be tested by carefully adopted MVP

techniques.

Similarly, Pangara (2017) shows that in order to determine if your MVP is a product people are

going to want and to pay for, it is required to pass certain tests. These types of test will help you

get valuable data to help and guide you not to only answer technical questions about your product but they will also help you determine if your MVP is viable. She proposes several techniques for MVP testing including landing page, AdWords, A/B tests, fundraising, demo video, and customer interview.

All in all, most comprehensive list of MVP testing strategies has been suggested by Bank (2014). It includes 15 strategies for testing MVPs which in other article just partially covered. A big gap in the literature of academic research is that not only there is not any research regarding MVP testing techniques, but also there is not any method for comparison and selection between MVP testing methods.

B. real cases of MVP testing techniques

In this step by selecting Bank's (2014) as the most comprehensive list with 15 proposed techniques I dig a little bit deeper and provide some real world examples of methods used by startups.

1. Landing page

The landing page is the first page visitors and early customers come to when try to find out what you have provided. It's also a marketing opportunity where we can explain our product's features and prepare a list of sign ups. Based on MVP definitions the objective is validate learning, so collecting visitor analytics with tools like Google Analytics or KISSmetrics is the most critical part of landing pages. Another key point is that landing pages should not treated like email capture pages, but they can be used more extensively to test new products and ideas. In figure below there is a sample of landing page.
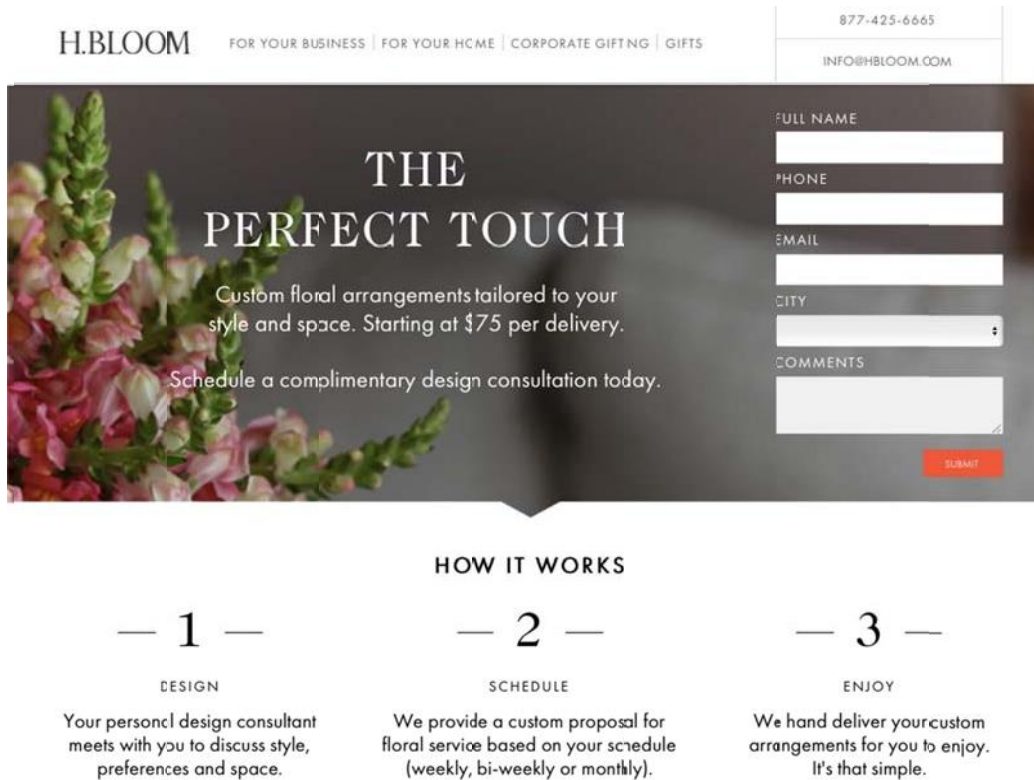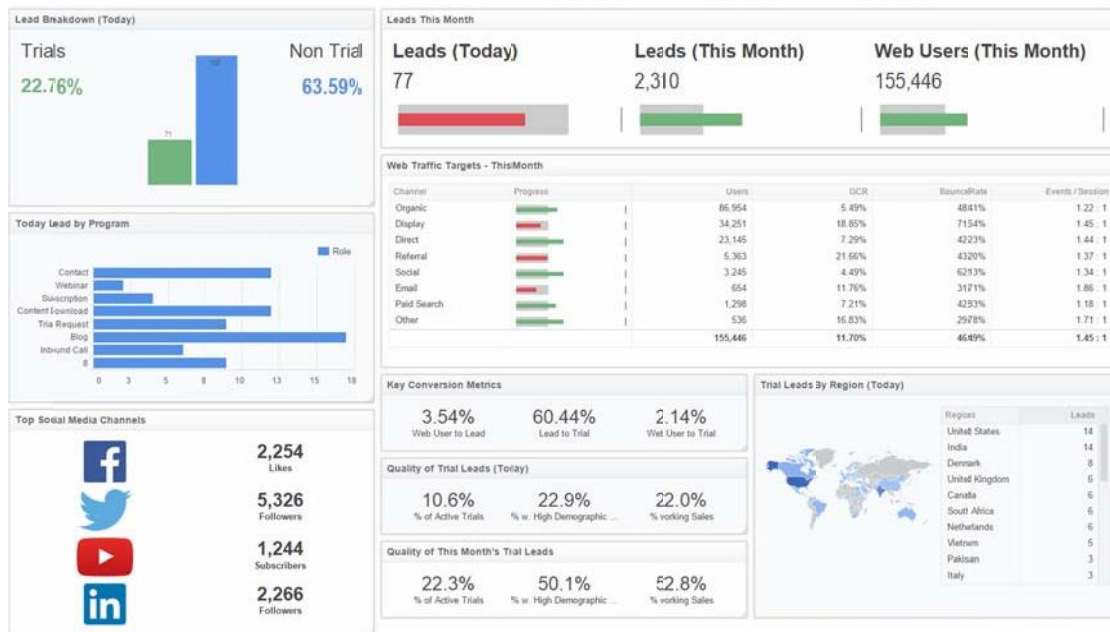
(Figure 4-1)

2. A/B testing

A/B tests are utilized to test the effectiveness of any modifications t**o** the product or marketing. In order to eliminate guesswork once we want to improve a product or service, various analytics tools can be used to test how visitors react to design improvements. This method allows testing two versions of the page or marketing campaign and let visitors determine which is preferable.
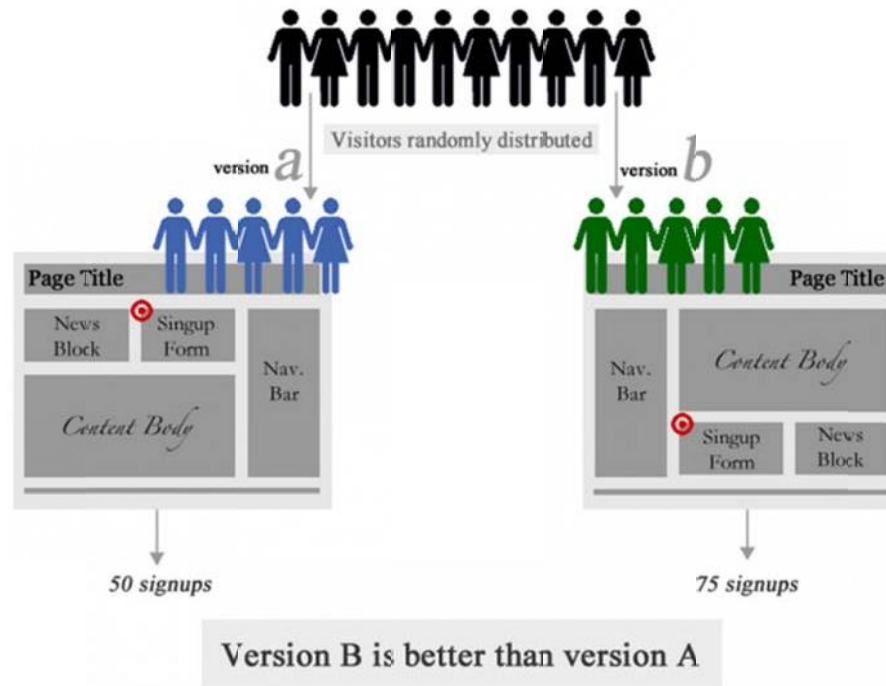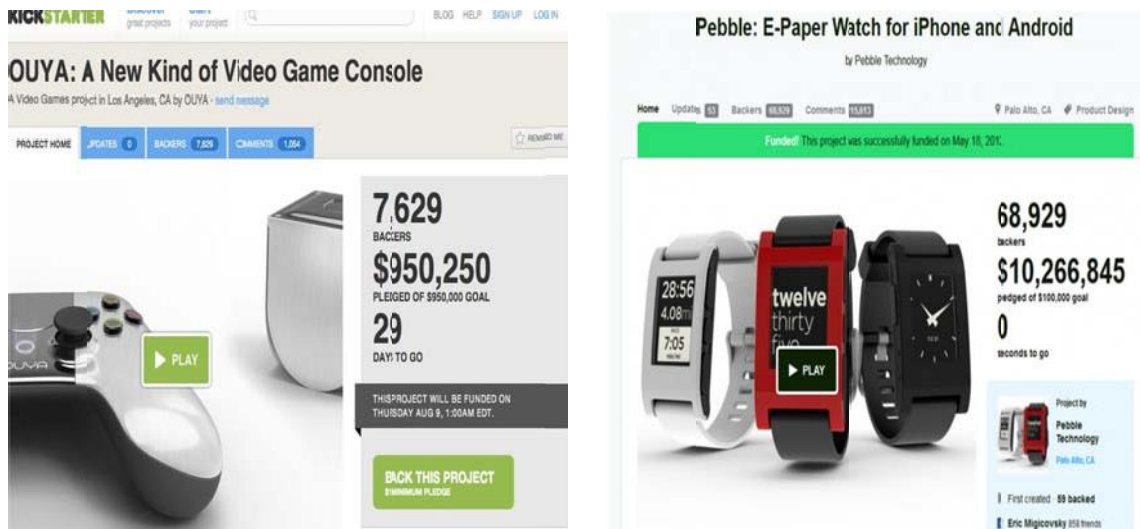
(Figure 4-2)

3. Ad Campaigns

Ad campaigns are a good mean of running market surveys. There are too many social media platforms such as Google, Facebook, Instagram, and son that let you focusing on your specific target m rket, and this lets you to see which features of your products or business hypothesis are more attractive for customers. Using these platforms to run an ad campaign gives valuable statistics such as conversion rates or click rates which can be pieces of valuable information in determining features of product. Competition in the realm of search marketing is fierce, so it's important to take into account your specific target market and features of a platforms that is going to be used.

(Figure 4-3)

4. Crowdfunding

Crowdfunding platforms such as Kickstarter, Gofundme, and Indiegogo, among others, are one of important tools which can be used to test MVPs. These websites are basically systems of MVPs where early adopters can be recognized more easily since their interest are supported by financial contribution. One advantage of this MVP testing method is that it combines benefits of validated learning w th fundraising for development of product or business hypothesis. It also gives access to early adopters who are proper means for further feedbacks and learning and can spread the idea by word-of-mouth. Some other good features of crowdfunding method are compelling story, impactful explainer videos, and useful incentives for customers to support a project. Two successful fundraising campaigns are Pebble and Ouya.
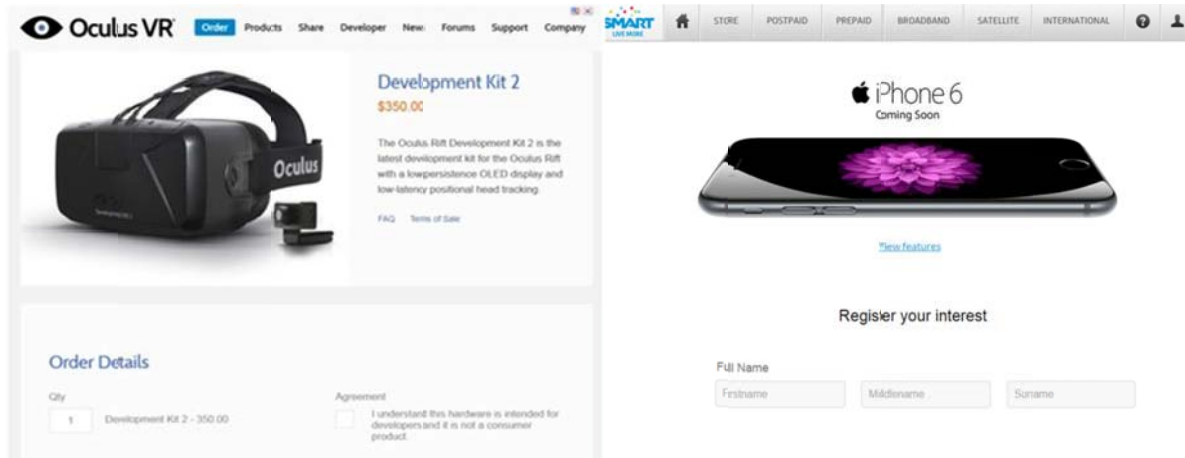
(Figure 4-4)

5. Pre-order pages

Like the crowdfunding which raises fund, the Pre-order page MVP test gives us a chance to introduce products and business ideas to potential customers with the point of luring them enough to pay for it before you even produce it. Two good examples are iPhone 6 and Oculus Rift, a virtual reality gaming kit, as shown below. Too many projects on Kickstarter begin as pre-orders. This can give us an estimation of demand for the product we are trying to build, giving us some clues of whether we should continue or eliminate the project. The problem with this method is that once customer back a project they actually want something in return for their faith and money, and they don't have certain feeling that whether the promised product will be delivered.

6. Wizard of Oz

Instead of building a video or coding a complete system, a substitute alternative for the steps of

market validation is to deliver product or service manually. 'Wizard of Oz' originates from

putting on the impression of full functionality, while faking it until the point when you make it.

Customers think they are experiencing the actual product, but in reality works behind the scenes
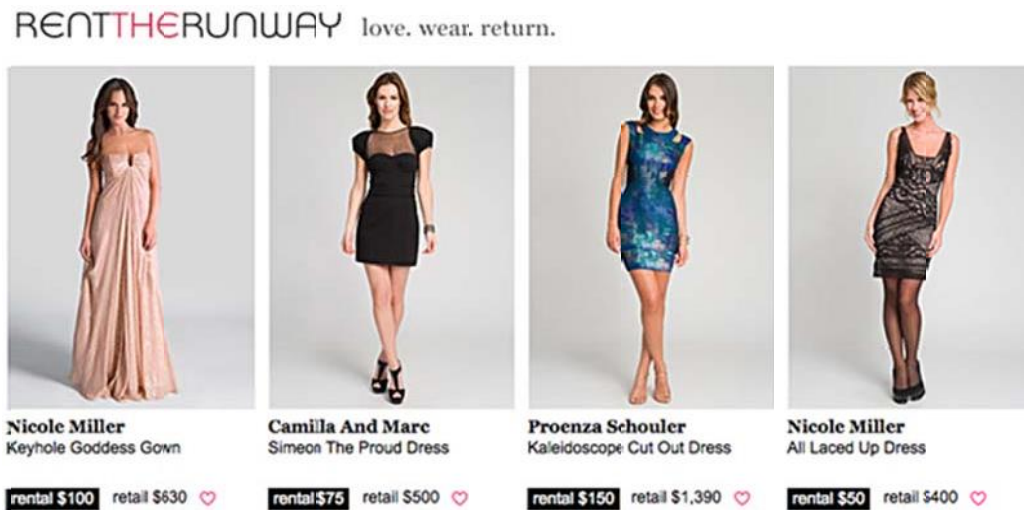

(Figure 4-5)

are being done manually. ZeroCater and Zappos started their businesses in this way. Arram

Sabeti, founder of ZeroCater began with a monster spreadsheet which he used to monitor

companies and caterers he could connect with. Zappos started a similar path, Nick Swinmurn

setting up photos of shoes from   eighborhood shoe stores on a website to gage interest for an

online store. (Figure 4-6)

7. Concierge MVP

The Concierge test is similar to Wizard of Oz, except instead of faking a working product, you are present for a manual work and product or service is delivered as a highly customized service to specific and targeted customers. Rent the Runway tested its online dress rental plan by providing an in-person service to female college students where anyone could try the dress on before renting them. Time is valuable, particularly at this stage and **g**oing through the procedure manually additionally reveal other aspects of the customer experience that is really valuable. Rather than putting in assets toward building a real product, MVP test can answer the more important questions first.

(Figure 4-7)

8. Piecemeal MVP

As a ble d of Wizar of Oz and Concierge procedures, the Piecemeal MVP implies assembling a working demo of your item utilizing existing tools and administrations to convey the experience

as opposed to building anything yourself. Groupon, in its beginning periods, was a blend of

WordPress, Apple Mail and an AppleScript that produced PDFs physically as requests were

gotten from the website. Instead of putting time and cash into building your own particular

infrastructure, the product can be fabricated utilizing other existing platforms and services as the

establishment, successfully utilizing odds and ends from different sources to make your version

of the product.

(Figure 4-8)

9. Single-feature MVP

In many cases it might be best to concentrate on a single feature of your MVP to save

development time and exertion and additionally keeping customers from getting to be plainly
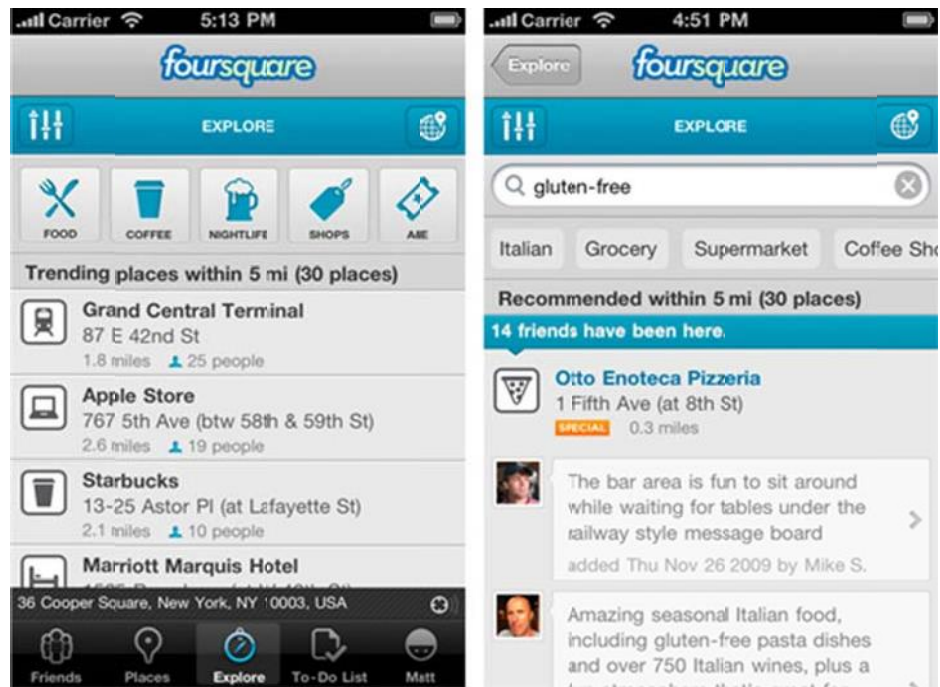
(Figure 4-9)

occupied with what the product is principally expected to be. Foursquare, for instance, started

with the basic idea of giving users a chance to register with the social network with their location

and the first version of their app mirrored this straightforwardness. Buffer began with simply

Twitter support and just a single account for every customer.

10. Digital prototypes

Mockup , wireframes and prototypes can be utilized to show the product's functionality in a way

that mirrors the real use. These prototype MVPs can run from low-fidelity portrayals to
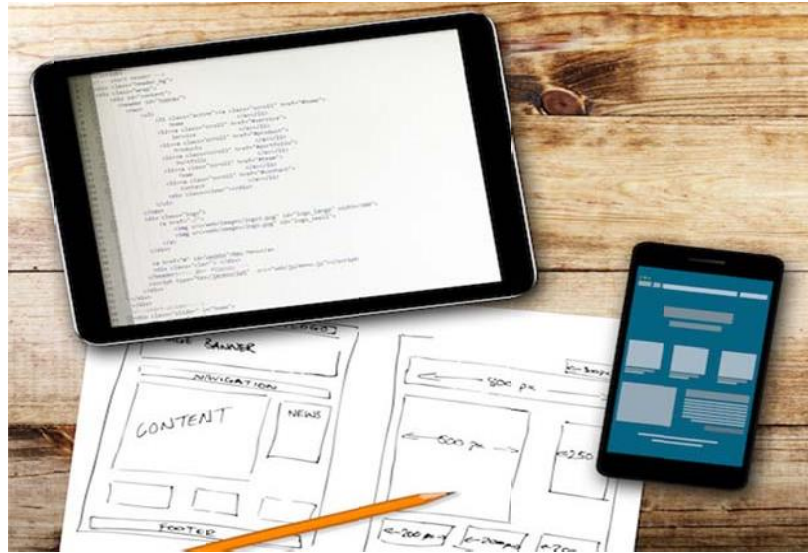
(Figure 4-10)

screenshot previews to more complicated "dummy" applications that demo the user experience.

There are collaborative wireframing and prototyping tools like UXPin that let you make what

you want to build and share those ideas clearly with team members.

11. Paper prototypes

Like Digital Prototypes, except these are physical, either made of set patterns or even sketched

on paper to show your product and its user experience. The favorable position with paper

prototypes for MVP testing is that they can be utilized by anybody on the group, from product

managers, graphic d signers, and financial supporters to end users. Also, require next to no

clarifying in light of the fact that it gives you a real representation of the item. For physical

product development like phones or chairs etc. this technique is invaluable.

(Figure 4-11)

12. Blogs

Blogs are an incredible method for validating thoughts with the correct target market in

insignificant exertion. Blogging platform Ghost, and App.net started in idea on their founders'

blogs where they kept on fleshing out their thoughts and pick up help from a group of followers

and supporters. The two-way communications from blogs gives a perfect platform to construct

force and accumulate customer input in the MVP development process.

Furthermore, blogs can likewise fill in as early models of your product. Eric Ries, writer of The

Lean Startup additionally started his book as a blog, constructing a group of people and request

before signing any publishing deals. So also, so did 50 Shades of Gray!

(Figure 4-12)

13. SaaS and PaaS

Instead of investing in scalable server technology, relying on cloud **p**latforms like Amazon Web

Services, Heroku and MongoDB, Facebook Connect, se**r**vices like Chargify, Mixpanel,

Mailchimp, Google Forms and LiveChat or even platforms like WordPress and Drupal are all

great pieces in the ji saw puzzle that is your MVP test. These services and platforms enable you

in the advancement to process, accelerating the time it takes to get your MVP to showcase.

Groupon for instance, started life as a modified WordPress site where the founders posted deals

and emailed subscribers PDFs manually in the soul of approving their market potential.

(Figure 4-13)

Utilizing a framework or library can fundamentally accelerate your development time. They give

plentiful documentation and make it to a great degree simple to get up and running with your

MVP. many of the problems engineers confront like cross-browser compatibility, mobile-

friendly design or code optimization are already taken care of, leaving you free to concentrate on

building your MVP instead of the design or development that is intended to help it.

14. Explainer video

In the event that words generally can't do a picture justice, at that point a video exhibiting your

products customers experience is worth a million. The most famous case of a startup utilizing an

explainer video to approve the market and offer their MVP is Dropbox. It started with a 3-minute

video that exhibited Dropbox's expected functionality, which brought about information

exchanges and subsequently sign up increasing expanding from 5,000 individuals to 75,000

overnight—the majority of this without a real product. Obviously, it likewise helped that the

video was targeted on well informed early-adopters valued the easter-eggs and entertaining

references all through the video itself.

(Figure 4-14)

Dropbox's explainer video served as a splendid approval of the market before the founders at any

point needed to put resources into the infrastructure and advancement required for its cutting

edge product to achieve a practical level in reality. Achieving the target customers is sufficiently

troublesome, particularly when you're outlining to solve of a problem that numerous customers

might not even recognized they have. For Dropbox, maybe saying it was putting forth a

"consistent document synchronization application" wouldn't have a similar effect. The explainer

video rather walks potential users through what the product is and plainly exhibits how it

encourages them, in the end prompting why they would need to pay you for it.

15. Customer interview

In a startup no facts exist inside the building, only opinions," according to Steve Blank, co-

author of The Startup Owner's Manual and creator of the Customer Development Methodology.

In his book "The Four Steps to the Epiphany," he discusses the Customer Problem Presentation,

a vital piece of the customer approval process that causes you test your hypothesis with actual

customers. This is basically an unscripted interview with users intended to evoke data about the

issue your product is attempting to solve. These interviews are intended to be exploratory as

opposed to as an attempt to close the deal for your product, functional or something else. This

procedure can be proceeded by posting down the issues you expect your product will solve and

after that getting some information about them and in addition how they would rank every issue.

These interviews can be a gold-mine of noteworthy data, because even if your assumed problems

turn out to be not as important to the customer, still you have profitable information that can

enable you to turn your value proposition.

C. Assessment criteria of MVP techniques

In this step of research I would assess discussed MVP techniques based on some criteria. Since

there does not exist any evaluation criteria in the literature, based on definitions and

characteristics of MVP definitions in (Figure 2-3) I have defined different assessment criteria for

MVP testing techniques as follows:

- Low resource (money, time, people,…)

- Able to gain diverse customer data

- easy to conduct and update

- applicable to broad range of products

- test willingness to pay and generate sales

- easily definable metrics for evaluation

All of MVP techniques are given scores based on their feature which shows the score of every

technique according to every mentioned criteria. (Table 4-1)

5. Comparison of two MVP testing techniques

In this section I want to compare two different methods of MVP testing based on the defined

assessment criteria and shows their distinctiveness. Tow selected MVP testing methods are

Crowdfunding and Wizard of Oz the reason in selecting these methods is that they have

differences based on criteria which is clear from scoring of their features.

Before I compare these two methods I briefly represent some of their features. In case of

Crowdfunding, it can be described based on following summary:

- Crowdfunding platforms provide means for running MVP tests

- It assigns the dollar value to your idea

- Market response is judged by the amount of money donated

- Access to a group of highly interested and actively involved early-adopters

Furthermore, for the method of Wizard of Oz it goes as follow:

- essentially faking it until you make it

- Customers experience an actual product/service

- Works behind the scene are done manually

According to low resources criteria which means low need for money, time, people and so on,

Crowdfunding has a higher score than Wizard of Oz. it is due to the fact that when we want to

use fundraising platforms it does not need too many resources, but in Wizard of Oz, since

activities are mostly done manually it takes too many resources.

Additionally, based on 'able to get customer diverse customer data' criteria which means ability

to get in-depth and too much information from customers, Wizard of Oz has higher score than

Crowdfunding. Because, in Wizard of Oz, founders have direct interactions with customers

which leads to higher understanding of customers. although, in Crowdfunding it's not simple and

straightforward to get different types of information from customers. in this case, there is also not direct communication between founders and customers.

	Low Resource	Able to gain diverse customer data/idea	Easy to conduct and update	Applicable to broad range of products	Test willingness to pay and generate sales	Easily definable metrics for evaluation
Customer Interview	★★☆☆☆	★★★★★	★★☆☆☆	★★★★★	★★☆☆☆	★★★☆☆
Landing Page	★★★★★	★★★★☆	★★★★★	★★★★★	★★★★☆	★★★★★
A/B Test	★★★★★	★★★★☆	★★★★★	★★★★★	★★★★☆	★★★★★
Ad Campaign	★★☆☆☆	★★★☆☆	★★★★☆	★★★★☆	★★★★☆	★★★★★
Crowdfunding	★★★★☆	★★☆☆☆	★★★★☆	★★★★★	★★★★★	★★★★☆
Explainer Video	★★★★★	★★☆☆☆	★★★★☆	★★★★★	★★★☆☆	★★★☆☆
Piecemeal MVP	★★★★☆	★★★★☆	★★★☆☆	★★★☆☆	★★★★☆	★★★★★
SaaS and PaaS	★★★★☆	★★★★☆	★★★★☆	★★★☆☆	★★★★☆	★★★★★
Blogs	★★★★★	★★★★☆	★★★★★	★★★★☆	★★★★☆	★★★★☆
Wizard of Oz	★★☆☆☆	★★★★★	★★★☆☆	★★★★☆	★★★★★	★★★☆☆
Concierge MVP	★★★☆☆	★★★★★	★★★☆☆	★★★★☆	★★★★★	★★★☆☆
Digital Prototype	★★★★☆	★★★☆☆	★★★★☆	★★★☆☆	★★☆☆☆	★★★★★
Paper Prototype	★★★☆☆	★★★★☆	★★★☆☆	★★★☆☆	★★★★☆	★★☆☆☆
Single-Feature MVP	★★★★★	★★★☆☆	★★★★☆	★★★★☆	★★★☆☆	★★★★★
Pre-order Page	★★★★★	★★☆☆☆	★★★★★	★★★★☆	★★★★★	★★★★☆

Table 4-1

6. Study Results

Starting from defining some evaluation criteria based on MVP definitions in the literature I have ranked different MVP testing techniques according to their total score gained from summing up of all scores in different criteria. As it is shown in chart **5**-1 A/B testing and Explained Videos have highest scores and Blogs, Single-feature MVP, and SaaS and PaaS come in the second

place. It is evident from this result that simplicity and easy-to-usefulness are important factors

when we want to test our MVP. Because most of high ranked methods have this feature.
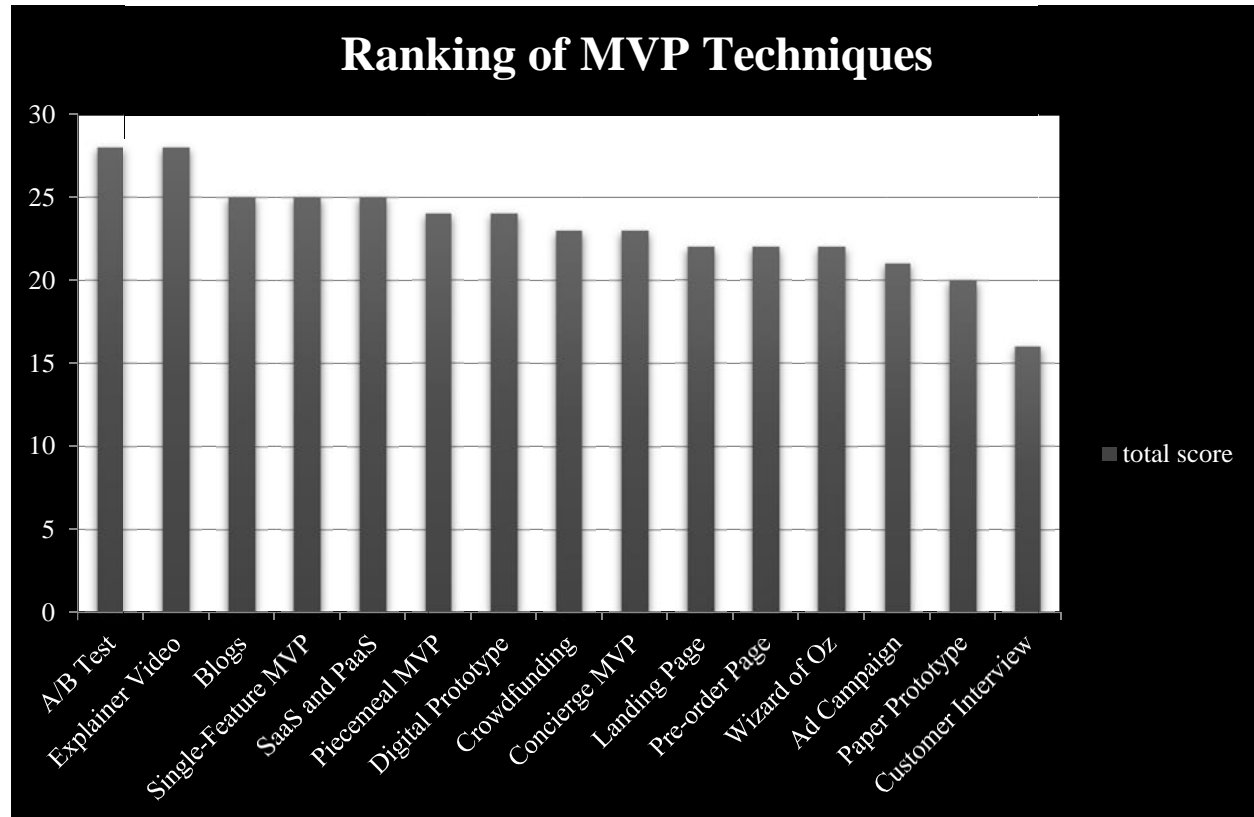
(Table 5-1)

B. Conclusion and Future Studies

Several definitions have been proposed in the last years. However, only few have been used or

extended. Most of other definitions are based on prior ones. They have mainly adopted and

rephrased initial definitions. In addition, several MVP testing techniques have been suggested

which are useful based on the complexity and type of th**e** product or business hypothesis. Taking

into account different definitions of MVP and proposed methods for NVP testing I summarize as

follows. First, there are several and somehow contradictory definitions of MVP. The key point

here is that difference between MVP and MVP experiment has not been distinguished. Second, regarding to MVP testing techniques, there is not a systematic approach for selecting amongst a set of MVP testing methods. Third, depending on the type of product or service different techniques can be selected. Moreover, overlap exists between some of techniques.

In this case, MVP techniques are better to be mixed and used together to increase flexibility and improve development. Also, there is no consensus among practitioners and scholars for the metrics being used in MVP testing.

Considering issues mentioned above, I have suggestions for future research. First, there is a gap the generally accepted definition of MVP. This can be a stage for further research to find out a definition which most people have consensus about. Second, we need systematic methods for evaluation and selection phases of MVP testing techniques. This research could be a base for further studies on defining assessment criteria, selection methods, and finally depicting a framework for practice. Third, study on the combinatorial ways of use in MVP techniques could open some windows toward better understanding of commonalities between methods and emergence of newer techniques. Finally, it is critically important to have a set of measures to monitor and control results of testing methods which requires further research.

Reference

6 Ways to Test Minimum Viable Product. (n.d.). Retrieved November 15, 2017, from

http://www.magazinesworld.org/2017/09/6-ways-to-test-minimum-viable-product.html

Bank, C. (2014, November 12). 15 Ways to Test Your Minimum Viable Product. Retrieved November 15,

2017, from https://thenextweb.com/dd/2014/11/12/15-ways-test-minimum-viable-product/

Lenarduzzi, V., & Taibi, D. (2016). MVP Explained: A Systematic Mapping Study on the Definitions of Minimal Viable Product. In *2016 42th Euromicro Conference on Software Engineering and Advanced Applications (SEAA)* (pp. 112–119). https://doi.org/10.1109/SEAA.2016.56

Minimum Viable Product | SyncDev. (n.d.). Retrieved November 15, 2017, from http://www.syncdev.com/minimum-viable-product/

Moogk, D. R. (2012). Minimum Viable Product and the Importance of Experimentation in Technology Startups. *Technology Innovation Management Review*, (March 2012: Technology Entrepreneurship), 23–26.

Steve Blank Perfection By Subtraction – The Minimum Feature Set. (2010, March 4). Retrieved November 15, 2017, from https://steveblank.com/2010/03/04/perfection-by-subtraction-the-minimum-feature-set/

Steve Blank What's A Startup? First Principles. (2010, January 25). Retrieved November 28, 2017, from https://steveblank.com/2010/01/25/whats-a-startup-first-principles/

The Lean Startup | Methodology. (n.d.). Retrieved November 24, 2017, from http://theleanstartup.com/principles

The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses: Eric Ries: 9780307887894: Amazon.com: Books. (n.d.). Retrieved November 1, 2017, from https://www.amazon.com/Lean-Startup-Entrepreneurs-Continuous-Innovation/dp/0307887898