

Development of a Mobile Application Using the Lean Startup Methodology

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Abstract— Knowing that 90% of startups fail, entrepreneurs often search for ways to reduce their risk and improve their chances of success. The lean startup methodology suggests a scientific way to start startups. After coming up with a good Idea, We decided to implement the lean startup methodology during the development of news service mobile application.

Index Terms— Agile, entrepreneurs, Ideas-data-cde, Lean Methodologies, Lean Startup

1 INTRODUCTION

A startup is a company designed to grow fast. Being newly founded does not in itself make a company a startup.

Nor is it necessary for a startup to work on technology, or take venture funding, or have some sort of "exit". The only essential thing is growth; everything else we associate with startups follows from growth [1].

A start-up is dedicated to creating something new under conditions of extreme uncertainty. With a fairly efficient market, the constraints on normal businesses may help to protect them from competition but prevents idea generation. Under conditions of extremely uncertainty, the idea needs to be fairly novel to start a start-up. Successful startups have sufficiently different ideas that are not obvious to everyone else.

2 IS THERE A DIFFERENCE BETWEEN A LARGE COMPANY AND A START-UP?

It must be re-iterated that start-ups are not smaller version of companies. The business practices that make sense for large companies are not appropriate for start-ups. Startups evolve and go through different stages to finally arrive at the stage of a large company [2]. Every stage differs in goals and challenges, these stages as:

1. The Scalable Startup Stage
2. Metamorphosis – the Transition Stage
3. The Large Company Stage

The biggest difference between start-ups and large companies can be in their culture. Startups with a small circle of coworkers are far more interactive with the team working towards the same shared goal with less stringent administrative controls than the systematic makeup of a large company. In larger companies there is definitely a shared sense of company pride, with less conviviality. Start-ups deal in an area where the stakes are high and the outcomes that can go either way. They have to be aware of funding concerns, keeping up with market conditions, and protecting intellectual property. A large company on the other hand has a defined path towards an end goal.

2.1 Why do Start-ups Fail?

- **Market Problems:** The major reason companies fail, is

that they run into the problem of their being little or no market for the product that they have built.

- **Business Model Failure:** In many cases the cost of acquiring the customer (CAC) is actually higher than the lifetime value of that customer (LTV).
- **Poor Management Team:** Weak, inexperienced and incompetent management can easily drown the boat.
- **Running Out of Cash:** Spend too much too soon, Prolonged R&D, Delay in Production, Inconsistent cash flows, VC lost etc.
- **Product Problems:** Product- Design errors & Complexity or simply does not meet the market need.
- **Pick the Wrong Market:** Choosing a good market can make up for a lot of operational mistakes. Choosing the wrong market can turn the game of business into a game of roulette in which each chamber has a bullet.
- **Time to Market:** Waited too long to launch or launched early.
- **Choose the Wrong Co-Founder:** Authority, power, personality conflicts can easily turn things down.
- **Strategy Failure:** The allure of a good plan, a solid strategy, and through market research
- **Perceptual Blocking:** After seeing traditional management fail to solve problems, some entrepreneurs and investors have thrown up their hands and adopted the "Just Do It".
- **Reluctant to Innovate:** It may seem counterintuitive to think that something as disruptive, innovative, and chaotic as a startup can be managed or, to be accurate, must be managed.
- **Wrong Fit:** Most people think of process and management as boring and dull, whereas startups are dynamic and exciting.

3 ANDROID AND IOS OPERATING SYSTEMS

A cell phone operating system, also known as a cell phone OS, a cell phone platform, or a handheld operating system, is the operating system or the software that controls a cell phone device. We can compare it to laptops and desktop computers operating systems such as Windows or Mac OS, in terms of many functions. However, cell phone OS's are not designed for complex computing or as a replacement of the traditional computer OS's. In 2007, Apple released its revolutionary iP

one device which was considered the invention of the year [3]. The iPhone operating system was called iPhone OS but in 2010 Apple changed the name to iOS. The iOS was very similar in terms of ease of use and basic functions to the Mac OS. In November 2007, Google formed an Open Handset Alliance with hardware, software, and telecom companies to start producing cell phone devices carrying its operating system, which was called Android. The Android OS is an open source OS, and it was built essentially to give developers full advantage of all a handset has to offer [4].

3.1 Mobile Operating Systems Market Share

The Operating System OS market is becoming increasingly fierce and Google's Android OS is sprinting to the top of the cell phone OS market and leaving behind Apple, Microsoft and Research in Motion (RIM). This is mainly because unlike its competitors, Google is offering an open-source OS. An open-source OS allows the phone manufacturers to modify and add their personal touch to the OS and make it their own, additionally, it offers freedom to the users and developers to modify the OS according to their needs. The Android OS is not as sophisticated as Apple's iOS but it offers customizations and freedom, which other platforms don't offer, such as the ability to change the theme of the OS, the ability to view flash based content and the ability to have animated wallpaper. In other words, being able to customize the OS is the biggest advantage of Android-powered devices.

In addition to the openness, the Android OS is available on different cell phone devices unlike the iOS. For example, in order for the customer to use the iOS he/she must buy an iPhone while on the other hand, if the customer wants an Android phone he/she can have a variety of choices from different companies such as Samsung, HTC, Motorola, LG and Sony. A recent report shows that Google's strategy of having different devices from different companies is working because Android OS now accounts for 51.2% in United States, while the iOS accounts only for 43.5% in the United States as shown in figure 1 [5].

Google's Android became the dominating OS although Apple started selling phones in 2007—one year before Google. The competition between Operating Systems is increasing rapidly and as a result it became more productive and beneficial to the customers.

3.2 Comparison between Google and Apple Operating Systems

Android's OS has more powerful features than Apple's iOS and Microsoft's Windows Phone OS. Google worked hard to overcome its weaknesses and improve its Android OS in the last two years through introducing innovative and creative features such as Facebook integrated software, Google Wallets where customers can pay via swiping their phones instead of their MasterCard or Visa, and Google Offers in which customers get discount offers for using their cell phones for purchasing instead of their bank cards and finally multitasking where

users can watch YouTube and write emails at the same time. On the other hand, Apple also has great ideas such as their innovative iCloud service where customers can have their data backed up on the cloud automatically and have access to it twenty-four hours a day seven days a week from anywhere.

Moreover, Apple has its famous iTunes Store where customers can download music, movies and books directly to their phones. However, Apple suffers from lack of innovation in the last year because the company is focusing on the device specification and the OS at the same, while Google is utilizing all of its resources to improve the OS. Furthermore, Apple's strategy is mainly about persuading people to use their devices in order to maximize their satisfaction and take full advantage of the OS features, while Google devices offer compatibility with a variety of devices from different companies. Analysts Michael Burns says "Google's more open Android OS distribution strategy has garnered the support of numerous notable original equipment manufacturers (OEM's). This is spawning a rapidly growing installed base of Android devices that is gunning to overtake the iOS installed base" [6].

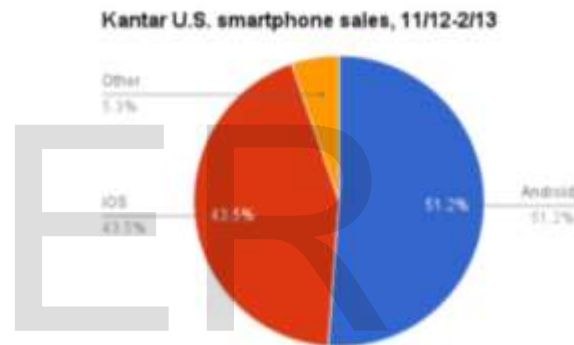


Figure 1: U.S Smartphone Sales

3.3 Developers Point of View

Although Android OS is more popular among consumers than Apple's iOS, developers are leaning towards the iOS because of its great App Store. Surveys show that Android developers are suffering from device fragmentation, which means that developers are having problems with developing application to a variety of Android versions; the survey found that 87% of the developers are having concerns about fragmentation as shown in Figure 2 [7].

Following this further, most developers are developing for both platforms to get maximum revenue but Apple is gaining more developers than Google.

4 AGILE METHODOLOGY

Agile methodology is an alternative to traditional project management, typically used in software development. It helps teams respond to unpredictability through incremental, iterative work cadences, known as sprints. Agile methodologies are an alternative to waterfall, or traditional sequential development. [8]

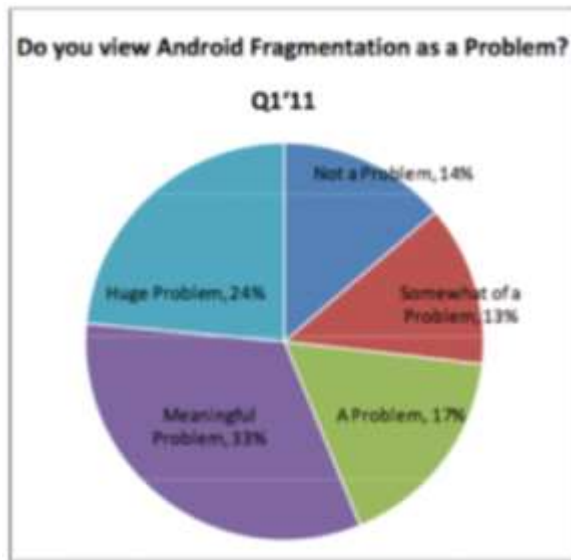


Figure 2: Android Developers Concern over Fragmentation

Agile techniques can be employed when it is required to solve a known problem, and have pretty high confidence that the things built will last indefinitely. As shown in Figure 3, user stories flow in from left. After they are worked on and reviewed through iterations, they are released and put in to be tested. Only if they are accepted will they be finished stories and released. There are generally limits, so that a team will only have a certain number of stories in each stage at one time. For example, in software development, because the code could be around for years, it is necessary to write programs in a sustainable way and the Agile movement, especially the Extreme Programming end of it, has discovered and promoted a lot excellent techniques for making code that lasts [9].

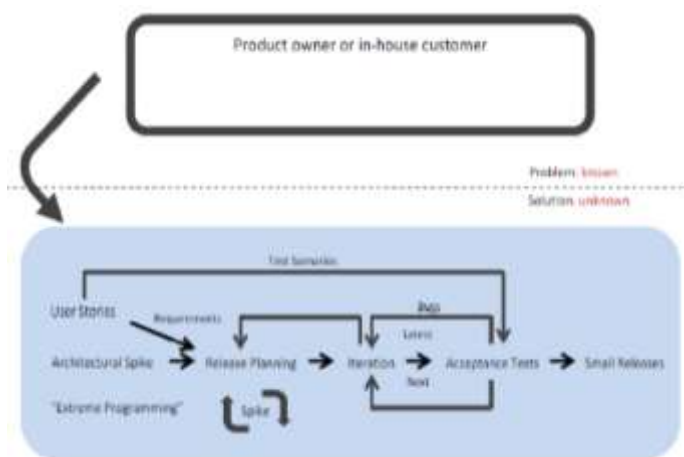


Figure 3: Agile Methodology

4.1 Agile Systems

Agile development can be categorized into five main types as follow:

- Extreme Programming (XP).
- Scrum.
- Crystal.
- Feature-Driven Development (FDD).
- Dynamic Systems Development Method (DSDM).

While each of the agile methods is unique in its specific approach, they all share a common vision and core values. They all incorporate iteration and continuous feedback that it provides to successively refine and deliver a software system. [9]

4.2 How to Go Agile

Many people especially entrepreneurs have been searching for an alternative ways to replace the typical system analysis methods. Agile practices had some concerns we are going to discuss later in the report. Some of the agile practices are:

- **Planning:** Agile projects tend to function on a solid planning system; however these systems are created during the project development to adapt to modifications of the requirement.
- **Flexibility:** Agile systems are flexible in order to accommodate all the teams together to work on achieving a common goal that is not conflicting with the main focus of the teams.
- **Predictability:** Having preplanned milestones and predefined metrics helps the agile process to be highly predictable and well organized.
- **Documentation:** Unlike traditional methods where team members have to create massive documentations, agile creates concise documents that help lead the project to the finish point.
- **Privacy and Security:** Because the data can be accessed by several teams, the agile process is very strict when it comes to security. Project managers usually set policies and disciplinary action.
- **Project Size:** Agile methodologies could be implemented on small and large scales projects while maintain the same process.

5 LEAN START-UP METHODOLOGY

The Lean Startup relies on validated learning, scientific experimentation, and iterative product releases to shorten product development cycles, measure progress, and gain valuable customer feedback. In this way, companies, especially startups, can design their products or services to meet the demands of their customer base without requiring large amounts of initial funding or expensive product launches. The lean startup has five main principles as follow:

Entrepreneurs are Everywhere: The startups doesn't have to start in a garage as everyone thinks. Startups are a human institution designed to create new products and services under conditions of extreme uncertainty. That means entrepreneurs are everywhere and the Lean Startup approach can work in

any size company, even a very large enterprise, in any sector or industry.

Entrepreneurship is Management: Due to the state of extreme uncertainty, startups should be managed differently while keeping the uncertainty in mind.

Validated Learning: Startups exist not just to make stuff, make money, or even serve customers. They exist to learn how to build a sustainable business.

Build-Measure-Learn: The fundamental activity of a startup is to turn ideas into products, measure how customers respond, and then learn whether to pivot or persevere. All successful startup processes should be geared to accelerate that feedback loop.

Innovation Accounting: A new accounting approach is developed for startups to hold innovators accountable and the people who hold them accountable [10].

The Lean Startup is not just about how to create a more successful entrepreneurial business it is about what we can learn from those businesses to improve virtually everything that can be humanly done. The Lean Startup principles can be applied to government programs, to healthcare, and to solving the world's great problems. It leverages technology commoditization, agile management practices and customer development. The Lean Startup is designed to test hypothesis and answer the unknowns. The Lean approach helps foster start-ups to be capital efficient and to leverage human creativity more effectively [10].

5.1 Build- Measure- Learn

The fundamental activity of a startup is to turn ideas into products, measure how customers respond, and then learn whether to pivot or persevere as shown in figure 4. We Build-Measure-Learn to manage Leap-of-Faith assumptions:

- Build a minimum viable product (MVP)
- Measure: whether efforts are leading to real progress.
- Learn: Pivot or Persevere
- Repeat: with a new hypothesis



Figure 4: Build-Measure-Learn Process

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. MVP can range from simple smoke test (a little more than advertisement) to early prototypes. A start up's job is to rigorously measure where it is right now, confronting the hard truths that assessment reveals. It will help to devise experiments to learn to move the real numbers closer to the ideal reflected in the business plan. Innovation accounting helps startups validated their learning and grows a sustainable business. It begins by turning assumptions into measureable financial model. The model provides insights about how the business will look like at an advanced state in the future.

First step to the Innovation accounting is to create an MVP to establish real data about the startup current situation. If the company is making good progress toward the ideal then they should continue. If not, its current product strategy is flawed and needs a serious change. When a company pivots, it starts the process all over again, reestablishing a new baseline and then tuning the engine from there. The sign of a successful pivot is that these enginetuning activities are more productive after the pivot than before [10].

5.2 Lean Development Process

Using the same scenario of software product development, software startups following the Lean Startup approach, are dealing with an unknown problem. The goal, at the initial stage is not to build software. It deals with discovery of needs and that customers will want to be satisfied.

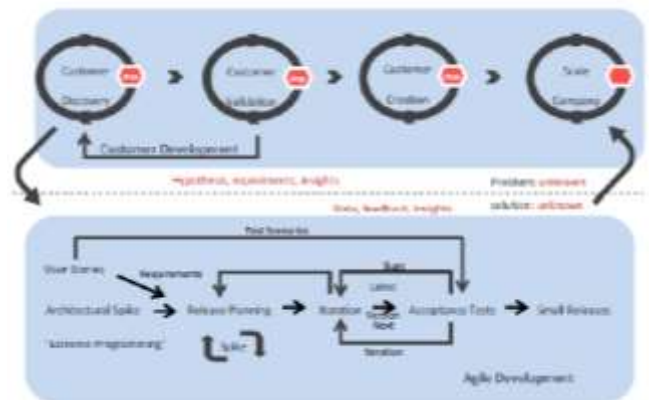


Figure 5: Lean Startup Process

The standard startup approach is known in the Lean Startup community as the “field of dreams” approach. In this approach a complete product is built in the hope that it is done, the market will create itself. The Lean Startup approach instead requires that type of customers, type of market, and type of products are fleshed out and tested as early as possible as shown in figure 5. This is through collection of data, feedback and insights and then seeing how they work once the proto product comes along. In essence through “validated learning” [10].

5.3 Vanity Metrics

These are measurements that give “the rosier picture possible” but do not accurately reflect the key drivers of a business. Vanity metrics for one company may be actionable metrics for another. For example, a company specializing in creating web based dashboards for financial markets might view the number of web page views per person as a vanity metric as their revenue is not based on number of page views. However, an online magazine with advertising would view web page views as a key metric as page views are directly correlated to revenue.

6 AGILE METHODOLOGIES VS. LEAN METHODOLOGIES

Joshua Kerievsky [11] puts forward the following set of differences between Agile and Lean start-up methodologies. In his words “Lean start-up makes the best portion of agile more lean and combines them with the brilliant customer development process.”

TABLE 1
AGILE VS LEAN

Agile	Lean Startup
Product Roadmap	Business Model Canvas
Product Vision	Product Market Fit
Release Plan	Minimal Viable Product
Sprint	Kanban
Sprint Review	Pivot or Persevere Decision
On-Site Customer	"Get Out Of The Building"
User Story	Hypothesis
Backlog	"To Learn" List
Definition of Done	Validated Learning
Red-Green-Refactor	Learn-Measure-Build
Customer Feedback	Customer Validation
Acceptance Test	Split Test
Velocity	AARRR
Mock Object	Feature Fake
Continuous Integration	Continuous Deployment
Certified Scrum Master	Customer Success Manager

Although this comparison has come through, it could seem that Agile and the lean startup methods are mutually exclusive. Literature, however show that they can be compatible. The areas of application of Agile and Lean Start-up tend to differentiate them. Agile tends to target software development; Lean Startup tends to target business development/product management/customer development.

7 IMPLEMENTATION OF LEAN METHODOLOGY ON AN iOS APPLICATION DEVELOPMENT

The goal was to develop an Arabic news application for Middle Eastern and North African iOS users. The plan was to come up with the MVP application in under five months. To sustain the momentum in the development of this product, “pivot or persevere” was used to decide the course of the next iteration of the build-measurelearn- repeat cycle. As part of this process, a variety of free internet resources aid the methodology such as Lean Canvas and Google Analytics. A beta version of the application developed and published in the iOS app store under the name “nyoozi” as shown in figure 6.



Figure 6: nyoozi on the app store

With a \$5,000 budget, the product was launched with a high potential of scalability and at minimum risk. Incorporating the customers during the development cycle was a big part of the process, customer’s feedback made a tremendous impact on the duration of the project which validates the lean startup methodology and its scientific approach to startups.

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