

Mobile Money Innovations

- A case study on entrepreneurs in Kenya



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Abstract

Since the launch of M-Pesa in 2007 Kenya has been one of the worlds leading countries in mobile payments, a fact that often comes as a surprise to many western practitioners and academics. The system works on even the simplest phones and is used by almost everyone in Kenya, rich and poor alike. In addition to enabling people to fast, securely and cheaply send money over distances, M-Pesa has facilitated the establishment a wide range of new businesses leveraging mobile payments. Through a multiple embedded case study of five different startups in Kenya, this thesis explores how this M-Pesa-enabled process of innovation has taken place in the new businesses.

A theoretical framework is built by reviewing existing literature on innovation. From this review it is clear that innovation theories and studies, as well as the understanding of innovation, is closely linked to the historical and contextual origin of the literature, and that all theories in some sense can be seen as a response to the societal challenges at that given time. Three overarching themes are selected for the analysis; types of innovation, drivers and directions of innovation, as well as impact of innovation.

Data collection for the empirical part is carried out through in-person interviews with five different startups on the ground in Kenya. The stories and insights from the cases are compared, contrasted and synthesized into empirical framework, describing the key findings in the data. Key trends are discovery of opportunity, role of founders and startup mindset.

In the analysis, empirical findings are compared and contrasted with existing literature, to see how the existing literature can help explain the process of innovation. It is clear that while the literature does a good job of explaining several aspect of the process, gaps are missing when it comes to understanding the process of innovation of entrepreneurs in creating businesses in markets where there was no existing competition.

In the end the strings are tied together by concluding that M-Pesa has enabled innovation among entrepreneurs in Kenya by drastically lowering the cost and increasing the speed of reaching existing, as well as millions of new customers in Kenya. Entrepreneurs have leverages this possibility to create various new business models. The innovations enabled take a wide range of shapes and are present in all parts of society. A lot of the firms try to address a social problem, which is often driven by passion from the founder. Despite its radical success M-Pesa might already soon be technologically outdated as smartphone penetration is growing at an unprecedented speed, opening a whole new set of possibilities. Finally it is noted how these firms, as part of their internalization process, can help increase mobile money usage in other countries.

- Copenhagen, December 2015

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2 Introduction

Kenya: The worlds leading country in mobile money payments!?! That a medium sized East African country until recently primarily know for Safari and good long distance runners should take one of the leading mantles in a FinTech revolution comes as surprise to many outsiders, whose gaze for something new and exciting rarely leads their attention to that part of the world. Yet, the facts are undeniable. In 2014 an amount equivalent to 42% of Kenya's GDP was transferred through M-Pesa their acclaimed mobile money service, and more than 60% of the adult population used the service, cementing the fact that Kenya really is one of the leading mobile money countries on the planet (Muthiora, 2015). The M-Pesa system has however not only transformed the way people send money to each other, but has also seen a host of services and businesses grow up around the platform.

The aim of this paper is to look at how and in what ways the M-Pesa has worked as an enabler for innovation among entrepreneurs in Kenya, trying to answer the research question of:

"How has M-Pesa enabled innovation among entrepreneurs in Kenya?"

In the first part of this paper I will review existing literature and debates on innovation theory. This will lead into the theoretical framework that I will use as the foundation for an analysis later. After this I will present M-Pesa, its history and the context in which it arose. Specific attention will be devoted to financial management strategies and priorities of poor. For the empirical part I will present an extensive case study where I present five different Kenyan startups and discuss how they use M-Pesa and for what purpose. This will be followed by a thorough analysis drawing upon both the theory and the case studies, with the aim of bringing about a better understanding of how M-Pesa has worked an enabler for innovation among entrepreneurs in Kenya.

Finally I will conclude with a general discussion on what lessons can be learned from the Kenyan experience, how this information can be used elsewhere, and what larger questions can be answered or should be asked.

3 Methodology

3.1 Research Methodology

The aim of the research is to investigate how M-Pesa has been an enabler for innovation among entrepreneurs in Kenya, in order to enhance the knowledge about the process through which technological and financial innovations in emerging markets have spurred business development. This will be done through what (Yin, 2009) refers to as "analytical generalization", namely the process of generalizing, evaluating and expanding existing theory in the field. As a result, existing theory of innovation will be used as a backbone, through which the empirical results of the cases studies will be compared and analyzed.

3.1.1 An embedded multiple case study

Yin (2009, p 18) defines a case study as *“an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident.”* and argues that this method is *“preferred in examining contemporary events, when the relevant behaviors cannot be manipulated”* (Yin, 2009, p 7). In addition Scholz, (Scholz & Tietje, 2002, p 25) notes that since the case is *“embedded in a conceptual grip”* it facilitates a contextual perspective appropriate for researching a phenomenon. Following this thinking, the case study method is deemed appropriate, since the cases studied are intrinsically linked to the Kenyan context in which they operate. In addition, the phenomenon is relatively new and as the aim is to enhance the understanding of the process of innovation in this context, a case study is deemed to be most appropriate. In addition, as the research aims to compare the knowledge derived from the empirical part with existing theory, surveys and experimental designs are deemed too complex. An embedded case study method, with multiple cases have been chose over single case, as this enhances the ability to draw more generalizing conclusions and decrease singular bias (Yin, 2009).

3.1.2 Selection of cases

In order to provide enough perspective to ensure robust knowledge five different cases were selected: Uber, Mdundo, HiviSasa, M-Kopa Solar and Branch. For selecting the cases two different criteria were used.

The first was that they had to have similar properties in order to ensure literal replication and investigation in variations of the outcome. The three criteria were:

Selection criteria		
Uses M-Pesa	Entrepreneurial	New or recent to the Kenyan context.

Table 1: Selection Criteria

The second was diversity. As the study is exploratory in nature, and its focus is on the phenomenon of M-Pesa as an enabler for innovation, it was deemed important to select cases that worked in different industries and had different origins, in order to isolate the three primary criteria selected, as focus areas. As a result the outcome will be in the form of cross-case conclusions, as these are deemed more valuable, robust and insightful compared to single case conclusions in this context. The cases will be presented as separate cases, and subsequently the findings will be compared and contrasted to provide a common understanding of M-Pesa as a phenomenon. Eisenhardt (1989) argues that this approach enhances reliability and accuracy of a theory since it helps avert premature or false conclusions.

3.1.3 Selection of theory

In this thesis, abduction, a mix of deductive and inductive methods is used, to best address the research intended. Deduction is used to test a theory's causal relationships explained through testable hypotheses. The hypothesis is operational and intended to confirm or reject/modify theory. The research is structured such that it facilitates replication and is ideal for generalizing finding (Saunders et al., 2015). Induction is in some way the opposite of deduction, in that it uses data to develop theory. This is done through exploration of context, in order to enhance the general understanding of what is occurring, as opposed to testing or rejecting a hypothesis (Saunders et al, 2015). Inductive methods are thus mainly used for qualitative data. The abductive method incorporates both induction and deduction in a back-and forth manner (Suddaby, 2006). Saunders et al (2015 p 144) notes how the process of abduction usually starts with a "surprising fact" that is the basis of the research. In this case, the surprising fact that *M-Pesa has enabled innovation among entrepreneurs in Kenya*, knowledge the researchers gained through personal observation through working for several years in Kenya's tech startup scene. The research in this paper is intended to explore this new phenomenon and investigate the *how*. This leads to the research question:

"How has M-Pesa enabled innovation among entrepreneurs in Kenya?"

In this context the independent variable is *M-Pesa* and the dependent variable is *innovation*. Saunders et al (2015, p 178) argue that it is possible to combine philosophies and that various research strategies are not mutually exclusive. Instead they argue that one should choose the approach that is best for undertaking the specific research. To clarify and position of the dependent variable, innovation, the deductive method is used to structure the research and guide the researcher in the development of a theoretical framework, in order to determine key features of innovation. Thus, instead of adopting a specific theoretical stance a priori, the researcher decided to review and engage with existing general literature on innovation, highlighting its contextual origin. This is done to enhance the understanding of, and assess, the various research strains within the field of innovation, in order to establish a theoretical framework that is appropriate for looking at various aspects of innovation, as enabled by the independent variable, M-Pesa. This approach resonates with Yin (2009), who notes that reviewing the existing body of literature in the area of study is a good starting point towards establishing a theoretical framework aimed at enhancing the understanding of a new phenomenon. Furthermore, Saunders et al (2015, p 149) note that. *"a topic about which there is a wealth of information in one context but far less in the context in which you are researching may lend itself to an abductive approach"*. As much research has done on the topic of innovation, but not much research has been done in the context of M-Pesa, this method is deemed appropriate for creating the theoretical backbone. This also very suitable for the case study approach, in which context is key to understanding the actions (Saunders et al 2015, p 184).

Subsequently an inductive method has been used in the empirical part to try to understand and explore the cases, as well as in the analysis. It is important to note that the goal here is to explore "how" the independent variable, namely M-Pesa, impacts the dependent variable, namely entrepreneurs in Kenya, and not if it does. Thus, the research does not yield a testable hypothesis that can be falsified, but is aimed at enhancing the understanding and exploration of a new phenomenon. The process can be seen in the figure below:

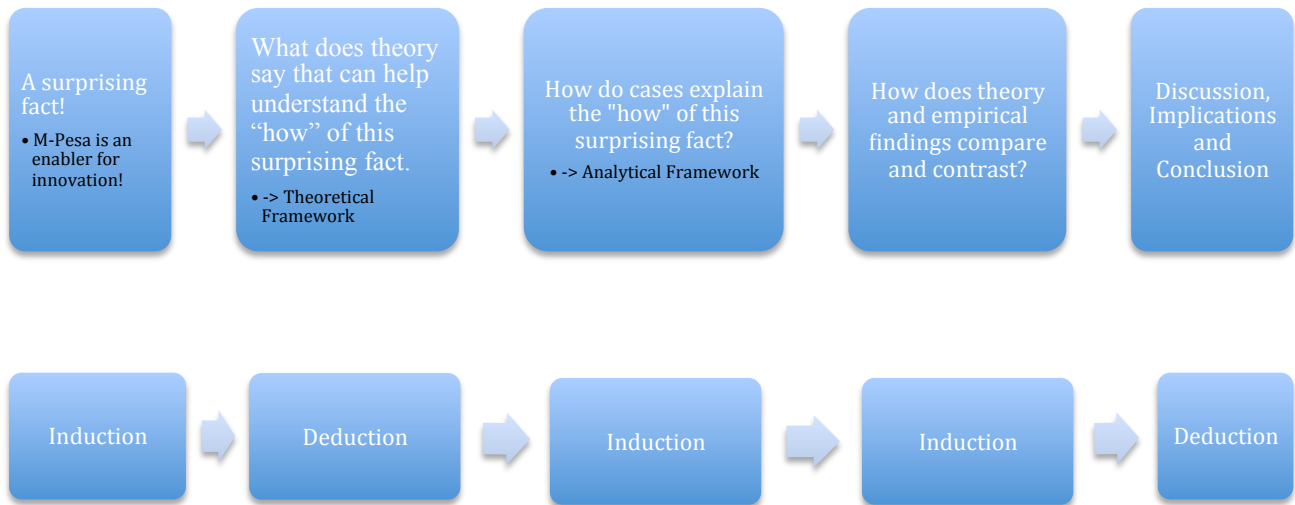


Figure 1: Structure of Thesis

3.1.4 Data collection method

For data collection, the researcher has relied on both primary and secondary data. The initial primary data was collected through personal observation over a two-year period as a participant observer. Saunders et al (2015, p. 354) argue that observation is *"a somewhat neglected method of business and management research"*. In this case the primary data collected through observation was used to establish the initial baseline observation, leading to the “surprising fact” that M-Pesa is widely used in Kenya by firms.

The deductive part leading up to the theoretical framework has solely relied on secondary data, through a revision on existing literature on the topic. This has consisted of books, journal articles, webpages, web articles, and industry reports.

The primary data for the inductive part was collected through six interviews carried out during an eight-day visit to Kenya in September 2015. Five of the interviews were with the different case companies. A sixth interview was carried out with an industry expert not related to the cases, but with the aim of providing the researcher with a better understanding of the specific context being investigated. This, together with secondary data on M-Pesa, other Kenyan startups and the Kenyan context in general, enables triangulation of results to increase validity in the analysis.

Of the five cases the highest-ranking locally available person was interviewed. For Mdundo and HiviSasa, these were the CEO's. For Uber, the local Operations Manager, for Branch, the Kenya Country Lead and for M-Kopa Solar it was the Director of Legal, Administration and

External Affairs. All interviews were carried out at the premises of the respective firms. The researcher had previously spent time in Kenya, and also previously worked with startups leveraging mobile technology in Kenya. While this unquestionably provides a bias in the inability for the researcher to completely detach from the level of research, it also ensured that the researcher had enough existing knowledge and experience in the context to establish trust, as well as to ask context-related follow-up questions during the interviews, as all technical and colloquial jargon was understood immediately.

For the interviews a semi-structured approach was chosen. In case studies of exploratory nature, Saunders et al. (2015) argue that semi-structured interviews are deemed most useful, as they allow for open ended questions, in varied order, which increased the knowledge creation and data to be analyzed qualitatively. All interviews lasted between 45 minutes and two hours, and all interviews started with the researcher reiterating the purpose of the research, to increase trust and thus reliability of the answers. All interviews were recorded after asking permission from the subjects. The subjects were all told that they had the right to turn off the recorder at any time, should they feel the desire to explain/clarify or otherwise state something to the interviewer off the record. To decrease bias, easily comprehensible questions were asked in a neutral manner. The semi-structured and relaxed approach is also great for validity, in that it enables questions to be asked in different ways and a subject to be studied from different angles, to ensure that the question is understood and answered correctly (Saunders et al. 2015). The study is of cross-sectional nature as all interviews and data is collected at one point in time. The alternative would be to do a longitudinal study, and while the researcher has collected primary data through observation over several years, the data collected directly intended for this thesis was collected at a single point in time.

3.2 Philosophy of Science

Critical realism has been chosen as the main branch of epistemology (Saunders et al, 2015), and the interpretation and analysis of data reflects this stance. In critical realism, it is argued that we do not experience the world directly, but instead through images and sensations. As a result, our sense can deceive us, as we believe we are experiencing the real world, but in fact we are only seeing part of a bigger picture.

Critical realist therefore postulates that full reality can never be experienced, but that these can be uncovered through the theoretical and practical processes of social science. In addition, in a critical realist perspective social phenomena are understood through social structures in that

“knowledge of reality is a result of social conditioning” (Saunders et al, 2015 p 105). The multiple embedded case study design acknowledges this, as it looks at the cases in relation to their contextual setting (Yin, 2009). Furthermore, critical realist recognizes that *“knowledge is historically situation (in other words, it is a product of its time and is specific to it), and that social facts are social constructions agreed on by people rather than existing independently”* (Saunders et al., 2015 p .140). As a result, the review of the existing literature is carried out with reference to the historical and social origin of that knowledge, and emphasis is put on context as well as socially constructed meanings.

3.3 Limitations and Delimitations

There could be some bias in the selection of samples or the small sample size. A few other cases that fit the criteria were contacted, but it was not possible to set up an interview, as a result the sample reflects the companies that agreed to participate in the study. All cases interviewed were founded or run by expats. In general, it was difficult for the researcher to find startups meeting the criteria that were started by locals. The few that were found were unavailable for an interview. Furthermore, as the researcher has previously worked in the Kenyan Startup scene, some of the cases were not completely new to the researcher and the people contacted also knew the researcher in a previous capacity. This could have impact on the neutrality of the researcher.

In order to minimize bias, the researcher has tried to select cases from different sectors of the economy, and triangulated results with other findings and data.

Even though there are several other mobile payment services in Kenya, and around the world, the focus of this paper is exclusively on M-Pesa, unless otherwise stated. This paper only focuses on startups. The use of M-Pesa by SMEs, larger or foreign corporations, as well as the public sector is beyond the scope of this thesis. Furthermore, while the M-Pesa ecosystem plays an integral role in this thesis, this paper will also not discuss monetary policy and other potential implications of the M-Pesa systems, unless directly related to the cases.

In terms of terminology the words “firm” “startup” and “case” are used interchangeably when referring to the five cases studied, unless otherwise stated. While all the cases are firms, this thesis does not engage with general literature on strategic choices or options for firms. The focus of this thesis is on innovation, and business strategies will only be touch upon so far as it is related to innovation.

4 The Theory of Innovation

4.1 Introduction to Innovation Theory:

"We wanted flying cars, but instead we got 140 characters," (Vance, 2015), noted Peter Thiel, co-founder of PayPal, summarizing his general disappointment with the rate and direction of innovation over the last 50 years. Despite this opinion, and probably of little comfort to Thiel, there is little doubt that at least literature and theories on innovation has advanced and grown tremendously over the last 50 years (Fagerberg, 2003). In this chapter I will review this existing literature on innovation, and investigate what innovation is, with special reference to how the literature has changed over the last 50 years.

Innovation as a concept is as old as mankind itself, and one of the key, if not the main, drivers of the advancement of human civilization (Fagerberg, 2003). Fagerberg (2003) argues that innovation is inherently multidisciplinary in its nature and that it is necessary to combine insights from many disciplines to understand innovation today. However, for many years, especially in the beginning, the study of innovation was primarily confined to the area of economics and closely linked to technological change and advances in technology, which has also directed much research (Fagerberg 2003). This early economics focus, as well as innovations inherent multidisciplinary could be one of the reasons why, according to Fagerberg (2003), the process of innovation itself in was often treated as a mysterious black box, by academics. Within the realms of academia innovation studies as a distinct discipline first started to emerge in the late early 1960s and often took place outside of the mainstream of academia (Fagerberg, 2003).

In addition to it being multidisciplinary, or perhaps because of it, innovation is also an inherently contested term that has come to mean many things for many people, and been adopted in a wide range of situations confusing its meaning to practitioners, journalists and policymakers alike (Godin, 2015). It has in some way become a buzzword used for something progressive and positive, even though these new things or phenomena would rarely be considered "innovation" in the classical or academic sense of the word (Smith, 2005). In fact, according to Godin (2015), it is only within the last century that the term "innovation" has received the positive connotation that it holds today. In the middle ages the term had a negative connotation and was associated with intellectual rebels who wanted to change or challenge the existing order of things (Godin, 2015). Observing innovations' broad and multidisciplinary nature Sundbo (1997) notes how all innovation methods

and theories in some sense should be seen as a response to a given set of societal challenges at a specific point in time. Innovation methods and theories are thus intrinsically linked to their historical and cultural context, and are thus as much a reflection of the time in which they were popular as they are a guiding theory for understanding innovation today. Betz (2011, p 4) for instance notes how *"...successful innovation is context dependent, and the theory needs to be illustrated and bounded by the contexts of actual historical examples of innovation"*

Yet, one of the challenges with such a broad definition or understanding is that the term innovation has become rather diffuse. The broader our definition of the term "innovation" is, the more complicated it becomes to study. There is however a general agreement that innovation refers to something that is new or novel, and instigates or facilitates positive change (Godin, 2015). For now we will use these two features "novel and positive change" as our working definition. Later after the literature review, we will revise this definition and declare a working definition for the rest of the paper.

In the following pages I will map out some of the major historical advancements within innovation studies and the advancement of thinking surrounding innovation. Enormous amounts have been written about innovation and the space here does by no means do justice to many interesting and insightful pages that have been written on the topic. Instead I have chosen to engage with a small part of the key innovation literature in order to establish a theoretical framework that can be used as a base for understanding M-Pesa in the discussion and analysis later. Following Sundbo's (1997) proposition that all theories and models are reflections of a given time and era, I will embed the literature review in a contextual framework. This historical and contextual review is critical to understanding where we are today and also to understanding M-Pesa role as enabler of innovation in a Kenyan context.

4.2 Early Innovation Thinkers

4.2.1 Karl Marx and Technological Change

While innovation has been an integral part of the advancement of human civilization, the concepts origin as a field of study is often associated with German philosopher and economist Karl Marx who was one of the first to write about the topic of technological change (Sundbo, 1997). Marx grew up in the late stages of the Industrial Revolution, and bore personal witness to the great economic, institutional and social changes industrial innovation had brought with it (Freeman,

1994). While being a prolific philosopher and writer in many facets of politics and economics, he showed great interest in the inner workings of capitalism and the plight of the laboring class and their role in the rapidly changing society. In this context, he noted how competition within the capital holding class generating strong incentives to innovate (Elliott, 1980; Freeman, 1994). Marx argued, that as capitalists competed to gain market shares, increasing and improving productivity was seen as a key to meeting this goal. This led to continued investment in increasingly advanced machinery and production tools, increasing demand for innovations in this field (Freeman 1994). From Marx point of study, innovation, or what he called “technological change” had a great impact on the socioeconomic structure of society - and it was with this angle, societal impact, that Marx wrote about innovation (Godin, 2008).

4.2.2 Ogburn and Social Innovation

As the world entered the 20th Century the Industrial Revolution was already a prominent chapter in the history books and the speed and growth of technological advancement had only continued. Steam, railways, steel and heavy engineering had already seen the light of day and made a massive impact on the world (Sundbo, 1997). The industrial revolution had also shaken up the old monarchies as the working class increasingly became educated and demanded more suffrage. One of the first people in the 20th century to look at innovation was Ogburn, a sociologist, who looked at culture and innovation and how they impact each other. Living in the US during and after the 1st world war, he was witness to an economic super power rising (Sundbo, 1997). This was the roaring 20s and large societal changes were taking place and industrialist like Henry Ford had already had a big impact on industrial production. It was also a time of large-scale migration and transition from rural farms to urban areas. Observing these things, Ogburn noted how increases in the existence of material culture (I.e. goods and tools) lead to an increase in the possible inventions (Godin, 2008). Simply put, the more tools and goods a potential innovator or agent of innovation has at his disposal, the larger the possibility to produce a novel and useful innovation. In Ogburn's view innovation depended on many individuals and was seen as a gradual process that was both a result of and a shaper of society. Thus, in the views of Ogburn, innovation was inherently a social and gradual process.

By describing the accumulation of new ideas as a gradual process Ogburn was one of the first to argue for innovation as an incremental process with many individuals and actors slowly changing society and technology. His focus on society and the social aspect of innovation is

noteworthy, since the adaptation, acceptance and diffusion of new technologies is often a largely cultural question. Reversely, technical change and new innovation undoubtedly have an impact on society in all shapes and forms. Finally, from his realization that more tools leads to more innovations, he also identified the increasing rate of innovation.

Since the writings of Ogburn, a more nuanced picture have emerged of on the concept of incremental innovation as proposed by Ogburn. Kondratiev (1922), Ruttan (1997) and Schumpeter (1934), largely argued that innovation is a cyclical or radical phenomena. Others (Abernathy & Utterback, 1978; Christensen, 1997) have however later noted that incremental innovation is indeed a part of the innovation process, albeit not the only way innovation proceeds. In addition, Ogburn's focus on the social aspect of innovation, both as a shaper of society in lie of its technological evolution, but also directly as a way of addressing social issues as was an area of focus that would first come back in the mainstream almost a century later.

4.2.3 Kondratiev and Economic Waves

Around the same time as Ogburn's writing in the US, the Russian economist Nikolai Kondratiev published a book on major economics cycles, mainly based on the English economy in the late 18th and 19th century, that challenged the communist economic convictions about society (Betz, 2011). A key argument in Marxism and later Communist theory was that the post-industrial world was a struggle between capitalists and labor. In this struggle capitalist would never ensure fair wages to labor, and continuously starve labor (Betz, 2011). A starvation that would, according to Marxist and Communist orthodoxy, eventually lead to the inevitable decline of capitalism. Thus, Marxists argued that capitalism simply could not survive and sustain economic growth in the long term (Betz, 2011).

Kondratiev tested these postulations and found that the English economy had gone through several growth cycles, with recurring expansion and contraction, but that overall there was a net increase in economic activity and growth over time. Kondratiev furthermore argued that these cycles were a result of periodic innovation, that brought new and growth enhancing technologies to market (Betz, 2011). Kondratiev's idea was that big new technological innovations, like the steam engine, railways or steel and heavy engineering came in cycles, today referred to as Kondratiev Waves (Sundbo, 1997) and that these caused economic expansion, stagnation and recession (Betz, 2011; Sundbo, 1997). That capitalism could survive in the long term was anathema to communist orthodoxy and as a result Kondratiev was executed in 1938 on orders by Stalin (Betz, 2011).

Relying on his empirical research, Kondratiev was one of the earliest advocates for the cyclical and nonuniform nature of innovation. Economic cycles are still a commonly accepted phenomena though there is great disagreements over its causes and length. Kuznets (1930) later advocated for much shorter economic cycles than the ones proposed by Kondratiev, and others have also proposed different lengths. In addition, there is no consensus on what causes these cycles.

Despite the uncertainty of the existence of Kondratiev Waves, there seems to be little doubt today that major new technologies have an immense impact on the nature of economic growth and society at large, and that many of these changes are not uniform as advocated by Ogburn. Similar arguments have later been made by Sundbo (1997) who talk about paradigmatic changes in innovation, when a new technology ushers in a new era of economic activity not seen before. Schumpeter (1934), Kuznets (1930), Christensen (1997) and Freeman (1994) all also stress the noncyclical nature of innovation and its importance in the field of economics.

4.2.4 Schumpeter, The Entrepreneur and Innovation

A few years later, in the 1930s, the Austrian born economist Joseph Schumpeter looked at innovation from the perspective on the entrepreneur. Schumpeter grew up in Austria and shortly served as minister of finance as well as a professor at the University of Bonn, before moving to the USA in 1932 to teach at Harvard University, where he published his seminal work "The Theory of Economic Development" in 1934.

Many consider Schumpeter the first person that brought innovation studies into the realm of economics (Croitoru, 2012). Like Marx and Kondratiev before him Schumpeter saw innovation as one of the key drivers for economic change. And like Kondratiev, and unlike Marx, he did not consider Economic profit a result of the starvation of the labor, but as a gain to the entrepreneur. Schumpeter was also one of the first to try defining innovation and argued that it could take five different shapes. 1): Introduction of a new good, 2): Introduction of a new method of production, 3): Opening of a new market, 4): Conquest of a new source of supply of raw material or half-manufactured goods, 5): Implementation of a new form of organization (Croitoru, 2012).

In much of his early work his focus was mainly on the single entrepreneur and how an entrepreneur innovated with the focus of making an economic profit (Croitoru, 2012). Like Kondratiev halfway around the world, Schumpeter also observed and discussed innovation and economic cycles. It was in this context that Schumpeter is accredited with coining the term "creative destruction" describing situations or industries where incumbents "get destroyed" by more innovative - or creative - newcomers (Croitoru, 2012). In this context Schumpeter emphasized three main aspects of

innovation. First, that innovation was inherently an uncertain process, and thus cyclical in nature. Secondly, the need to move fast, and reap potential benefits before others did, focusing on the importance of entrepreneurship. And thirdly, the prevalence of inertia in society, working against new ideas. In addition Schumpeter is also known for introduced the distinction between Innovation and Invention (Godin, 2008a). To Schumpeter an invention was something novel, creative and useful that was produced or created, where as an innovation had an economic motive in it. Thus to Schumpeter, an innovator are an entrepreneur or a firm adopting an invention and bringing it to market (Godin, 2008a).

The experience of the interwar period and the beginning of the World War II demonstrated that firms account for a large share of innovation, as opposed to the independent entrepreneur as first outlined by Schumpeter. Taking these insights into account Schumpeter revised his theory in 1942 to include the profit-seeking corporation as a driver of innovation, as opposed to only the independent entrepreneur first discussed. Many have considered this as the birth of R&D as a distinct area or study in the academics of innovation (Godin, 2008). Schumpeter's writing about innovation was also a significant step in an academic transition from the realms of sociology to the realms of economics. Focus now moved from how innovation/invention impacted society from a cultural perspective to how it impacted the economy and the economy of firms.

There is little doubt that Schumpeter had a big role in the advancements of innovation studies and is by many consider the father of the category (Ruttan, 1959; Freeman, 1994). While the role of the sole entrepreneur as the main source of innovation have subsequently been criticized, there is general agreement that entrepreneurs play a key role in many parts of the innovation process (Fagerberg, 2003). Schumpeter himself later recognized this limitation and revised his writings to reflect the importance of other sources of innovation, particularly R&D and basic research. Similarly, Schumpeter's focus on innovation as an economic process, inspired by Marx is also a key understanding that brought innovation into the center of economics (Freeman, 1994). This also shaped the interpretation used by many that innovation as a term holds some sort of utilitarian or economic motive in it. Finally, while Schumpeter's definition of five different types of innovation, is generally not used anymore it still provided a starting point for understanding the idea of innovation. Especially the distinction between product and process innovation is generally accepted (Freeman, 1994). His biggest claim to fame in the general population is probably as the coiner of the term "creative destruction" describing the short term cyclical nature of innovation, and

how new firms with better technologies and innovations replace incumbents, in a generally accepted process (Christensen, 1997; Freeman, 1994; Markides, 2006).

4.3 Post-war Industrial Expansion Face

4.3.1 MacLaurin and Technology-Push

While Schumpeter is credited with being one of the first academics to delve into the concept of innovation he never clearly accounted for the process of innovation, or presented a theory of why innovation happens in his writings (Ruttan, 1959). One of the first people in the post-war period to try to do this was W. Rupert MacLaurin who in 1947 presented a Linear Model of Innovation as an attempt to explain the process of innovation (Rothwell, 1994). He suggested that innovation follows four stages (Godin, 2008b):

- 1: Fundamental Research
- 2: Applied Research
- 3: Engineering Development
- 4: Product Engineering

The premise of MacLaurin's model is that the level of technological advancement, so scientific discoveries and new inventions, determines the level of innovation and thus economic growth of the firm. The assumptions behind this type of linear model have hence been labeled as “Technology-Push” (Nemet, 2009), indicating that it is the advancement of technology that pushes the level of innovation. Another representation of the model can be seen below from Rothwell (1994). While the stages of this and several of the other Technology-Push models vary a bit the underlying premise is the same as in MacLaurin's stages above, namely that its advancement in technology that drives innovation.

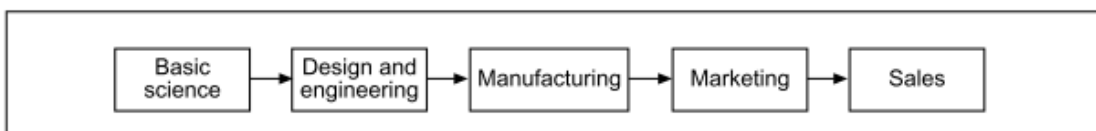


Figure 2: Stages of Innovation in Technology-Push – (Rothwell, 1994)

Organizational and National Level of Research: Around the same time discoveries and advances in other fields of economics looked at innovation from a macro perspective. (Solow, 1957) found that the total factor productivity (TFP), the economic growth residue when accounting for the

impact of land, labor and capital, was a result of innovation, i.e. introduction of new technologies or optimization of organizational or production processes. This was, according to Solow the major cause of long-term economic growth, elaborating on the idea proposed by Kondratiev decades earlier. A few years later, in 1962 Kenneth Arrow looked at the social returns to R&D vs. the private returns, and came to the conclusion that the social returns were often far higher, primarily because of externalities and spillover effects. This would, according to Arrow (1962) lead to a societally suboptimal allocation of resources, as firms would only invest in R&D so far as the private returns could justify the investment. This observed market failure, which could be partly corrected with patents and copyrights, was a frequently used argument for justifying increased investment in basic research from the side of the government.

Following this logic, MacLaurin model is not only descriptive, but also prescriptive from a policy point of view. If long-term economic growth is a result of innovation, and if innovation is a result of basic science and new inventions, then long-term growth could be secured by increasing investment in R&D and basic research. Yet, since, according to Arrow (1962) the societal return to R&D was larger than the private returns, society as a whole, would benefit if government increased investment in R&D beyond what the firms themselves did. With the US leading the way as an industrial and geopolitical super power, the prescriptive nature of the technology-push made its underlying premise very popular among politicians arguing for more investment in R&D, particularly on the military front. The large emphasis on industrial and governmentally lead R&D initiatives primarily aimed at increases military advances, eventually became so strong that President Eisenhower in his farewell address in 1961, warned the public of the challenges with what he called the Military Industrial Complex (Godin, 2015).

Many new discoveries in both physics and healthcare took place during and shortly after World War II, often a direct result of heavy investments in R&D, supporting the general idea that Technology-Push really was the main driver of Innovation (Rothwell, 1994). Despite these observations, as well as the studies indicating that advancement in science and the investment in R&D was a major driver of both innovation and economic growth MacLaurin's model came under increasing criticism, especially from Schmookler (1962), who argued that the technology-push models failed to take into account other types and drivers of innovation. The model was criticized for being linear, sequential and oversimplifying the innovation process (Rothwell, 1994). In addition, there were too little details on what goes on in each stage (Hobday, 2005), making it difficult to operationalize it in other contexts. Rothwell (1994) calls this and similar Technology-

Push models for “1st Generation Innovation Models”. While noting their drawbacks he also points out how its a first attempt at actually making a model for how innovation occurs and stressing that there is generally a consensus on the fact that advancement and basic science and research is in many aspects a major driver of innovation.

4.4 Market Development Face

4.4.1 Jacob Schmookler and Demand-Pull

As time progressed the Technology-Push model came under increasing criticism, for being too one-way. In 1957, Zvi Griliches, studying the invention of hybrid maize showed how the role of demand played a big role in the timing and location of the invention (Griliches, 1957). A few years later Jacob Schmookler (1962) demonstrated a similar thing in a large study on patents from four different industries. In here he concluded that demand was a bigger driver of innovation than the state of technology. This lead Schmookler to develop what has become known as the “Demand-Pull” model, described by Rothwell (1994) as a 2nd Generation model. In this model innovation comes as a result of people’s wants in a 4-stage model seen below:

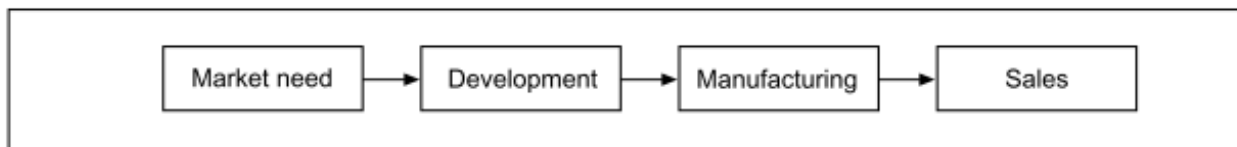


Figure 3: Stages of Innovation in Demand-Pull (Rothwell, 1994)

The essence of Schmookler's model was that market demand was one the main drivers of innovation, and that innovation came about as a result to meet a demand in the market.

Around the same time a related discussion to place among economist (Ruttan, 1959) about induced innovation, a concept first advanced by Hicks in 1932 (Hicks, 1932). Hicks argued that a change in the external economic environment or price has a direct impact direction of innovation. For instance if the price of labor increases compared to capital, efforts will be put into developing labor saving tools or machinery (Foxon, 2002). In this sense it is related to the demand-pull advanced by Schmookler, but instead of the pull coming from the customer or user the pull comes from external economic factors, affecting the price. Ruttan (1997) later used the examples of the advances in fuel efficiency in the auto industry during the oil crisis in the 1970's to illustrate induced innovation. As oil prices rose drastically, auto transport became significantly more

expensive. Consumers became increasingly conscious of the gas-mileage on cars, leading producers to allocating more resources into R&D for fuel efficiency. For the firm, the return on investment on R&D in fuel efficiency suddenly increased dramatically inducing innovation in that particular field.

The Demand-Pull perspective advocated by Schmookler, Griliches, resulted in an early debate between the Technology-Push advocates and the Demand-Pull advocates (Godin & Lane, 2013). While empirical studies at the time clearly indicated that demand often played a role in the innovation process, it was still uncertain in what way and how (Godin & Lane, 2013). Subsequently, the Demand-Pull model became subject to much of the same criticism as the Technology-Push model. While it adds the new perspective of demand it was considered a too simplistic and sequential approach to innovation by taking into account feedback loops, and unlike induced demand did not take into account external factors (Hobday, 2005).

4.5 Integration Face

4.5.1 Myers, Marquis and Coupling

In the late 1960's and early 1970's the increase in empirical studies of the economy and collection of data greatly increase the possibilities of macroeconomic research. Both of the earlier technology-push or demand-pull models were criticized for their narrow focus, linear approach, lack of feedback loops and ignorance of external factors (Dosi, 1982). As a response to this several new models occurred in the 60's and 70's that tried to take this different factors into account, while relying to a much larger extent on data and studies. One of the first prominent ones was the Myers and Marquis Model (1969) that is known as a coupling model. In this model include both technology-push and demand-pull factors, and also include feedback loops and external factors, and was a lot better at capturing the complexities of the innovation process (Dosi, 1982). In addition, the model couples on existing

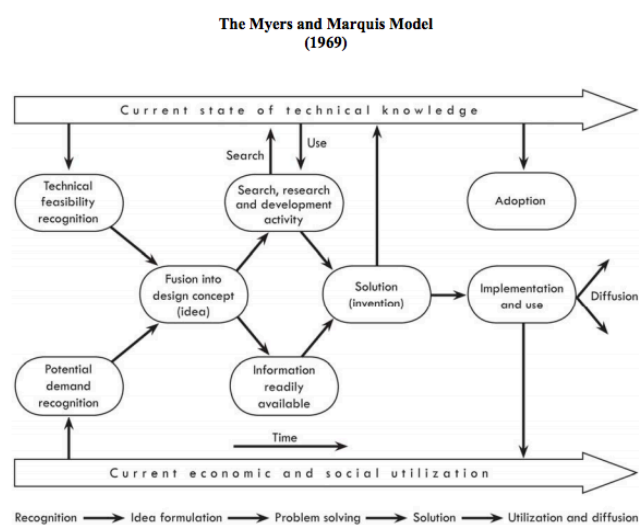


Figure 4: Coupling Model by Myers and Marquis (1969)

stock of knowledge as well as basic research. The model can be seen here.

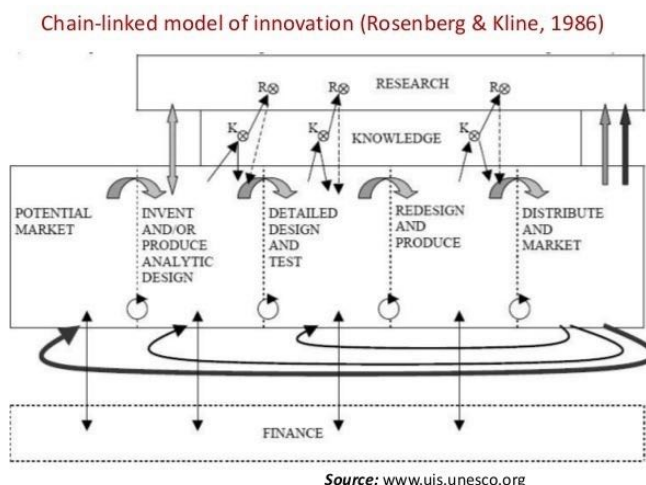
While a major improvement over the 1st and 2nd generation model it was found not too apply to all industries, as initially claimed (Hobday 2005), it does not sufficiently differ between process and production innovation. Hobday (2005) argues that there is especially big differences between unit production, mass production and continues process production, which the model does not address. These models where classified as 3rd Generation Innovation Models by Rothwell (1994).

4.5.2 Kline, Rosberg and the Chain-Linked Model.

In the 1970's the world went through two oil crises and experienced a tumultuous decade with slowing growth and stagflation several places in the western world. On the other side of the world Japanese firms were proving to be tremendously successful and the Asian Tigers were becoming the worlds factory. This was also an era of increased rapid globalization, often symbolized by Nixon's historic visit to China in 1972 (Wolf, 2004). In this era trade barriers were lowered and multinational companies started expanding worldwide. In addition to the reduced trade barriers, advances in communication and transportation technology made the world more connected than ever before. In the 1980s Japanese carmakers in particularly proved tremendously successful and managed to carve out a relatively large piece of car markets around the world (Rothwell, 1994).

Partly inspired by the successful Japanese tech and auto industry Kline & Rosenberg (1986)

introduced the Chain-Linked Model, which Rothwell (1994) refers to as a 4th generation model. While relatively short-lived, this new models goes a few steps further from the coupling models and take a much broader approach. Factors such as outsourcing, value chains, vertical ties to competitors become factors that in the model all try to describe the innovation process. Key features of this model were integration



and parallel development.

Figure 5: Chain Linked Model of Innovation (Kline and Rosberg, 1986)

In addition the “speed” of development of new ideas was added, to account for the fact that time of development and implementation was a factor that plays a big role for firms when it comes to successful innovation. This was again a reflection of the Japanese Carmakers who were much faster at brining new innovations to market, than their western counterparts. As opposed to earlier models the Chain-Linked Model describes innovation as a parallel process of R&D, marketing, prototype development and even sales.

Furthermore, the model distinguishes between fundamental research and the existing body of knowledge. A lot of innovation came from existing knowledge that was just put to use in a new way or applied to a new sector or new context. This type of innovation, based on existing knowledge, was called “Analytic Design” by Kline and Rosberg and was an integral part of their model. In this way Kline and Rosberg acknowledged that innovations did not necessarily have to originate from new basic research, but could often be a result of existing knowledge or tools used in a new and different way.

Another representation of the 4th Generation model is the parallel model as seen below (Rothwell 1994). Like in the Chain-Liked Model, the innovation process takes place in parallel between the different departments of the firm and is tightly integrated. This again exemplified the process of Japanese Automakers during the 1980s. Marketing starts even before the R&D team gets to work, and work together throughout the process.

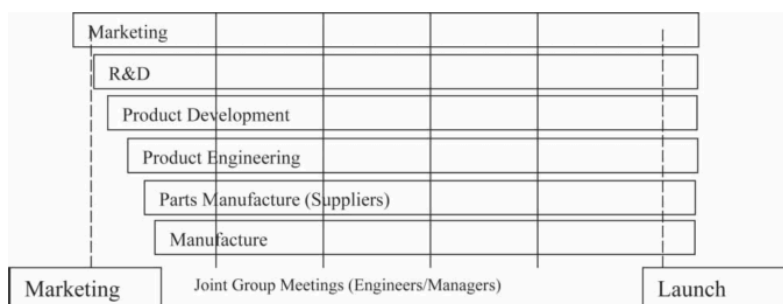


Figure 6: Parallel Development (Rothwell, 1994)

4.5.3 Brian Arthur and Path Dependency

In the early 1980s another approach to understanding the drivers and direction of innovation known as "Path Dependency" was described by Brian Arthur (1983). Path dependency explains how current actions of a firm are determined by past actions, even though those actions are not relevant for the current context. In cases of increasing returns to adoption, path dependency can lead firms and innovations (and whole societies) down a particular path (Arthur, 1983). This can cause a lock-in effect where a suboptimal technological situation is reached. Changing to a better or newer system is deemed prohibitively expensive, as all users and consumers are locked-in into an existing system.

Building on Arthurs earlier work Paul David (1985), studied a number of sectors where this had happened. One of the most obvious examples highlighted by David, is the structure of the QWERTY keyboard. In the 1860s the American Inventor Sholes built one of the most popular typewriters of his age. When two keys next to each other were pressed quickly in sequence, the arms on the typewriter had a tendency to get jammed, destroying both the document and delaying the writing process. To avoid the arms getting jammed when typing, the keyboard was designed such that letters used most frequently were spread out over the keyboard as widely as possible, leading to the QWERTY configuration known today. With the introduction of electronic typewriters with type balls in the 1960s and later on computers, the arm-jam problem disappeared, but the design of the keyboard stayed the same, despite its suboptimal and illogical layout. Ruttan (1997) also argued that path dependence and lock-in effect could help explain the relative decline of the American Auto Industry compared to the Japanese, as the Americans were locked-in to older and more inefficient processes, which the Japanese manufacturers were not locked into.

Few, who look down at their QWERTY keyboard, would doubt that path dependency plays some role in the direction of innovation. Ruttan (1997) in fact argues that path dependency is very relevant on the micro level to explain specific historic events and that much technology is path dependent in the sense that it is a further development of previous technologies. However, that does not necessarily dictate future direction or drivers of innovation. Finally, the concept of lock-in effect and path dependency is primarily relevant in situations with network effects or increasing returns to scale, where the cost of switching to a new system is prohibitively large, limiting the general applicability to path dependency to the larger innovation context (Ruttan, 1997).

4.6 Networking Face

As the world entered the last decade of the 20th Century two major developments occurred that influenced innovation theory and its development. The first was the rapid advances made in information technology, computers in particular, which rapidly started to play an increasingly large role in all kinds of firms. The other big development that shaped the 1990s was the fall of the Berlin Wall in 1989 and the end of the Cold War, leading to the end of half a century of ideological and political battles. Together with the establishment of WTO and NAFTA in 1994 and subsequent reduction in trade barriers, the end of the Cold War heralded a new era of international co-operation, global competition and outsourcing (Wolf, 2004).

4.6.1 Brian Arthur and Scale Approaches

Following up on his work on path dependency Arthur (1994) wrote a number of articles investigating increasing returns to adoption in technology. The premise of Arthur's argument is that market forces shape and impact the innovation process and incentives over time. Arthur identified four kinds of return: Scale economies, learning effects, adaptive expectations and network economies. Scale economies, as explained by Arthur, is the process in which the price of a good decreases as the fixed costs are spread over time as sales increase. This decline in price in turn increases demand, leading to increased production and adoption. This will however only come about if enough consumers buy the product in the early stage where it is relatively expensive. Another type of increasing returns comes from learning effects. As the producer become more experienced in the production process, they are able to improve their production process and decrease the production costs. At the same time consumers learn more about the product and its benefits leading to increased utility and demand. Adaptive expectations describes the process in which the more a technology exists, the more consumers are convinced of quality and longevity and will continue buying and investing in it. Finally, Network economies describe the process in which a product or service become valuable the more widespread it becomes. Examples include, cellphones, Internet and social networks.

While related topics had been discussed for almost a century (Arthur, 1994), the idea that goods or products could have increasing returns to scale, as opposed to decreasing returns had only been briefly discussed in the mainstream innovation and economics literature. However, it seems evident that increasing returns to scale plays a big role in innovation. Scale economies, learning effects and adaptive expectations are all integral part of the inner workings of the company and are

today considered conventional knowledge in manufacturing businesses. When it comes to network effects then discussions on dominant design (Nemet, 2009, Markides, 2006) revolve around the topic of a "winner-takes-it-all" process and are very relevant for technologies or products that increase in value as more people use them. The importance of network effects are increasingly vindicated in the internet age where many services rely on "users" in the early stage of the business as opposed "customers", simply to drive up the networking effects.

4.6.2 Taxonomies of Innovation

In line with the development of increasingly complex technologies, as well as the systems view of innovation (Freeman, 1988), Henderson & Clark (1990) proposed a new taxonomy for defining degrees of innovation, within the firm. Until then technological innovation had generally followed the distinctions leading back to Schumpeter and Ogburn, as either radical or incremental (Ruttan, 1959, OECD, 2005; Godin, 2013). Building on the idea of Analytic Design proposed by Kline and Rosberg (1986), Henderson and Clark proposed to expand this classification to include modular innovation and architectural innovation, as seen in the matrix below.

Figure 1. A framework for defining innovation.

		Core Concepts	
		Reinforced	Overturned
Linkages between Core Concepts and Components	Unchanged	Incremental Innovation	Modular Innovation
	Changed	Architectural Innovation	Radical Innovation

Figure 7: A Taxonomy of Innovation (Henderson and Clark, 1990)

Henderson and Clark (1990) argue that most products or services can be considered a system consisting of many different components. To them, incremental innovation is seen as an improvement in an existing component in an existing system. Henderson and Clark (1990) use the example

of a ceiling fan. If the blade is optimized but all other components stay the same, then it is an incremental innovation, since the configuration between the different parts stay the same (I.e. "unchanged linkages") and the fan works the same way "core concept reinforced". Architectural innovation is when existing components are configured in a new way to provide a similar service or utility, whereas modular innovation is when the product works the same way but a new or radically altered component is installed. Radical innovation then happens when there is both a change in the component as well as in the linkages providing new functionality. According to Henderson and Clark (1990), this separation or distinction is not necessarily water tight, but enhances the focus and understanding of exactly what is meant in context of innovation.

Henderson and Clarks' taxonomy was essentially an attempt to try to make sense of the increasing complexity of understanding innovation. As (Smith, 2005) notes, one of the key problems now, as in the past, have been that "innovation" as a concept is too diffuse, making it difficult to analyze and isolate its nature. Henderson and Clarks' taxonomy was an attempt to create more clarity, so the causes and drivers could be isolated and better understood. While their classification increased the understanding of how innovation works in the firm, it has also been criticized for focusing too much on product development and not other types of innovation (O'Sullivan & Dooley, 2008). However, despite this and other attempts to decrease diffusion and increase clarity about different degrees of innovation, today there is no exact agreement on what constitutes an incremental or a radical innovation, as well as what taxonomy to use.

Betz (2011) for instance divides innovation into three general categories. Incremental, Radical and Next-Generation Technology Innovation. Incremental is used in the same way as Henderson and Clark (1990), but a radical innovation, according to Betz, is a basic technological innovation that establishes new functionality, like the internet, railroad or the steam engine. Foxon (2002) and (Foxon and Kemp, 2007) however refer to this latter as a disruptive innovation, and use radical innovation to describe what Henderson and Clark (1990) refer to as modular innovation. Betz in turn refers to this as Next-Generation Technology Innovation (Betz 2011). To confuse matters even further (Freeman & Perez, 1988) propose an altogether different taxonomy that is still widely used (see Greenacre, 2012), namely incremental, radical, changes to "technology systems" as well as "technological revolutions".

In the table below the different definitions are outlined:

	Improved Component + Same System	New Component + New System	Existing Component + New System	New Component + Same System	Basic technological innovation establishing new functionality (E.g. The Internet)
Henderson & Clark (1990)	Incremental	Radical	Architectural	Modular	
Betz (1993)	Incremental			Next-Generation	Radical
Kemp & Foxon (2007)	Incremental			Radical	Disruptive
Freeman & Perez (1988)	Incremental	Radical			Technological Revolutions

Table 2: Overview of different definitions.

O'Sullivan (2009) points out that it is important to note that the uses of the different taxonomy should be seen in the context in which they were intended. As such an innovation that is radical for the firm, can have an incremental impact on society while a disruptive impact on the industry, and can thus be considered all three things at the same time depending on the level of analysis. Unfortunately, instead of providing clarity to the field and aiding analysis, the interpretations using similar language for different things complicates the task of study, or as Smith (2005, p 22) notes *"If innovation comes in a variety of shapes and sizes and is used by different people to mean different things then making coherent sense of the subject is not an easy task"*. In order to provide clarity it is therefore essential to understand the various definitions and taxonomies together with the unit they are intended to analyze, whether it is the, department, the firm, the industry, the country, the world or some other context.

While is clear that there are many different understandings of innovation, in the context of the firm and what type of innovation is going on when it comes to product and service development, the four ways of understanding innovation presented in the innovation matrix by Henderson and Clark (1990) provides a great analytical tool, as also noted by Fagerberg (1997), Markides (2006) Smith (2005) and (Christensen, 2006).

4.6.3 Christensen and Disruptive Innovation

In his seminal book “The Innovators Dilemma”, Christensen (1997) explores and explain in more detail how new players entered the market with new technologies and replaced seemingly superior and well established players. According to Christensen disruptive technologies initially underperform in the establish markets, and the firms employing them focus on capturing the bottoms of the market either through lower margins or a simpler product. But as time goes by their technology improves and matures to the point where it satisfies the mainstream consumer enough at a significantly lower price point than what the incumbent can offer. The incumbents are sometimes locked-in on an old technology and have a hard time catching up and will eventually be replaced. Christensen (2003) later expanded his theory to include not only products, but also disruptive services and business models.

In many ways Christensen’s idea of disruptive innovation takes departure in the concepts of path dependence discussed earlier by Arthur (1983). Existing players are locked-in to a specific path and will continue investing in that particular path as long as it makes economic sense. Newcomers do not have the same legacy investments and can invest in a new and better technology from the start. Path dependency and disruptive technologies are also some of the factors that lead to

leapfrogging and catch up effects. The process of technological catch up, received increasingly attention as the East Asian Tiger economies quickly ascended economically (Hobday 2005), by adopting the newest production methods available and sometimes avoiding path dependent legacy technologies and institutions. Similarly, the concept of leapfrogging is often used to describe firms, sectors or whole nations that skip or leapfrog old or outdated technologies and instead invest and install a newer generation of technology right away. While this is not the process described by Christensen's, Hobday (2005) argues that these could also be considered disruptive innovations as they have immense transformative impact on society, in some cases leading to what Freeman and Peres (1988) calls "technological revolutions". Good examples are mobile phones and Internet in emerging markets. Many places never had land line telephony or Internet, but jumped straight onto the mobile wagon (Omwansa & Sullivan, 2012). Yet, these kinds of disruptive innovations often follow radically different paths, as there are often no existing players to "replace" so to speak. The markets captured by these innovations are often markets not address by existing players, and are thus more reminiscent of players addressing blue oceans, as described by Kim et al (2004) than strategically replacing incumbents. There should be little doubt that the introduction of some new technologies or services to emerging countries have had far reaching consequences, it is however questionable whether the introduction in places where there were none before are really disruptive according to Christensen's theory (Hobday, 2005).

While there is considerable evidence in favor of the disruptive nature of some new innovations following Christensen's (1997) framework, Markides (2006) argues that while they are all cases of disruption, different models are needed for disruptive tech innovation, disruptive business innovation, disruptive product innovation, as the origin and consequences often are very different. For instance, Markides (2006) points out that in the case of disruptive business model innovation, the new player often enters and captures a significant market share, but does not replace the incumbent. Furthermore, as Hobday (2005) also notes, the applicability of Christensen's framework is somewhat limited to explain the introduction of new technologies and services in places where there existed few or no alternatives before. Finally, some technologies, with what many would consider disruptive impacts, did not follow the trend described by Christensen, but instead started out as high-end expensive products targeting the premium consumers, such as the iPhone and Tesla Motors (Diamandis & Kotler, 2015).

4.7 21st Century Innovation

In the last twenty years or so Innovation Studies has received increasing attention among academics in various disciplines, and the number of journals dealing with some aspect of innovation has likewise increased rapidly. The field itself has also expanded and broadened to now include a number of subcategories within the larger innovation umbrella. This graph below from Fagerberg (2003) shows the increase in innovation papers.

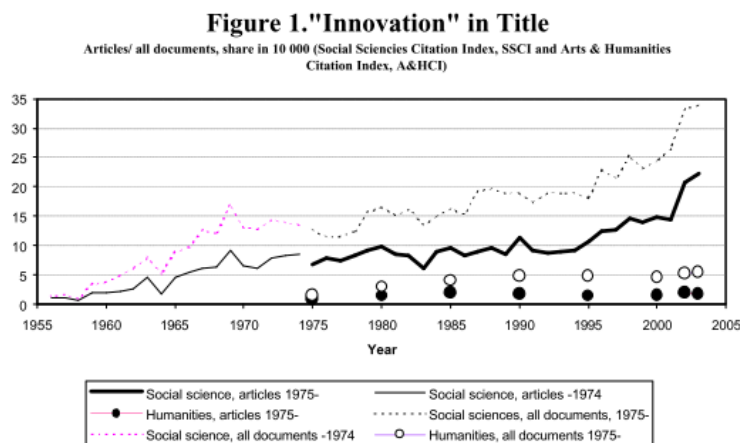


Figure 8: Growth in Innovation Studies (Fagerberg, 2003)

This move in academia partly reflects a general move in society away from “big theories” and also a general recognition within innovation studies, that innovation can take many different shapes and forms, and occur in many, often unrelated, contexts. At the same time it also arises from a general desire for industry and academia to work closer together. Previously most business studies had been at the macro level and less on the industry or firm level. Henry Chesbrough for instance, considered the father of Open Innovation, mention the desire to mend this split as one of the main reasons why he ventured back into academia. Commenting on his past work as a manager in Silicon Valley he noted, *“I distinctly recall feeling frustrated that there weren’t more useful ideas and advice from academia. It seemed like the concerns of professors and the concerns of managers like me were far, far apart.”* (Chesbrough, 2011, p 2)

Thus, unlike earlier theories like technology-push and demand-pull who had contradictory ideas of how the innovation process works, modern innovation approaches and theories, are often more field specific and often propose models that are both descriptive and prescriptive on the firm level at the same time. It is beyond the scope of this paper to cover all modern innovation theories and their critics in depth. Many are still in the developmental phase, and have not been empirically

tested enough to evaluate their validity. I have instead outlined some of the main streams of thoughts below.

4.7.1 Open Innovation, Co-Creation, Crowdsourcing and User Innovation

Within the last decade several new approaches to innovation have gotten increased attention among practitioners and are now also making their way into academia. Among the most prominent ones are open innovation, co-creation, crowdsourcing and user innovation. Below the basic ideas behind of the four different approaches to innovation are outlined.

In *user innovation*, the origin of a given innovation is a user who invented or modified a given product or tool to meet a personal need as a motive in contrast to having profit as a motive (Von Hippel, 2005). User innovation as a strategy has increasingly grown in popularity as large firms are increasingly trying to tap into this resource and interact with users to harness this innovativeness for profit seeking purposes. The novelty in this context is not that people modify or improve tools or products for personal gain. This purpose has been the driver for innovation for most of human history, the novelty lies in how firms increasingly see this as an avenue to innovation, as opposed to solely relying on in-house R&D (Von Hippel, 2005). One of the big drivers of this new move is the Internet, which has facilitated communication and co-operation with users. One particular way to tap into this is through crowdsourcing.

Crowdsourcing innovation, is a process in which a firm or an entity ask a crowd, sometimes the general public, for help or assistance with innovation (Diamandis & Kotler, 2015). This is often done through incentivized innovation competitions or challenges on the Internet, where anyone can post suggestions or ideas to problems posted by a company. As an incentive, the company promises to reward the best idea financially (Diamandis & Kotler, 2015).

Another way firms interact with users is through a process called *co-creation* where the company works closely with end users in the production process (Diamandis & Kotler, 2015). In this constellation the end user and producer (firm) work together to co-create a solution or product for the end user, with the user both giving feedback on the product, but also giving direct suggestion for improvements.

Both co-creation and crowdsourcing are closely related to *Open Innovation*, which is defined as “*the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively.*”(Chesbrough, 2011, p 2) and relies upon many of the same developments as user innovation, and both concepts have similar origins. Open innovation is a relatively new approach to innovation where firms

outsource innovation and R&D firms work both behind closed doors, but also closely with users and external parties and sometimes outsourcing the innovation process altogether (Chesbrough, 2006). In an open innovation systems globalization and information technology is fully embraced and harnessed to get the best ideas and sources no matter where they originate. Research institutions, universities, suppliers and users are all incorporated into the innovation process, and spillover effects are generally seen as a positive thing. In practice this often means licensing or purchasing R&D from other companies or partners, as well as selling licensing internal R&D patents to external parties. This approach to innovation not only impacts the role of the R&D department of firms, but also impacts the business models as new markets open, as patents or copyrights that were previously seen as competitive advantages, now becomes a sellable product in itself (Chesbrough, 2011).

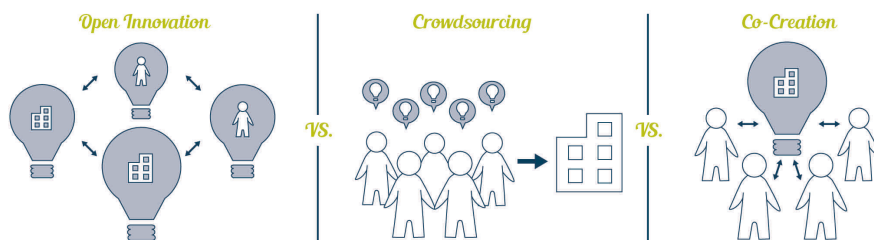


Figure 9: Open vs. Crowdsourcing vs. Co-Creation (Chesbrough, 2011)

4.7.2 Kim, Mauborgne & Blue Ocean Strategy

In 2005 Kim and Mauborgne released their acclaimed book "Blue Ocean Strategy" in which they explain how firms can innovate to compete by creating new markets, instead of competing in existing ones (Kim & Mauborgne, 2005). According to the authors there are two kinds of markets: Existing markets, or what they call "red oceans" where competition is intense and firms have to make a constant trade off between value provided and the cost charged. Then there are blue oceans, which are uncontested markets or markets not yet created. In their book they explain how companies can adopt a Blue Ocean Strategy and successfully compete by creating an uncontested marketplace where competition is irrelevant, which allows the firm to break the value/cost trade off. In such an approach the company should align a whole system of activities in pursuit of differentiation and low cost. Historically Kim and Mauborgne (2005) argue that the innovation enabling the creation of a blue ocean, has often not be new technology, but a new business model or a new approach to capturing a different market with a different combination of existing products. To some extent the blue ocean strategy bears many similarities to frugal innovation. Frugal

Innovation can be a way of creating products or business models that capture a blue ocean, where no other competitors necessarily exist.

4.7.3 Prahalad, Hart & The Bottom of the Pyramid

Another important addition to the literature is a paper called "The Fortune at the Bottom of the Pyramid" published in 2001 by Prahalad and Hart. In their paper they argue that the world's poor, or what they call, the bottom of the pyramid (BoP), is an enormous underserved market that hold a big opportunity for companies. They note that their sheer number of more than 4 billion people collectively makes them a huge market, but that existing businesses have avoided catering to them due to six assumptions that Prahalad and Hart tries to dispel. They argue that increasing access to information technology among the poor, as well as deregulations and increased openness has opened a whole new set of possibilities for firms that did not exist before. For firms to capitalize on this Prahalad and Hart (2001) however argues, that firms, MNCs in particular, need to adopt different business models and a different approach to innovation than they have employed in industrialized countries. Particularly they argue that firms needs to reconfigure products and developed them specifically with the BoP users and markets in mind.

4.7.4 Frugal Innovation

The term frugal innovation is a recent addition to the academic discourse, but has gotten a lot of attention over the last couple of years. While the terminology is new, the concept in itself is not. The concept is closely related to what Indians call "Jugaad" innovation meaning a "quick fix". Others have earlier labeled it "BoP Innovation", as it is linked to innovations specifically targeting the bottom of the pyramid as described by Prahalad and Hart (2001). Its intellectual origins can be traced back to the concept of appropriate technologies proposed by E. F. Schumacher in 1973, who argued for specific solutions designed with emerging market consumers in mind (Schumacher, 1973). Similarly frugal innovation takes departure in innovations created for, and by, fast growing emerging economies.

Most existing innovation theories come from the west with assumptions of predictability, affluence and abundance (Radjou et al., 2012). According to Radjou et al (2012) and Hobday (2005) these theories did not sufficiently explain how both incumbent and new coming firms in emerging markets approached innovation. Circumstances in emerging economies often differ radically and both the producers and the consumers face a number of constraints that make the conventional "western" innovation process unfavorable. First of all, there are severe resource

constraints on the side of the producer in many emerging economies (Radjou & Prabhu, 2015). This both in terms of machinery, financing, tooling and R&D apparatus (Bhatti, 2012; Radjou & Prabhu, 2015). Secondly, consumers in emerging economies, especially the ones in the lowest income brackets, have much smaller income at their disposal, adding an affordability constraint to their process. Finally, institutions in emerging economies often differ from their western counterparts, adding an institutional component. Often public institutions are lacking or inept, making much of the conventional innovation work difficult (Radjou & Prabhu, 2015). Khanna & Palepu (2006) calls this the “institutional void” that must be overcome. In addition to political institutions, there are also often social institutions that need to be understood (Stiglitz, 2001; Acemoglu & Robinson, 2013). One of the core tenants of Frugal Innovation is moving the onus of innovation away from the product itself, and instead focusing on solutions (Radjou & Prabhu, 2015).

Thus, a frugal innovation can be an existing product that is utilized in a new and innovative way that brings a cheaper solution to the consumer without decreasing the quality. The last part is key in this context. Frugal innovation is not just simply producing something cheaper; it is about maintaining the same quality but finding a cheaper way to do so. An often cited example comes from the company Unilever who developed a special detergent packed in tiny 1-wash sachets, directly targeting the low income emerging market consumer (Prahalad & Hart, 2001).

While Frugal Innovation is often used to describe innovation aimed at the BoP market segment, the terms can also be used to describe a whole approach to innovation itself. One of the core tenants of Frugal Innovation as a process, is that of working under constraints. Onarheim and Biskjaer (2014) notes that setting constraints can work as a great driver for innovation, as people and innovators are forced to find alternative solutions and think outside of the box, since conventional possibilities are not an option. In this way the Frugal Innovation approach can lead to new innovations that would not have come about under normal circumstances. For this reason having frugal innovation as an approach to innovation can also lead to reverse innovation, where innovations that originate in a frugal innovation context, find their way back to more developed countries, providing a cheaper alternative to an existing product or solution at a lower cost. This in turn has the potential to have a disrupting effect on existing markets in the west, when cheaper alternatives to an existing product or service enter the markets.

Despite the recent interest around frugal innovation, there is still not any agreement on exactly what the concept means or what it covers. It is however clear that lack of institutional support and resources in many emerging economies are real challenges, forcing a different type of

innovation. As the context, and thus the societal challenges are different, it seems clear that different kinds innovations are needed in order for them address those challenges (Bhatti, 2012; Prahalad & Hart, 2001; Radjou & Prabhu, 2015).

4.8 Establishing a Theoretical Framework

The following section will establish a theoretical framework through which the empirical work will later be analyzed.

Context: As illustrated in the preceding pages the study of innovation has developed far since the time of Marx. Innovations, as well as innovation studies are intrinsically linked to the contexts, both cultural, historical as well as political, in which they were conceived. This insight, the contextual relevance of innovation studies and theories, is an important piece of knowledge keeping in mind as we move on to the empirical part.

Definition of Innovation: The literature on innovation is a vast complex collection that spans over wide range of topics. The last couple of decades of diffusion and increased interested in the topics has by no means simplified the task of getting an overview. In addition to the many different theories on what innovation is, also follows a number of different attempts to define innovation. Each definition is in itself a reflection of the context in which it was created. While all definitions share similar features, they differ in focus and details, reflecting their usage, focus and origin. Thus, a definition used by a sociologist looking at society, like in the case of Ogburn, is necessarily different to the one used by an economist having the firm as the unit of analysis, like the case of Schumpeter. In much of the 20th century the term "innovation" became synonymous with technological change, as well as economic exploitation (Godin, 2008). In this context it important not to compare apples with oranges, and I will therefore spell out how innovation will be defined henceforth in this paper. Common keywords in most definitions of innovation are novelty, change and value adding. In our context, looking at how M-Pesa has worked as an enabler for innovation among entrepreneurs in Kenya, the units of analysis are the startups studied. Thus our definition, need to define what innovation is in the context of the entrepreneur or the firm. Since the firm is the unit of analysis, and a firms' primary strategy is to survive, it holds that the definition of innovation needs to have an economic component in it. When it comes to types of innovation, from the

discussion on Schumpeter, as well as in disruptive innovation and frugal, it follows that innovation can be seen in three different types, namely

- Products.
- Processes.
- Services.
- Thus, the working definition of this paper is simply:

"An innovation is the implementation of a new or improved product, process or service, that creates value for the firm and the customer."

It thus holds that "novelty" in this context is new to the firm, and not "new to the world" or "marketplace", as other definitions sometimes use. This definition of "novelty" is better at capturing the process of innovation in the firm that we are interested in understanding (Hobday, 2005).

Theoretical Framework:

From the literature review I have decided to focus on three key concepts, which will constitute my theoretical framework. First is degree of innovation, so how to understand an innovation. Second are the Drivers and Directions of Innovation, so what enables or facilitates innovation. Third is the impact of innovation and how it transforms and changes society and the economy.

Four Degrees of Innovation I will employ the innovation classification matrix used by Henderson and Clark (1990), as different ways to understand degrees of innovations within the firm.	Incremental
	Architectural
	Radical
	Modular
Drivers and Direction of Innovation For drivers and direction of Innovation I will look at six factors.	The advancement in technology or basic science, or what MacLaurin (1947) referred to as “Fundamental and Applied Research”.
	Demand for innovation as demonstrated by Schmookler (1957), as well as the induced demand as discussed by Hicks (1934) and Ruttan (1997).
	Path Dependency, as discussed by Arthur (1983), namely how previous innovations can create lock-in effects, and how new innovations can be understood in this light.
	Scale Approaches, as discussed by Arthur (1994) - how some innovations first become economically feasible once they reach a certain scale.
	Frugal innovation - that focus should be on solutions rather than products.
	The pattern of disruptive innovation described by Christensen (1997).
Impact of Innovation I have chosen to look at two primary impacts of innovation.	The first is the social impact, as articulated by Ogburn in that innovation, and the introduction of new technologies and services have a tremendous impact on the social composition of society and that innovation can meet a social need.
	The second is economic. As demonstrated by Kondratiev, Schumpeter and Solow, innovation is one of the key drivers of long term economic growth and lies at the center of much modern economic growth theory.

Table 3: Theoretical Framework

5 Presentation of M-Pesa

This following section contains the main empirical part of this thesis. I start by providing some contextual information on how poor people use money in the absence of M-Pesa. This is followed up by a presentation of M-Pesa and its history. Finally follows the presentation of five different cases. The findings from these will be analyzed in the end resulting in an empirical framework that will be used in the analysis and discussion.

5.1 How the poor manage money

In order to fully comprehend the M-Pesa ecosystem and its potential as enabler for innovation among entrepreneurs, its important to first understand how the poor, who are unbanked, handles finances in absence of a mobile money ecosystem, such as M-Pesa. According to Collins et al. (2009) the poor, defined in their study as people living for less than two dollars a day, have three primary goals in mind when it comes to managing finances: Coping with risk, managing basics and raising lump sums.

The specific context of the poor means that they do not have access to the same methods for dealing with finances as their rich counterparts, and therefore adopt very different methods to deal with their situation. Normal banks are often absent from rural areas in Kenya and in cities they only cater to the rich. In addition, banks are often very expensive, both in terms of money and time. One primary difference is that the majority of poor people are day laborers. They do not earn a fixed monthly income, but live of the money they take home on a daily basis. Either as short-term contractors or as micro-entrepreneurs. This naturally causes large fluctuations in income, complicating the task of estimating future income and smoothing out consumption. Thus, just managing day-to-day finances can be a surprisingly daunting and complicated task. Collins et al. (2009 p. 30), for instance note that poor households “*actively employ financial tools not despite being poor, but because they are poor*”.

Rich people borrow or save money in order to raise lumps sumps. Raising lump sums, whether it is used for investment in business, buying cattle or seeds, or for paying school fees, is key to much economic activity. In addition, rich people devote a fraction of their income to hedge against unexpected outcomes or risks, normally in the form of insurance schemes. The poor however, because of their specific context, are unable to use the same mechanism for raising lump sumps or hedging themselves against risks. With absence of a formal banking sector they must take other measures to manage risk (Karlan & Appel, 2011, p. 138). To meet these goals Collins et al

(2009) notes how at any given time the portfolios of the poor they studied included various different financial tools, such as loans (liabilities) from micro finance institutions, money lenders as well as friends and family, while at the same time including advances (assets) to other friends or family members or investments in livestock or materials. This complex web of informal financial instruments is used to cope with risk and smooth out consumption. When it comes to raising lump sums, the only option many poor people have is to seek loans from informal money lenders or micro finance institutions who are either inflexible or charge very high rates. These are both used for conventional uses such as investments, but also used for urgent needs such as in medical emergencies.

5.1.1 Why the poor cannot save

A questions poised in this context is why the poor does not save more money instead of taking out expensive and inflexible loans. One reason is the lack of secure savings mechanisms. In the absence of formal financial institutions, the mattress often becomes the most secure place. Yet, the mattress, in addition to not being very secure in the physical sense, also have the problem of not being a very good guard against personal temptation (Banerjee & Duflo, 2011, p 84).

In this context insights from behavioral economics have in recent years enhanced our understanding of temptation, procrastination and inertia, as well as time inconsistency when it comes to preferences, especially in the area of money management (Cartwright, 2011). For instance, in the short term, people exhibit a preference for immediate gratification, while people exhibit a preference for long-term gratifications in the long term. This behavior leads to inertia and procrastination in the short term, exhibiting the pattern described as time inconsistency. Essentially people are naturally wired to postpone work for pleasure. While this behavior could lead to people not doing anything at all, the reality is that most people are to some extent aware of their own time inconsistency and therefore try to mitigate or institute commitment mechanism to help them not procrastinate and stick to their long term preferences (Cartwright, 2011). Additionally, institutions are often designed to assist or help people overcome these behavioral pitfalls. These are particularly relevant when it comes to handling finances, as few things are more tempting than using money in the short term for instant gratification, while still planning to save more "tomorrow". People consistently rate a low personal savings rate as a problem (Thaler & Sunstein, 2008). In most western countries these behavioral mechanisms are however built into our automatic pension schemes, dedicated savings account or other illiquid assets - that help people meet their own goals of saving without succumbing to temptation. Yet, in the absence of any formal banks or wage

earning jobs, the poor are much more exposed to the temptation risk than the rich, since they lack effective commitment devices helping them overcome temptation.

The poor seem acutely aware of this behavioral problem and employ various kinds of informal financial tools to help them save. One such solution is a Rotating Savings and Credit Associations (RoSCA), which used to be very popular in Kenya (Omwansa & Sullivan, 2012). In RoSCA's a group of people add a defined amount of money to a pool every week, from which one person gets the entire amount on a rotating bases. No interest is earned and with the chance of default or absenteeism by one member, there is an actual risk of a negative interest rate. Another very popular tool are Susu loans (Collins et al., 2009). A saver deposit a set amount of money everyday for a month at a money lender and at end of the month withdraw the grand total minus one days deposit, causing an effective negative interest rate of -3.3% (Collins et al., 2009). Finally, in the more extreme cases Collins et al. (2009) site an example in their research where a household had borrowed money from a micro finance institution to buy gold, simply because gold is less liquid and therefor harder to spend.

It seems that succumbing to the temptation of using finances in the short term is just as big a barrier to savings, as secure savings mechanism. Yet knowledge of ones owns inability to overcome temptation is of little use if there are not commitment mechanism available to help, leading poor to using expensive loans for purposes usually associated with savings. When savings occurs it is often risky and expensive. Without any formal social security or insurance, the poor often employ their own informal social security systems, largely consisting of strong ties to families and friends. In many countries this system involves migrant laborers who move to the cities or elsewhere to look for employment, and use some of their meager earnings to send money back home to their families.

In the absence of M-Pesa sending or receiving money over distances was not only costly, but also time consuming and was associated with great risk and uncertainty. Without access to banks, money were sent either through money sending companies specializing in remittances, such as Western Union or as cash in an envelope sent with a friend or relative or as a parcel. In the case of money sending companies, they often charge very high fees and while they lower the distance significantly, they are still often only confined to the larger towns, meaning that inhabitants of more rural places still have to travel a distance to receive or send money. Sending money as cash with a friend can be cheaper and ensures delivery at the address, but holds a high risk of theft and is also time consuming for the traveler.

5.2 M-Pesa

The following section will introduce M-Pesa as well the local context.

M-Pesa is the name of Kenya's widely acclaimed mobile payment system. M stands for "Mobile" and "Pesa" is Kiswahili, and means "money". The system is a part of the SIM card toolkit and can be found on every single mobile phone with a Safaricom SIM card in it, not only Smartphones. In 2014 the system had more than 12.5 million active users with an average of 73.9 Million transactions pr. month, amounting to around 192.6 Billion KSh (1.8 Billion USD).

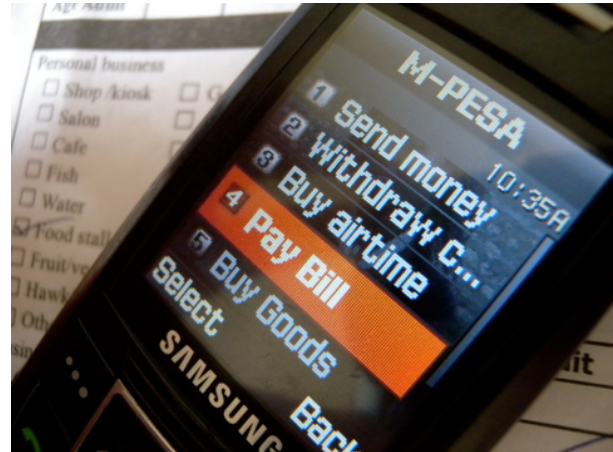


Figure 10: M-Pesa menu on feature phone

According to some sources an amount equivalent to more than 42% of Kenya's GDP runs through the system every year (Wainaina, 2015).

5.2.1 Setting the stage

Prior to M-Pesa, studies had repeatedly shown that access to finance was one of the biggest barriers to development (Collins et al., 2009). Indeed, studies showed that the biggest barrier was not lack of available finance, but the mere access to it. In the previous decade micro finance, pioneered by Nobel Prize winning Muhammad Yunus, had brought the importance of finance for the poorest onto the world stage (Yunus, 2007). In most emerging economies, Kenya in particular, the number of unbanked was extremely high. In 2006, a year before M-Pesa Launched a FinAccess Report (FSD Kenya, 2006) estimated that only 18.9% of Kenyans were formally banked, around 35% were using some form of informal financial service, like savings groups, and more than 38% were directly financially excluded. The attitude towards banks was also negative. 61.5% said they could live without a bank and 47.1% said that "*banks took advantage of poor people*" (Omwansa & Sullivan, 2012, p 16). From the study it was clear that the banking industry in Kenya only served a small urban elite and, for various reasons, had not been able to deliver financial services to the majority of the people demanding it (Omwansa & Sullivan, 2012). Similar criticism could be leveraged against the telephone industry a decade earlier. For instance, as of year 2000 there were only 309,329 landlines installed in Kenya, covering a mere 2% of the population, leaving 98% of

the population “unphoned”. In 2006, the phone penetration had grown more than 30 times, as a result of more than ten million mobile phones (Omwansa & Sullivan, 2012, p 9). One of the major players enabling this rapid advance of mobile telephony in Kenya at the time was Safaricom, a local Kenya telco owned partly by British Vodacom.

5.2.2 History of M-Pesa

While M-Pesa was first launched in 2007, the idea can be traced back to 2002, where researchers had noticed how mobile phone users in several African countries used the transfer of airtime as a proxy for money (Omwansa & Sullivan, 2012). With this mind Nick Hughes, then Head of Social Enterprises at Vodacom, conceived the ideas of using mobile phones as a means of accessing finance, and proposed the idea to Vodacom in 2003.

A public-private partnership: In the early years of the new millennium DFID, the British development agency, was looking for a way to expanding access to finance among the poor and increase financial inclusion, beyond what microcredit had provided. As one of the earlier players, DFID had a philosophy of engaging with the private sector in finding a business model that could address the financial inclusion problem for the poor, beyond what banks had been capable of. As a result of this philosophy DFID awarded one million pounds to Nick Hughes and Vodacom, which was matched by Vodacom in cash and staff time. This led to a series of informal talks and workshops in East Africa with banks, Microfinance Institutions (MFI's), Telco's, NGO's and government officials looking at different possibilities for establishing some sort of mobile payment platform or mechanism.

The initial idea from the DFID grant was to increase the access to finance by lowering the transaction cost and increasing the reach for micro loans and other micro financial products. To meet this goal a memorandum of understanding was signed between Safaricom/Vodacom, Commercial Bank of Africa and Faula Kenya (a local MFI). Safaricom would use their network and airtime sellers to ensure reach, the micro finance institution would bring in expertise on the need for loans and other financial services, and the banks would ensure discipline and regulatory compliance when it came to storing the users money.

A few basic principles were laid down by Nick Hughes and the organizing team from Vodacom. The system had to be designed specifically with the unbanked in mind and had to run on basic feature phones (at the time Smartphones had yet to see the light of the day). From a technical standpoint, while meeting the requirements above, it was decided to use the SIM toolkit, a standard

product on almost all cellphone services, as the basis for the system. This did not require mobile data access for the users, and met all the security requirements necessary to minimize fraud.

Testing the System: In 2005 the team launched a pilot with 500 clients of Faula Kenya, who were all given phones and asked to pay back their existing micro loans via their phones instead of in person. However, after the pilot it became clear that the uses far exceeded just paying back loans. M-Pesa was used for sending money between people, as a way of paying for goods, as a way of remitting money home, and as a safe way of storing cash for businesses and purchasing airtime for relatives. With these insights Safaricom and the initial team realized that this could be a lot bigger than just an efficient way of repaying micro loans.

In the following two years the project group finalized the tech, got all the necessary regulatory approvals in order, ensuring compliance with Kenya law, underwent financial risk and fraud assessments and convinced Safaricom of the financial soundness of the business model. Before launch Safaricom trained and signed a large number of deals with partners who would work as M-Pesa agents, ensuring that future users would have places to *deposit* cash into their M-Pesa account and *withdraw* cash from their M-Pesa account.

Launching M-Pesa: Finally, in March 2007 Safaricom launched M-Pesa with a big marketing campaign with the tagline “Send money by Phone”. The initial goal was to have 300.000 customers by the end of 2007. By early 2008, a year after launch, more than 2 million people were actively using the M-Pesa platform, a usage more than 8 times higher than projected. In the words of Michael Joseph, then CEO of Safaricom “*But did I know it was going to be so big? No. I didn’t dream of it, none of us did, nobody did*” (Omwansa & Sullivan, 2012, p 23). In the beginning everyone could receive and withdraw money, also people who were not Safaricom subscribers. It was however cheaper to withdraw if you were a subscriber, causing people to sign up quickly. As many as 12.000 new registrations took place daily in the beginning, and that pace has more or less continued until now.

In 2009, Safaricom expanded its services and added the Pay Bill function to the M-Pesa menu, allowing people to pay their regular bills, like utilities, using M-Pesa. In addition companies, such as Kenya Airways, allowed ticket purchases through M-Pesa. Furthermore, a bulk payment option allowed employers to pay their employees via M-Pesa instead of cash. At the turn of the decade, less than three years after its launch, M-Pesa had eight million active subscribers. In 2010,

several banks set up systems to transfer money between bank accounts and M-Pesa accounts and more banks became super agents, working as the financial backbone of the system providing floats for agents.

In 2012, 600 institutions accepted payments via M-Pesa and the system had more than 15 million subscribers, covering nearly 70% of Kenya's adult population. Already then more M-Pesa transactions occurred in Kenya alone, than Western Union transactions globally. Since then the system have only grown and expanded. In partnership with various banks Safaricom has launched several savings and lending option, the most prominent and successful one being M-Shwari, which is an integral part of the SIM Toolkit, on par with Pay Bill. Through this users can open a savings account at Central Bank of Africa (CBA) straight from their phone, where they can save money and earn an interest rate. At the same time this gives them a credit score, which CBA in turn uses to dispatch loans. There are today over 10 million M-Shwari accounts and CBA disburses 50,000 loans every day. One-third of all active M-PESA users are also active M-Shwari customers (Cook & McKay, 2015).

In mid-2015 the company decided to release an M-Pesa API, allowing other companies and services to easier incorporate M-Pesa into their products and services. Many observers expect this to boost innovation and M-Pesa business models even further (Cook & McKay, 2015).

5.2.3 Success factors

To understand the success of M-Pesa it is important to understand the context in which it developed. Kenya had a high rural to urban migration, with people remitting money home to rural areas. The alternatives prior to M-Pesa were very expensive and insecure. The only savings option for most of the unbanked was the "mattress", which does not provide any good protection against theft, temptation or rats. In addition, Safaricom had a near monopoly on cellphone users with 65% of the adult population subscribing to their services, and a wide network of agents who were accustomed to selling airtime, that could easily be trained to work as M-Pesa agents. Finally, the trust in Safaricom was high among the population, enabling a faster rollout. These factors combined with a regulatory environment that prevented banks from using agents, (a law that have since changed) meant that the number of unbanked demanding access to a cheap money transfer and savings scheme was not met by existing providers.

5.2.4 How M-Pesa Works

M-Pesa is frequently referred to as mobile banking, and while mobile banking has similar properties M-Pesa is a different setup. Technically speaking M-Pesa is e-money, and the phone works as an e-wallet.

At the top of the M-Pesa chain are super agents. These are conventional banks that provide e-float to the M-Pesa network. A normal agent can approach a super agent with a large amount of cash and swap the cash for e-float.



Figure 11: M-Pesa Agent

The cash is then deposited in a Safaricom trust account at the given bank. Agents, also referred to as merchants, are companies or individuals who have a large float of e-money and a large float of cash. They enable individuals or companies to either deposit cash into the M-Pesa system, or withdraw cash from the M-Pesa system. In the beginning, people would deposit cash at an agent, send it to the recipient who would withdraw it shortly after. However, as more and more people have become comfortable with the M-Pesa system and started using the savings option, less depositing and withdrawals are necessary. Today, there are fewer and fewer services or shops that do not accept M-Pesa, decreasing the need to ever withdraw your money from the M-Pesa system. In the M-Pesa menu on the phone there are four basic money options.

- Send which enables the holder to send money to any phone number.
- Lipa Na M-Pesa (Buy Goods), which enables the holder to purchase goods from vendors. Instead of typing in a phone number, a unique till number is provided.
- Pay Bill, which allows the payment of bills. The customer has to type in the pay bill number of the company, as well as a personal account number.
- Finally, there is the aforementioned M-Shwari account that works as a savings and loans account.

All external services that are integrated with M-Pesa use either the basic send/receive function, the paybill or the buy goods at this point.

6 Presentation of The Cases

The following section will present five different firms, selected based on the criteria: uses M-Pesa, entrepreneurial and recent or new to the Kenyan context (see page 6). Below is a table outlining some key data on all the firms. All information presented below about the firms is taken directly from the interview unless otherwise stated.

					
<i>Firm Origin</i>	<i>Kenya</i>	<i>Kenya</i>	<i>Kenya</i>	<i>Kenya</i>	<i>USA</i>
Founder Origin	Expat	Local	Expat	Expat	N/A
Year Established	2012	2012	2012	2015	2015 (In Kenya)
Key Features	An online marketplace for African music. + Pays musicians using M-Pesa.	Access to local news written by freelancers. + Receives micropayment and pays freelancers via M-Pesa	Solar systems sold in installments that also work as collateral for future loans. + Receives installments via M-Pesa.	Credit scores based on smartphone data. + Disperses loans directly using M-Pesa.	An app connecting riders and freelance chauffeurs. + Chauffeurs settle cash accounts using M-Pesa.
Person Interviewed	Martin Nielsen - CEO	Chloe Spoerry - CEO	Pauline Githugu - Director for Legal, Administration and External Affairs	Andrew Huelsenbeck - Kenya Country Lead	Kaitlin Freemant - Director of Operations, Kenya
Industry	Entertainment	News	Energy	Microfinance	Transportation

Table 4: Overview of Cases

6.1 Case 1: Uber



Person interviewed: Kaitlin Freemond – Director of Operations, Kenya

6.1.1 What does Uber do and how does it work?

Uber is one of the world's leading transportation network companies. They match independent freelance taxi drivers with people who need a taxi ride through an app on the user's smartphone. They operate in more than 50 countries around the world and are a direct competitor to local taxis.

How does it work? - Uber signs up freelance drivers or independent driver fleets who work as a taxi service, carrying around people. Customers can book a ride with their smartphone and see on the screen how far away their Uber car is. Before initiating the ride, they can type in their destination and get an estimate of how much the fare will be. As the driver approaches, the rider can see the driver's rating given by previous passengers, as well as the name of the driver, the type of the car, as well as the license plate number. Once the rider enters the car, the driver confirms the pick-up and the meter starts ticking. Once the ride is over, the driver indicates the ride is over and the cost of the ride is automatically charged from the passenger's credit or debit card. The rider gets a receipt on his or her phone, with an overview of the cost breakdown, a map of the route taken, as well as general info about the time of the day and the name of the driver. In addition, before taking the next ride, the rider must rate the driver's performance.

Prior to Uber's launch in Kenya, the company only accepted payments via credit card or debit card. One of the underlying premises of the service was that it was frictionless and seamless. At no point during the journey does the rider have to show or swipe a credit card. The purchase is automatically authorized through the app and money is withdrawn from the card. Rides are often cheaper than taking regular taxis and passengers can get an estimate of the price before taking the ride. All receipts can be seen on the app, for easy access. A driver needs to maintain a certain minimum rating to continue to operate as an Uber driver. This ensures that the drivers maintain a high level of customer service, which builds trust in the system.

Drivers get an 80% commission of the price of the ride. The funds are transferred straight into their bank account monthly. They are free to take as many rides as they want and make their own schedules. If there is a shortage of drivers on the streets, so more demand than supply, surge

pricing kicks in - meaning that the price for a ride increases incentivizing more drivers to be active (Kaitlin Freemond, Interview, 24th September 2015).

6.1.2 History in Kenya:

In January 2015 Uber launched their services in Kenya. At launch they were told by many people that the existing model would not work in Kenya, as credit card usage is very low. Despite these warnings they tried to launch using the traditional model. For a first few months, the only people signing up for Uber were expats, and metropolitan Kenyans who were used to using Uber elsewhere and who were comfortable using their phone as a payment platform. Outside of this sector conversion and uptake was very low compared to other markets and the local Uber team came to the realization that *“if this city is actually going to grow we need an alternative”* (Kaitlin Freemond, Interview, 24th September 2015).

Other competing players in the app/taxi space all took cash, so customers were used to ordering taxis with apps and smartphones, and paying with cash. The Uber team in Hyderabad in India, had faced similar low conversion rates due to very low credit card/debit card usage, and both teams were lobbying for an alternative payment methods. While M-Pesa was considered as a payment, the team decided to enable a cash option. A cash option was more scalable internationally and the Uber headquarter wanted the local team to prove that their model could work with cash payments. Integrating with M-Pesa would require a lot more coding and development that would only be relevant in Kenya. In addition, the user interface and integration options with Safaricom, the provider of M-Pesa, was not deemed very user friendly and did not provide a big advantage. Furthermore, since M-Pesa is in many cases treated as a substitute for cash in Kenya, a cash model would still allow customers to pay using M-Pesa (Kaitlin Freemond, Interview, 24th September 2015).

6.1.3 Uber's experience with M-Pesa

In the cash models customers can chose “cash” as a payment option before they book a ride. Once they arrive at their destination they pay the cab driver in cash directly, or transfer the equivalent amount to the cabdrivers phone via M-Pesa.

At the end of each day the taxi driver takes all their cash earnings and convert it to M-Pesa money at an M-Pesa agent. They then transfer that days earning to the Uber headquarter who settles the earnings and aligns the books. This ensures that the drivers do not have to carry around large amounts of cash after work and it also makes it easier for Uber to track earnings and deposits since

everything is digital, and they do not have to have a big pile of cash lying around at the office. After introducing the cash payment method and figuring out the operations behind that, the conversation has grown rapidly and uptake has been significant (Kaitlin Freemond, Interview, 24th September 2015).

6.2 Case 2: Mdundo



Person Interviewed: Martin Nielsen - CEO

6.2.1 What does Mdundo do and how does it work?

Mdundo is an online market place for music targeting the African Market. They enable local African musicians to market and sell their music online to a large international audience. In addition they allow a large local as well as international audience of customers to access a large catalogue of African Music, which can either be purchased or downloaded with adds directly a laptop or mobile phone. One of the key differentiators from competing westerns music services, is the large catalogue of local music, as well as a mobile interface developed especially to work on feature phones without 3G data connections (Martin Nielsen, Interview, 30th September 2015).

How does it work? - Musicians can create their own musician account on Mdundo's website, where they can upload their music into the Mdundo catalogue. Musicians decide for themselves what music should be online and what should not and they can control their catalogue as they want. Users of the platform can download unlimited ad-embedded music for free, either through an Mdundo Android App or directly from the Mdundo website. Mdundo works with various ad agencies and brands who put ads on the actual site, as well as in the songs themselves, securing a stream of revenue. Users can also pay using M-Pesa, as well as through Google Wallet on the android phone in order to download ad free versions of the song. Revenues secured from payments and artists are distributed back to artist via M-Pesa in Kenya, and other means in the rest of East Africa. The musicians are paid based on how many times their music is downloaded (Martin Nielsen, Interview, 30th September 2015).

6.2.2 History in Kenya:

Mdundo was founded in 2012, as an in-house startup in the tech accelerator 88mph, by founder of 88mph Kresten Buch, who both noticed the low level of local Kenyan content available for the mobile phone users in Kenya, compared to USA and Europe. From this insight the idea was to establish startups that produced local content that could scale online. They were introduced to a number of local musicians and learned about the difficulty they had in distributing their music to their fans. A problem that seemed present to musicians all over Africa. One of the central problems seemed to be lack of payment methods. Inspired by the way people in Kenya buy airtime through scratch cards, they came up with an idea of printing scratch cards with music on, as a way for musicians to distribute and sell music, which customers could then download from Mdundo.com.

Despite this start, they subsequently seized to produce and use scratch cards for two reasons. First, they could not produce scratch cards in Kenya, significantly increasing the price and time it took to receive them. Second, musicians were not able to sell the cards and instead gave out the cards for free. One of the key assumptions from the beginning was that the key problem for music distribution was lack of a payment method, but they slowly learned that this was not the case.

After 5 months, Mdundo started pitching to big partners, and got some big companies on board. Initially Samsung and Microsoft showed interest, which led to a pivot, where Mdundo gave music out for free, and tried to make money out of big deals and partnerships with big companies. The problem, according to Martin, was that this did not scale very well in the long run. To address this they tried to reintroduce payments for the users and see how this would go, after everything had been free for a while. However, they ended up switching back to the free model since the conversion rate was too low when taking payments. One of the reasons for the low growth, according to Martin, was the bad payment and user experience when paying with M-Pesa. He believes that in theory it is still possible to make money, and that the commission to Safaricom is not the main barrier. The main problem lies in the process, which is long and tedious for online users. As a result Mdundo decided to focus more on retention of existing users, which is done through the introduction of Facebook login as well as an Android App, enabling users to get an Mdundo account.

In September 2015, more than 50% were Android users. In February 2014, only 17% were Android users. In the beginning it was very important for Mdundo to be user friendly on low-end phones, but this is not a requirement anymore. However, is still a very light product as even Android users are very price conscious when it comes to data usage. The number of unique active

users amounts to 150.000 who download music, and more than 300.000 unique site visits on Mdundo.com (Martin Nielsen, Interview, 30th September 2015).

6.2.3 Mdundo's experience with M-Pesa

While M-Pesa is not a main driver for Mdundo now, Martin and his team see a lot more potential in a service where users pay directly. According to Martin, M-Pesa has disappointed more than they had expected. He had hoped it would be faster, swifter and easier. It almost looks the same as it did in 2007, with old and simplistic tech, which causes a bad user experience and flow on Android phones. Partly, as a result of these tech limitations Mdundo have tried to find other ways of receiving payments, such as through Google Wallet. Martin however notes, that Mdundo would probably not have started without M-Pesa, even though the business currently does not rely on payments via M-Pesa. Internally, all Kenyan musicians are still being paid with M-Pesa, as this is the easiest and fastest way to do so.

For scaling to non-mobile payment countries, Mdundo bundle up earnings by the musicians and then make lump sum transfers at a lower frequency through other means. While it makes operating harder not having M-Pesa, it is not a hindrance to scaling. This is however not without problems. In Tanzania for instance they have had a lot of problems with paying musicians. While M-Pesa exists in Tanzania, the system is very slow and cumbersome and it takes a long time for the payment to reach the recipient. The alternative is to do payments to other countries via Western Union or through banks, but this is not only very cumbersome and time consuming, but also very expensive and inflexible.

Martin however notes that in the long run, if musicians abroad want to get paid, they will need to open some sort of mobile money account in their country, so Mdundo can easily send them money. It should non the less be stressed that the requirement from Mdundo is that it is easy and cheap to send money. Whether its between banks, e-wallets or mobile money is less important to Martin, who think other services than M-Pesa could definitely do the job in the future (Martin Nielsen, Interview, 30th September 2015).



6.3 Case 3: HiviSasa

Person Interviewed: Chloe Spoerry – CEO

6.3.1 What does HiviSasa do and how does it work?

HiviSasa is a Kenyan online media platform that distributes local micro-news from freelance journalists. The words “Hivi Sasa” means “News Now” in Kiswahili. Citizen journalists from various counties can submit articles ranging from 200-500 words talking about local news. The article is reviewed by editors at HiviSasa who decide whether the article gets published on the platform or whether it gets rejected, depending on newsworthiness and originality (Chloe Spoerry, Interview, 30th September 2015).

How does it work? - Local freelance writers submit newsworthy original stories to HiviSasa.com ranging from 200-500 words with a picture. The editors at the HiviSasa office read through the article, does some editing and either approves or rejects the article, depending on whether it is newsworthy and original. If it gets approved the writer receives 100 KSh (around \$1) for his or her article. The payment is disbursed weekly to the writers, via M-Pesa. Some of the most prolific writers submit between 60 and 85 approved articles a week, cashing in between 6000-8500 KSh. (60-85 USD). Anyone can sign up to become a writer and as long as their news story meets the criteria of newsworthy, original and local, the writer gets paid.

Their business model is based on local micro ads. HiviSasa's goal is to target small local businesses and SMEs in their target areas and enable them to advertise to their customers in a direct local way. So far, according to Chloe, the majority of their ads come from people who want to advertise local events or parties. The process for getting an ad on HiviSasa can be done entirely over the mobile phone. Chloe explains it the following way “*we would have no sales people anywhere because you literally take a photo of your poster that you just created for your DJ party... you upload it to our platform, you pay Paybill with M-Pesa and that gives you X number of credits*” (Chloe Spoerry, Interview, 30th September 2015). In addition, the local writers also works as sales agents. Since they are located in the local context and know the local market they help sell ads to small local business, and in return get a cut from the deal. All money is paid via M-Pesa, so a

small business can in theory make and pay for an ad, and see it online within an hour (Chloe Spoerry, Interview, 30th September 2015).

6.3.2 History in Kenya

The idea to HiviSasa came in 2007 when the Mobile Tech Accelerator 88mph launched in Kenya. While their initial business plan was to invest in local companies working in the mobile payment space, they also started to develop their own in-house startups. Two of the investors, Pierre and Kresten, had a big passion for football and sports betting. As a part of their entry into Kenya they considered purchasing a football club. Their sight fell on Nakuru Allstars, at that time a club in Kenya's 2nd division located in Nakuru, a town of 0.5 million inhabitants a two hour drive from Nairobi. Before making his investment Pierre was curious to know more about the city and what else was going on. To his surprise there was not a single local newspaper or news source available. Doing more research Pierre, Kresten and 88mph learned that most news in Kenya is centralized around the two biggest cities, Nairobi and Mombasa, despite the fact that the majority of the population lives in smaller cities and towns. This turned out to be the case in most of Sub-Saharan Africa. With this realization in mind Pierre, a man with a tech background, built the basic foundation for HiviSasa. The team launched their service, starting with Nakuru as their main target. They were initially doing great, but needed outside investment to grow and continue operating. Their launch took place shortly before the 2013 national presidential election. The 2007 election resulted in nationwide riots, which internally displaced more than half a million people and more than 1500 people got killed. As a result investors were cautious about investing in a Kenyan startup just before the 2013 election, which meant HiviSasa was unable to raise more funds.

The election in 2013 ended peacefully and in 2015 Chloe Spoerry, who had previously been an intern for 88mph, and Nikolaj Barnwell, previously program manager at 88mph, took over the leftovers of HiviSasa and relaunched it. They received investment from Omidyar Network as well as another VC fund and in September 2015 had more than 50.000 unique visitors to their site and more than 100 freelance contributors in four different counties. Down the line they are hoping to use the site to help uncover crime and fight corruption through citizen journalism. Chloe notes that while they are growing well and have a large user base, HiviSasa is still trying to stay under the radar. In her experience the institutions in Kenya are too weak to protect startups and new ideas. As a result there is a fear that if some of the bigger media players or politicians see HiviSasa as a threat

they could try to prevent or block their growth, through unjustified legal measures (Chloe Spoerry, Interview, 30th September 2015).

6.3.3 HiviSasa experience with M-Pesa

HiviSasa's experience with M-Pesa has been somewhat mixed. In one way their completely setup is completely dependent on - and built around - the M-Pesa platform. Yet, working with Safaricom has not been without problems. Getting a business account and incorporating M-Pesa into their product has been very complicated. For this reason they use a relatively bad third party aggregator to facilitate payments, as they offer a cheap service and can do the job well enough. In general Chloe thinks the system is great, but could need a technical update which would facilitate better integration possibilities. When there are problems or when dealing with Safaricom, they often act very arrogant and are slow to respond to requests, which can be detrimental to a small firm that solely relies on M-Pesa as a payment method (Chloe Spoerry, Interview, 30th September 2015).

6.4 Case 4: M-Kopa Solar



Person Interviewed: Pauline Githugu – Director of Legal, Administration and External Affairs

6.4.1 What does M-Kopa Solar do and how does it work?

M-Kopa Solar sells off the grid solar powered household lightning via installments paid over M-Pesa. Rural customers pay a small up front fee of 3000 KSh (30 USD) to an M-Kopa Sales agent who installs the system in their house. The basic system consists of a solar panel connected to a control panel that includes a battery. As standard it comes with a LED light bulb that is connected to the control panel via a cord. While the sun is shining during the day, the battery is charging. At night the battery delivers electricity to the light bulb, or other extra services that can be added on. Most common are a rechargeable radio and a phone charger.

Once customers are up and running, they have to pay daily installments of 40KSh (0.40 USD) via M-Pesa for 365 days to purchase the system. Once they have done that the system is theirs, and they do not have to pay for it anymore. The control panel has a built in SIM card with data connectivity, so it can register if payments have been made. If a payment is not made, the system turns off, disabling the user from getting light or charging the phone. Once a payment is

made again, the system automatically activates again (Pauline Githugu, Interview, 30th September 2015).

How does it work? - If a customer misses an installment the system automatically turns off the day the installment is not paid, without any other penalties. This makes the payback more flexible, if for instance the family has a medical emergency and needs to afford medicine or pay school fees. Once the user is ready to pay again, he or she simply just continues paying the 40KSh a day. On the control device the users can see how many days left they have before they own the device. If they suddenly have more cash and want to pay a few days in advance they can freely do so.

In addition to the traditional household usage, aimed at providing indoor lightening, as well as electricity for a radio and a cellphone, the system is also very popular with small kiosks in rural areas. A small kiosk owner will install the system and use the power to charge customers' cellphones for a fee. According to Pauline, this fee can be as high as 20 KSh per person, and a kiosk owner can easily charge two phones a day, making enough money to cover the daily installments.

Once customers have paid off the device, they can use the device as collateral towards other goods or towards a loan. This means people can easily get cheap loans straight from M-Kopa solar and use them for investment in their business, or for emergency



Figure 12: President Obama visits M-Kopa

medical uses or school fees. Due to the existing payback pattern M-Kopa has already established a credit score to assess a person's ability to pay back the loan. And like with paying back the solar device itself, if a person misses a loan payment, the M-Kopa solar system will turn off. Thus, essentially when a loan or a new product is sold to a previous consumer the machine again shows how many days there are left until the loan is paid back. Currently, M-Kopa's sales team contacts previous owners and inquire about what they might be interested in purchasing, that they cannot afford up front. The most popular item is an effective cook stove. Normal cook stoves are generally inefficient, using a lot of costly fuel, while emitting a lot of dangerous smoke causing respiratory

tract infections, the latter causing more deaths annually in Africa than both HIV and Malaria. Other products sold are cellphones (Pauline Githugu, Interview, 30th September 2015).

6.4.2 History in Kenya

M-Kopa was founded in 2010, by Nick Hughes, former Head of Social Enterprises at Vodacom, also known as the “father of M-Pesa”, Jesse Moore, former Director of GSMAs Development fund and Chad Larsen. Having worked previously on Vodacom’s social initiatives and later on being one of the drivers and fathers behind M-Pesa, Nick thought of ways to leverage the M-Pesa platform to provide power to the rural poor. They took an off the shelves solar device and enabled it to work with SIM Cards as a pay-as-you-go service. The system is heavily advertised through Safaricom and they are in a tight partnership, as the founders and idea people behind M-Pesa were the same that came up with M-Kopa Solar (Pauline Githugu, Interview, 30th September 2015).

6.4.3 M-Kopa’s experience with M-Pesa

M-Kopa Solar is the second biggest recipient of money via M-Pesa after Kenya Power and Lightening Corporation, with more than 250,000 devices sold. Today more than 100,000 households pay a daily installment of 40KSh. M-Kopa Solar’s story is intimately linked to Safaricom, as one of the founders of M-Kopa Solar, was also one of the people behind M-Pesa. The product was launched as a partnership between M-Kopa and Safaricom and partially sold through Safaricom’s dealer network. The base station has an embedded Safaricom SIM card, and everywhere in the world where they scale they use the Safaricom SIM card. The deep partnership and large throughput of payment also means that Safaricom devotes significant resources and attention to ensuring that M-Kopa receives all the data and assistance it needs. They employ a unique purpose built back-end system that allows them to monitor payments and other financial information in real time at their head quarter (Pauline Githugu, Interview, 30th September 2015).

6.5 Case 5: Branch



Person Interviewed: Andrew Huelsenbeck – Kenya Country Lead.

6.5.1 What does Branch do?

Branch provides branchless banking services by leveraging the data that exist on users smartphones to create credit scores, manage risk and subsequently disperse loans via M-Pesa (Andrew Huelsenbeck, Interview, 31st September 2015).

How does it work? - Branch works through an android app that users download to their smartphones. In the app they register and sign up using Facebook and give Branch permission to access SMS logs, as well as some basic data from users' Facebook accounts. Based on these records, the transaction history of M-Pesa transfers as well as the nature of the language, data scientists at Branch have created an algorithm that looks for patterns of credit worthiness in this information and automatically give each of their users a credit score. If people have a new phone, they are not able to borrow, as they need to amass sufficient data for Branch to provide them with a credit score. Once users have received a sufficiently good credit score they can start applying for loans ranging from 1.000KSh (10\$) to 50.000KSh (500\$). The idea, according to Andrew, is that everyone starts small, and as they repay their small loans on time, they build better credit scores and can borrow larger amounts. Loans are generally short term of 3-12 weeks, with weekly installments. If a customer's credit score is sufficiently high and they apply for a loan the money is disbursed directly to the customer via M-Pesa. Down the line it is the intention of Branch to add other mobile money providers as well, but currently they are only using the M-Pesa platform. The other mobile money solutions would become more relevant as the system expands to other countries. Currently the process for disbursing loans is manual, and is done in bulk a few times a day. Credit scores are made in milliseconds for most users. Before applying for a loan the users also have to upload data from their national ID to verify identity, in order for a transaction to go through. To prevent fraud the name on the national ID has to match the name on the M-Pesa line used. Loans are used for various things. More than half use the money for their businesses, to help them with operations. Branch does not do any banking or deposit taking themselves, as there is a lot of regulatory red tape if a company becomes a deposit taking organization (Andrew Huelsenbeck, Interview, 31st September 2015).

6.5.2 History in Kenya

Branch was founded in 2015 by Matt Flannery, who in 2005 also co-founded Kiva, the acclaimed online micro lending platform that connects people all around the world to microfinance institutions on the ground. Working with Kiva and the MFIs on the ground Matt observed first hand the big overhead spending associated with lending through existing MFI's. MFIs had to send personnel physically to visit borrowers, handing them money and collecting their repayments. Doing all these tasks was very expensive which drove up fees for customers and took a lot of time for the MFIs. Through a product called Kiva Zip, that facilitated direct peer-to-peer lending, Kiva started experimenting with mobile disbursements, primarily through M-Pesa to keep overheads low.

Within the last couple of years Matt also started to notice, that a lot of the borrowers using Kiva Zip started to own and use smartphones. A few years ago smartphones broke the 10.000KSh (100 USD) barrier and today they come as cheap as 4.000KSh (40 USD). Inspired from credit scoring algorithms and data scientists in the US, Matt got the idea to provide credit scores based on data already on the cellphone. This, combined with the M-Pesa ecosystem would allow Branch to digitally provide credit scores and transfer funds, ensuring a minimal overhead cost (Andrew Huelsenbeck, Interview, 31st September 2015).

6.5.3 Branch's Experience with M-Pesa

Branch is fully reliable on M-Pesa, and as of now, the only way for borrowers to receive funds is through the M-Pesa system. This is also the only way that Branch disperses loans. The dispersion is still done manually, but it is the goal that the dispersion of funds can be increasingly automated. Branch hopes to incorporate the new Safaricom API into their service, but are not yet certain that the new API is the best solution, as it still have some technical limitations. Branch currently only operate in Kenya with M-Pesa, but down the line Branch wants to add other mobile payment providers to be able to lend to other kinds of users and also expand the service beyond Kenya.

In addition to the technical challenges with M-Pesa Branch also has an ambivalent relationship to Safaricom. On the one hand their entire service is build upon the M-Pesa ecosystem provided by Safaricom, on the other hand Safaricom is also one of Branch's biggest competitors through their M-Shwari banking option. While M-Shwari clearly has a big advantage in that it is integrated into the M-Pesa menu on every single phone, Branch has the ability, down the line, to issue loans through other mobile payment services, and are therefore not dependent on one key

system in order to disperse loans. Since Safaricom is also working as a lender and not just a provider of the ecosystem, they are not willing to share their internal transaction history, which could otherwise be used as an easy way for Branch to digitally provide credit scores. Instead Branch only has access to the data they can harness from the users smartphone. The advantage of this is that the system can easily be scaled to other countries, and is not dependent on the co-operation of telcos or other credit rating bureaus in order to assign credit scores and subsequently disperse loans (Andrew Huelsenbeck, Interview, 31st September 2015).

6.6 Empirical Analysis

In the following section I will discuss, analyze and synthesize the main findings from the five cases. I will outline key insights and trends in order to highlight the main take away from the empirical case studies. In the end the main findings will be combined to form an empirical framework.

6.6.1 Features of M-Pesa

In order to understand the role of M-Pesa is it essential to understand how M-Pesa stacks up against the existing money transfer and payment methods. The table below shows some of the key features and differences between M-Pesa, cash and credit cards.

Features	M-Pesa	Cash	Credit Card
Cost	Low	High	Medium
Speed	Instant	Low	High
Reach, local	High	High	Low
Security	High	Low	High
Reach, global	Low	Low	High

Table 5: Comparison Between M-Pesa, Cash and Credit Cards.

Cost describes the transaction cost of a given transfer. With cash the money have to be physically transferred and stored, which is costly both in terms of risk and in terms of time. Credit cards are medium, since there is a relatively high set-up cost to both acquire and accept credit cards. *Speed* refers to the time it takes to send money from A to B. *Reach local*, refers to the number of people in Kenya who accept a given method of payments. *Security* refers to the risk of holding or transferring money, and *Reach global* is the number of people globally who have or accept a given option. As is seen M-Pesa, is the only option that offers secure low cost, high speed, high reach in Kenya.

6.6.2 The Role of M-Pesa

M-Pesa is everywhere: The five different cases described all work in different sectors and all employ M-Pesa in very different ways. M-Kopa Solar works in the clean energy business and uses M-Pesa both as a way of lowering transaction costs of selling their solar panels in installments, but also as a way of providing loans and access to finance using their product as collateral. Branch is a more traditional finance provider, but relies on data on the users smartphone to assign credit scores and uses M-Pesa to provide minimal transaction cost loans. HiviSasa works in the media industry and uses it as a way of employing freelance writers and taking payments for ad space, for their micro-news site. Mdundo is in the entertainment and content industry and uses M-Pesa to pay out money to their artists, and have also experimented with taking payment for their content. However, so far, M-Pesa is primarily used internally in the firm. Finally, Uber drivers accept M-Pesa instead of cash payments, while Uber itself uses M-Pesa as a way for the freelance drivers to remit their daily cash earnings back to Uber. Both B2C is present, as exemplified by M-Kopa Solar taking payments from consumers, as well as B2B as exemplified by Mdundo, paying out their artists or HiviSasa taking payments from businesses wanting to buy ad space.

How cases use M-Pesa: The uses of M-Pesa can be separated into three different categories, depending on ways entrepreneurs have incorporated M-Pesa into their business models.

1. Enabled by M-Pesa
2. Optimized by M-Pesa
3. Uses M-Pesa

Businesses in category 1 are dependent on M-Pesa for their existence and have been directly enabled by the existence of M-Pesa. Put in other words, the company would arguable not exist without the existence of M-Pesa or an alternative mobile payment ecosystem. Of the cases described this includes M-Kopa Solar, Branch and HiviSasa.

Businesses in category 2, are not fully dependent on M-Pesa, but have integrated it into their business model in a way that has optimized performance internally. Of the cases describe both Uber and Mdundo fall into this category.

Business in category 3, include the majority of business in Kenya. These use M-Pesa in one way or another in their business, usually as an alternative way of receiving payments. These businesses could survive well without M-Pesa, and M-Pesa is not integral to their business model. Examples are restaurants, grocery stores, retail stores, Hotels, Tour Operators. The degrees to which they prefer and accept M-Pesa vary, but most will accept M-Pesa in one way other another.

6.6.3 Limitations of M-Pesa

Scaling internationally: When it comes to internationalizing their businesses all companies, except Uber, are having a hard time, as mobile payment penetration is generally lower in other countries. M-Kopa is already present in several East African countries and accepts payments from other telcos, but their growth is by no means as fast as in Kenya. Martin from Mdundo notes how *"dealing with payments in Tanzania and Uganda is a nightmare"* (Martin Nielsen, Interview, 30th September 2015) because of the lack of M-Pesa integration and as a result they have to spend time going through a cumbersome process to use Western Union or bank transfers incurring large fees. HiviSasa and Branch both explicitly stated that their business model depends on the existence of some mobile money platform, and their internationalization strategies depends on what countries have a well-developed mobile payment ecosystem.

Technology: Uber and Mdundo both exemplify the limitations of the M-Pesa platform when it comes to technological limits. They both want to enable people to easily purchase their product, but in both cases found the user experience and the flow too complicated, and the technology limiting. Mdundo has opted to primarily rely on Google Wallet, the payment system built into the Android platform. Not only does it integrate seamlessly with their service as they are not primarily relying on their Android app, but it also scales internationally, enabling Mdundo to receive payments from anywhere in the world. A similar argument, about the technological limits of the M-Pesa platform, was made by DJ Koeman, who helped Equity Bank roll out their mobile money banking (DJ Koeman, Interview, 28th September 2015).

Closed System: All cases, with the exception of M-Kopa Solar, which is intimately linked to Safaricom, made a big point out of stressing their dissatisfaction with co-operating with Safaricom, the provider of M-Pesa. While stressing their general satisfaction with M-Pesa as a service, they find Safaricom difficult and arrogant to work with. HiviSasa notes how they use a relatively bad third party payments aggregator, to avoid dealing with Safaricom directly. Both Mdundo and Branch mentioned how Safaricom is a direct competitor of theirs through their own service offerings and have a reputation for copying good business ideas that leverage the M-Pesa ecosystem. In addition, Branch stressed how it is a closed system, which makes it difficult for 3rd parties to improve or develop on it, without the co-operation of Safaricom. Uber also mentioned the unreliability of Safaricom as one of the reasons they avoided integrating M-Pesa Payments into the

Uber App. All parties, including M-Kopa, also note that it is not M-Pesa per se that is important. What is important for their business is a cheap, fast, secure and widely used payment system.

6.6.4 Startup Stories

With the exception of Uber, which is an American founded firm with international operations, all firms are startups that were founded in Kenya and were developed as a result of M-Pesa. Their services or products were thus, from the firms' perspective, new to the world, as no other players were offering a similar product in a similar way before. The journeys of all the cases, even Uber, are also very reminiscent of typical startup stories.

Business Model Iterations: All firms went through a process of rapid trial and error, with many modifications made based on feedback and new suggestions. Mdundo have tried a number of different business models and are not yet sure which one they will pursue. HiviSasa went dormant for over a year after they were initially unable to get funding, before a new team took over. Uber tried out without a cash option, but quickly decided that this was needed, and the local team was charged with finding a way this could be aligned with their existing business model. Uber's use of M-Pesa in its internal operations locally is a testament to the fact that even big companies can adopt an innovation to adjust to the local circumstances. M-Kopa has already undergone several iterations of their product, and is now moving into becoming a microfinance company as opposed to only being a solar energy company. Thus, all cases exhibit a pattern of discovering business opportunities and exploiting them as a way to innovate. None really engaged in any big heavy R&D or technological scientific research.

In addition, all their products are relatively standard off the shelf, from a technical point of view. The only exception for a physical product is M-Kopa who had special base stations designed and produced in China.

Role of Founders: In all of the cases, the role, vision and knowledge of the founders play a big role in the innovation and direction of the company. In addition, none of the founders and current CEO's of the companies are native Kenyans.

For M-Kopa, the knowledge and experience of founders Nick Hughes was essential. Nick had been one of the main people behind the developments of M-Pesa, and probably has one of the best understandings of mobile money in the world. In addition, as the "father" of M-Pesa he had direct access to Safaricom, making it easier to establish the partnership.

For Branch, Matt Flannery was co-founder of Kiva and head of Kiva Zip, a very popular online peer-2-peer microloan platform and it was this hands-on experience that inspired him to start Branch.

Martin from Mdundo, was with the team from the start and has been a driving force in trying different business models, like whether to integrate M-Pesa or not, and identifying and trying new products. Co-founder Kresten's initial observation that local content was low, was the idea that led to the founding of Mdundo.

In HiviSasa, it was the personal experiences and observations of co-founder Pierre that lead to the idea. Current CEO Chloe has in turn been a driving force in building and expanding upon that initial idea, trying out new possible solutions.

In Uber, founder Travis Kalanick, was initially very hesitant when it came to integrating cash option, as this was opposed to his vision. But when data showed that there were no alternatives, he quickly changed mind and personally allowed the local team to go ahead and implement it.

6.6.5 Context

Several of the startups raised the local political and regulatory climate as a concern. HiviSasa specifically said they preferred to work "under the radar" for a while, until they became big enough to handle eventual political challenges. For this reason they have also postponed their idea of criticizing politicians. Branch also noted some of the challenges with the regulatory framework limiting what they can do in financial services.

Mdundo, and especially HiviSasa, stressed the difficulty of getting investment and funding as a key challenge, which has forced both companies to run very lean modes of operations. Lack of investment, despite good performance, was also what initially caused HiviSasa to close down for more than a year. According to HiviSasa there are simply not enough local investors available, making it really difficult to find funding.

In terms of competitive market their stories vary a bit. HiviSasa, M-Kopa, Branch and Mdundo are in many ways such different and new products that it is difficult to put a finger on who they compete against. M-Kopa's founders like to note sarcastically that their main competitor is the kerosene lamp, which is by no means untrue. Since the level of mobile payment integration present in Kenya is fairly unique, HiviSasa's and Branch's business models are relatively unique to both Kenya and the world. In the case of HiviSasa, no other media currently provides local news - not even established newspapers - so their main competitor is word of mouth. Other companies in

Kenya do provide loans over the mobile phone, most notably the Safaricom lead M-Shwari. But no one uses data on the users smartphone as a way to establish credit scores. And while there are a lot of online music services around the world Mdundo is the only player that specifically targets the Kenyan market and can boast of having an enormous African catalogue. Thus, these four cases have to different extents created their own market places where there were none before. In the case of Uber, several smaller local companies had previously attempted to provide an app-based taxi booking service, but no one had even near the success of Uber. This has partly been a result of Uber's much bigger marketing and operations budget, but also as a result of a much better customer experience. None of the other allowed the seamless payment with credit card, a major value proposition of Uber. In addition, at launch Uber already had a large international loyal customer base who knew and trusted the service.

6.6.6 Social Impact

Of the companies studied three explicitly mention social impact as one of their key motivations or goals. M-Kopa notes how they have provided people with affordable light and electricity, while helping fight indoor air pollution as a result of their product replacing kerosene lamps. In addition, they note how their system provides collateral to hundreds of thousands of people, which they can use towards a loan. HiviSasa stressed that in addition to creating jobs for local writers they have a bigger goal of increasing the access to local news and information for people all over Kenya. Down the line they envision their platform being used as a medium for citizen journalists to hold politicians and business people accountable and provide a democratic voice to the masses. Finally, Branch notes how lack of easy access to finance is one of the biggest barriers to development in many areas of the economy and notes how their app can help solve that. In addition to simply acknowledging their social impact, all three cases also stress that social impact was one of their goals and main drivers from the start.

6.7 Empirical Framework

From our Empirical analysis the following things stand out:

1. <i>M-Pesa is used everywhere</i> , in very different ways irrespective of industry and location. Its use can be categorized as Enabled, Optimized and Used. With HiviSasa, Branch and M-Kopa falling into the first category and Mdundo and Uber falling into the second.
2. <i>The limitations of M-Pesa</i> are the inability for users to scale internationally since it is confined to Kenya, M-Pesa's simple and outdated technology as well as the difficulty of working with Safaricom, who ensures that M-Pesa is in many ways a "closed system". All parties, except for M-Kopa, stressed that M-Pesa as such was not important, what was important was a cheap, fast, secure and widely used way of easily transmitting money.
3. <i>All cases exhibit typical startup traits</i> and have gone through a rapid process of trial and error to find the right business model. In this process the founders, who in most cases got inspiration to the companies by "discovering opportunities", played a big role. In several cases this led to the creation of completely new markets, where there were none before, enabled by M-Pesa as well as the specific local context.
4. Difficulty getting funding, rigid regulatory framework, complicated political climate were mentioned as some of the <i>key contextual challenges</i> .
5. <i>Of the key motivations</i> three companies mention social impact as one of their key goals and motivations for starting.

7 Analysis

7.1 Uses of M-Pesa

Using our definition of *An innovation is the implementation of a new or improved product, process or service, that creates value for the firm and the customer*, we will now move into the analysis.

For all cases the existence and introduction of M-Pesa has been a tool that has had tremendous impact on their business models. There is little doubt that it has created value to the firm and in many cases enabled them to develop new business models reaching new customers, most particularly in the case of Branch, M-Kopa and HiviSasa. From our three types of innovation, M-Pesa has in all cases clearly worked as a process innovation, that optimized the internal processes of the firm. In addition, for Branch, HiviSasa, and M-Kopa, who fell into the "enabled" category, M-Pesa has also enabled a product innovation.

The categorization of *enabled*, *optimized* and *uses* lends itself well, as a starting point for analyzing M-Pesa through the lens of Henderson and Clark's (1990) innovation matrix. As table four showed, M-Pesa's competitors or alternatives are cash or credit cards, and the table outlines M-Pesa's key pro's and con's. Through the lens of Henderson and Clark, we can see M-Pesa as a component in a larger innovation system, that of the firm. Alternative components that could fill a related role would thus be Cash or Credit Cards (or other payment mechanisms).

In the case of Uber, M-Pesa has been a modular innovation. It has entered an existing system, and optimized that system, but not fundamentally changed the linkages or the way the business operates. In the case of Mdundo, the current use of M-Pesa is also modular. It is used internally as a way of transferring funds to artists, but artists could also receive funds through other means - and while there is little doubt that M-Pesa has greatly optimized that process - the linkages and systems would arguably not change without M-Pesa, as witness in other countries.

In the case of HiviSasa, M-Kopa and Branch, which were all classified as being "enabled" by M-Pesa, there is little doubt that M-Pesa has enabled a radical innovation. M-Pesa as a new component has directly changed or facilitated a change of the system. Or said in other words, the business model directly depends on the existence of M-Pesa, and the linkages within the firm are therefore configured and aligned to take advantage of M-Pesa.

When it comes to M-Kopa's recent development into a microfinance company, lending funds using the existing solar installation as collateral, we are observing an architectural innovation.

The same is the case of HiviSasa as they start to use freelance writers as sales agents for add space. In both cases, existing components are reorganized to provide new functionality to the firm. The table below shows an overview of the types of innovation according to Henderson and Clarks (1990) framework:








Incremental	Modular	Architectural	Radical
		 (Micro lending Service)	 (Solar System Sale)
		 (Freelance sales people)	 (Freelance writers)
			

Table 6: Type of Innovation in Cases

Despite its fairly general applicability, one of the limitations with Henderson and Clark's framework is that it is primarily designed to take into account R&D developments of existing products or services. When HiviSasa was founded M-Pesa was integral to the business model, and as such it did not replace anything. Thus, if we are to analyze what innovation M-Pesa facilitated through the lens of Henderson and Clark, we must look retrospectively, and ask hypothetically what a similar business model would look like in the absence of M-Pesa. This can be done with Mdundo, and Uber because they work in countries where M-Pesa does not exist, and we can thus use those countries as natural comparisons. For Branch, M-Kopa and HiviSasa it is more complicated. Yet, if a business model is fully dependent on a specific component, in this case M-Pesa, there is little doubt that its impact as an enabler for innovation has been radical for the firm in question.

7.2 Drivers and Directions

There is little doubt that advancement in technology, as proposed by MacLaurin in 1947 has been a major driver for innovation among all case firms. M-Pesa is a technological product, and the continuing decline in prices of regular cellphones and more recently smartphones has been key to

ensuring the high uptake and usage of M-Pesa. However, none of the technology in M-Pesa is new or in any way advanced. The entire ecosystem was built to work on even the worst and simplest phones, and it was therefore built with relatively old, proven and existing technology.

Most firms mention the "discovery of opportunities" as their main drivers. Demand, as explained by Schmookler (1961), was definitely a factor, but not directly stated by any firms. Instead it was often implied demand, such as impressions from founders that people wanted access to local news, or that people wanted access to cheaper and cleaner household lightening.

In addition, three firms mention the desire to make a social impact as one of the drivers and goals for them, which draws parallels to Ogburn's focus on the social process and outcomes of innovation.

A better way to understand the drivers is through induced demand, as explained by Hicks (1932). As M-Pesa entered the market the price, security and speed of sending money between people, as well as the possibilities for doing so, changed drastically, opening up a whole new set of opportunities not available before. Combined with the founders desire to make money or to have a social impact, this induced innovation in the field of providing services using M-Pesa.

When it comes to the development of M-Pesa over time there seem to be some clear traits of path dependency and lock-in effect, as explained by Arthur (1983). While the M-Pesa system in some ways leapfrogged the old banking system, which was itself, for various reasons, locked-in to an old inefficient system (Omwansa & Sullivan, 2012), it has also now caused clear path dependence. The services developed for M-Pesa, does not scale internationally, and due to the technical limitations, necessary to make a system that worked on even the most basic feature phones, the M-Pesa system is in itself in some ways outdated. This has been exemplified by Mdundo, Branch, Uber and HiviSasa, who all wanted to incorporate it, but had a difficulty incorporating the old technology, and also did not want to get locked into a specific, outdated, system.

Founders play a big role in the drivers and directions, but with the exception of Schumpeter's initial focus on the individual entrepreneur, their role seems relatively neglected in the literature. Their existing knowledge of the ecosystem, and ability to carry out innovations and run companies has been a pivotal enabler for innovation and for the creation of new business models. In addition, the process has involved a lot of trial and error, indicating that the process has been more akin to searching for demand through various product offerings in a rapid iterative process than seeing a demand and then specifically meeting it.

When it comes to scale approaches, as discussed by Arthur (1994), there is no doubt that M-Pesa as an ecosystem has increasing returns to scale and that the ecosystem increases exponentially in value as more people and services are provided in the ecosystem. This increasing value can also be one of the causes of lock-in effect, since it is too difficult and costly to change to a new and more modern system. While this does not have direct impact for the firm in the innovation process, it holds cumulative value societally. M-Kopa is already the second biggest user, in terms of revenue, of the Pay Pill function, receiving daily installments exceeding 4 million KSh (\$40,000 USD). Thus, every service or product added to the ecosystem enhances the value of the system as a whole.

This also highlights the challenges to internationalizing for the firms that are "enabled" by M-Pesa. The ecosystems for mobile payments are not as large outside of Kenya, making it difficult to find users or customers for their products and services. However, their own presence in another ecosystem, enhances the value of that ecosystem, and can in fact work as an important enabler for mobile money penetration elsewhere.

In many ways the innovations enabled by M-Pesa can be understood through the lens of frugal innovation. The innovations enabled are often more solutions than actual products. M-Kopa's solar panels are products, but the real innovation lies in their pay-as-you-go-like financing solution. Furthermore, they are not just selling a solar panel. They are selling access to cheap and clean electricity, and enabling customers to build a collateral. The product is specifically designed with the BoP customer in mind, and uses existing technology in a new and innovative way. Mdundo, HiviSasa and Branch all deliver solutions, at a fraction of the cost compared to the west, due to innovative business model tailored specifically to the local context.

On the contrary it is difficult to see the innovations enabled, as disruptive innovation as understood by Christensen. None of the cases rely on any particularly new or groundbreaking technology. They all create or play in a relatively uncontested playing field, and while there is no doubt that the innovations are unique, and in some cases, had a very transformative effect on people and society, they do not follow the path of disruptive innovation described by Christensen. It is hard to argue that kerosene lamps or word-of-mouth-news were market leaders in any recent time in history.

7.3 Impact

When it comes to impact there is little doubt that M-Pesa as a service has had an enormous social impact on society as a whole, confirming Ogburn's thesis that innovation has a social dimension. Not only has it enabled millions of people who were previously financially excluded to become part of the financial system, it has also changed the social composition of society - as funds between friends and relatives can now be transferred seamlessly and securely, increasing trust and social cohesion. Of the cases three, M-Kopa Solar, HiviSasa and Branch, explicitly state that meeting a social need and addressing societal challenges are some of their key goals. Having more than 250.000 households who have installed M-Kopa's solar solution, there are now 250.000 households who have better indoor air quality, save 40 shillings a day from buying kerosene, have access to indoor light and power for their cellphones. Out of these 100.000 households have already paid for the device, and can now use it as a collateral for future loans - for the first time entering the financial sector without paying exorbitant fees. Finally, there are now 250.000 households less that burns fossil fuels emitting Co2.

That M-Pesa has had an economic impact on the startups is of little doubt. It holds that the implementation of M-Pesa has without doubt created value to the cases examined. The value is obviously higher for the three cases that have been enabled by M-Pesa, compared to the ones that it has optimized. Specifically, M-Pesa has significantly lowered the cost of making and receiving payments, and also drastically increased the reach from which the firms can receive payments. The decrease in transaction cost has thus opened a whole new market that was not previously available. Whether M-Pesa has had a larger cyclical impact, as described by Kondratiev, is difficult to tell, and not of very high relevance for the firm. In terms of shorter term economic cycles, one could argue for evidence of Schumpeter's creative destruction cycles, as M-Pesa have replaced old infrastructure, but this knowledge does not say much about the firms innovation process.

8 Discussion

8.1 M-Pesa as an enabler of innovation

A Frugal Innovation: M-Pesa is in many ways the definition of a Frugal Innovation. It is targeting the mass low-income market; the product is not a discount version of something else, but developed directly with the user in mind. It is developed and tested in co-operation with the users and local stakeholders and is truly a "Kenyan" product. As a result, it is a Kenyan solution, conceived, implemented and used to address a Kenyan societal challenge, and perhaps embody more than anything else how innovations are in many cases a direct response to the societal challenges in which they arise. The innovations enabled by the firms are extensions of this enabler and try to address their own societal challenges leveraging the possibilities M-Pesa have enabled. It seems that the existing theory is good at capturing and enhancing our understanding of some parts of the innovation process in the cases reviewed, yet there are also limitations.

Unique Context: The unique context of where the firms operate means that much of the theory seems misguided. First of all, much of the theory seems to assume that an innovation in some way directly replaces something else already existing. In the cases studies, while a new service will almost always replace something else in society, like M-Kopa replacing kerosene lamps, the innovations happening in the companies themselves are first to the world and does as such not replace anything.

Opening a Blue Ocean: In this perspective it makes more sense to see the products and services offered by the firms through the lens of Blue Ocean Strategy. By providing a cheap method of reaching millions of people with a mobile payment solution M-Pesa has opened the door for a whole new customer segment that was previously not served at all, and where the demand for better solutions was very high. As discussed earlier in the section about how poor handles finances, the poor are very aware of their demands and needs and institute their own mechanism to meet them. With the introduction of M-Pesa, they are suddenly part of the economic system, and they demands can now be met by companies like Branch and M-Kopa Solar. Yet, while Blue Ocean Strategy outlines an option or a strategy the firms can pursue, it says little about how or through what process. This is partly a result of the firms being startups. Most of the literature, Blue Ocean Strategy included, primarily looks at big corporations or established firms.

The role of the Entrepreneur: In addition, the existing literature seems to overlook the human aspect of the innovation process. Yes, advances in technology and basic research opens up a lot of possibilities, and expressed demand means that one can sometimes innovate directly to meet that need. However, someone has to connect the dots and ensure that the opportunities are harnessed. The conventional economic theory of a multitude of players all needing to innovate in a competition for market share seems misaligned in a Kenyan context. There are often few or no players in the existing markets, as many of the potential customers are first now becoming consumers as a result of the market access that M-Pesa has facilitated. Blue Ocean strategy and Bottom of the Pyramid partly capture this process, but both theories seem mainly to concern larger companies.

The key drivers where the individual entrepreneurs who either *discovered an opportunity*, as was the case with Mdundo, Branch and HiviSasa, or who directly sought to solve a social problem in impactful way, like was the case with M-Kopa Solar and Branch, seems not to be well understood.

8.2 Smartphones and the limits of M-Pesa

While this thesis and research has mainly surrounded the development of M-Pesa and its function as an enabler for innovation, it is acutely clear that another massive new development with transformative potential is just around the corner, namely the Internet enabled smartphone. The M-Pesa system was developed in a time when cheap simple mobile phones were finding their ways into the most remote areas of the world and for the first time connecting people at an unprecedented low price.

The goal of M-Pesa was to build a payment system that could work on these simple phones and at this they were wildly successful. However, simple smartphones can today be acquired for as little as 4000KSh (40\$), around the same price as the cheapest basic feature phones cost when M-Pesa launched in 2007 (Hinz, 2014). That their uptake and importance is growing rapidly is also evident from our case studies. When Mdundo launched their service in 2012 their goal was to provide songs to normal people with feature phones. In February 2014, only 17-18% their users were on Android phones, but already in September 2015, a year and a half later more than 50% are Android users. As described in their case this has led Mdundo to increasingly focus their energy on building and developing their business through the Android App (in this context synonymous with smartphone). Another case, Branch, works solely through a mobile app so all their customers must

have a smartphone for their product to work. The entire Uber business model, both for riders and drivers require that both parties have smartphones.

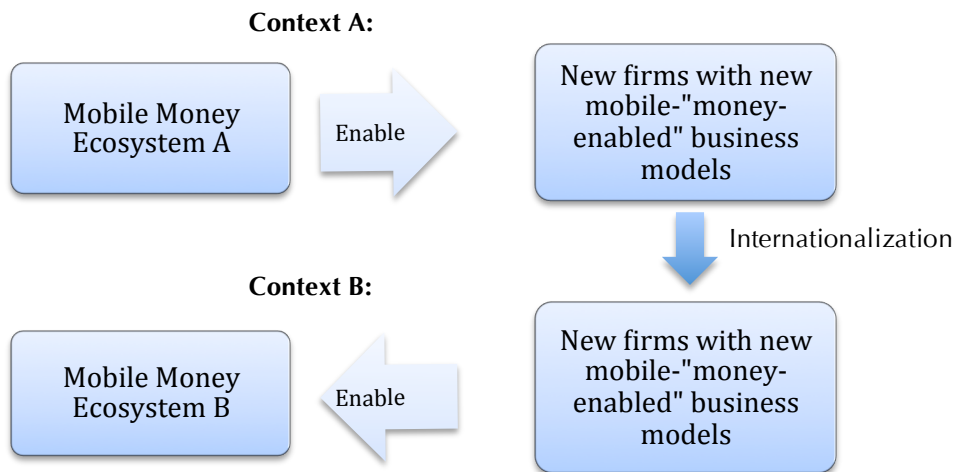
The decline in prices of smartphones and continuing decline in price of mobile internet, as well as initiatives, like the Facebook lead *Internet.org*, means that millions of people that were previously only connection through voice, sms and in the Kenyan context, also M-Pesa - will now be digitally connected on a whole new dimension (Talbot, 2014).

What the future will bring, what direction this new development will take and at what speed on the larger societal scale is of course guesswork, but in the context of M-Pesa it brings up some very pressing questions. What will M-Pesa do in an age of smartphones? M-Pesa was developed for a market where feature phones were dominant and their product was excellent at integrating in that ecosystem, but already today startups and entrepreneurs are finding it difficult to work with M-Pesa due to the limited technical integration possibilities with the current setup.

In some way this is a bit of a paradox. M-Pesa is heralded as one of the key examples of Frugal Innovation, incorporating most of the ideas that is described as frugal innovation. Yet, as time has progressed the M-Pesa platform that was heralded as a revolution, now seems to be its own biggest stumbling block. As people move to a world of smartphones, the question is how M-Pesa will integrate and also what other services that will appear. The questions also depends on to what extend Safaricom is able to keep up with the general development. Last year they launched M-Ledger, an Android app that scraped the phone for sms messages from M-Pesa (all transactions are confirmed with an sms) to provide an easy visual overview of users own M-Pesa transaction history. In addition, they launched an API in July 2015 that should, in theory, open up for the possibility of other parties easier incorporating M-Pesa into their products - though the result has yet to be seen.

In addition to this limitation there is also a question of scaling internationally. As Uber and Mdundo pointed out, they decided to not spend time trying to integrate a specific M-Pesa payment mechanism in their system, because that module would not scale internationally and therefore limiting its usefulness.

8.3 Firms as a driver for mobile money



The main focus of this paper has been on how a mobile money ecosystem, in this case M-Pesa in Kenya, impacts the firm (Illustrated above in context A). Yet, there is also evidence of a reverse correlation (Illustrated above in context A). That is; how the existence of firms that leverage mobile money impacts the mobile money ecosystem. One of the questions that have surfaced several times in the cases and in the analysis is the question of internationalization when it comes to the entrepreneurs enabled by M-Pesa. In this context the firms could play a role in enabling mobile money abroad, as it their presence in other markets increases the utility of the overall mobile payment ecosystem.

As discussed by Arthur (1994) in the literature review, the successful introduction of some innovations depends on network effects as they face increasing returns to adoption. For instance, being the first person in the world to hold a telephone or create a Facebook account is to little use if no one else signs up or buys a phone. The same is the case with a mobile payment ecosystem. The more people who utilize a given service or product, the more valuable the product or service is to all parties.

M-Pesa originated as a p2p financial service, whose biggest asset at its inception was to enable people to easily and cheaply transfer money between each other. As discussed previously the factors leading to its rapid and widespread adoption included a lack of useful alternatives, a big reliance on Safaricom as the primary provider of cellphone services, as well as a very large network of kiosk where users of M-Pesa could deposit or withdraw money from the platform. This meant, that even despite few auxiliary services, M-Pesa held great value as a p2p network. Since then

many services and uses have grown around the M-Pesa platform. It can now be used to buy goods, pay bills, take loans, further increasing the utility of the M-Pesa Network. Thus, the M-Pesa network now both work as a peer-to-node (buy goods, pay bill, etc.) and as a p2p network (direct transfer).

Yet, despite the existence of M-Pesa in Kenya for more than eight years and its worldwide acclaim, the uptake has been surprisingly slow in other countries. The reasons for this has been discussed at length elsewhere (See Omwansa & Sullivan, 2012) and there are a multitude of reasons. The most commonly cited reasons can be seen in the table below (adopted from Mas & Ng'weno, 2010):

Supply side barriers	Demand side barriers
1. Regulatory and legal barriers.	1. Cheap functional alternatives.
2. Low telco kiosk penetration.	2. Lack of trust in telcos.
3. No dominant telco.	3. Few existing users - decreasing the initial utility.
	4. Few existing services - decreasing the initial utility.

Table 7: Barriers to Mobile Money Adoption

While reasons and importance of the different barriers vary from country to country, the last two are barriers can be understood through Arthur's (1993) theory of increasing returns to adoption. Scaling internationally by M-Pesa enabled firms will not initially address the problem of "few existing users", but it will address the problem of "few existing services". Thus, as these firms start scaling and growing internationally their products or services will be available in other non-mobile money countries.

This means that when a new person in a new country signs up for mobile money, they will from day one have access to a wide host of products, increasing the initial utility. Reversely, these firms will push their users and customers to pay them with mobile money, and proactively promote it. As Kaitlin from Uber said *"drivers taking cash in other countries will likely be forced to open a mobile banking account to reimburse their excess cash holdings"*. Similar situations could happen with HiviSasa and Branch and is already happening with M-Kopa. If users in other countries want access to cheap loans through Branch or solar systems paid in installments through M-Kopa Solar, it is a requirement that they have mobile money. The presence of firms and the products in essence increases the value of the entire mobile payment ecosystem, encouraging more people to sign up. Thus, the firms go from being enabled by mobile money in on context, to themselves being enablers of mobile money in another context.

This fact also has policy implications. As discussed M-Pesa have tremendous positive social and economic impact, and many other countries have tried to roll it out exactly for that reason. If the likelihood of a successful establishment of a mobile payment ecosystem increases as more services or products are added to the ecosystem, then politicians and other official bodies advocating for the system should do as much as they can to incentivize or facilitate the creation or establishment of third party players using the system.

9 Implications

9.1 Implications for Governments and practitioners

1. *M-Pesa as a tool for development:* M-Pesa has in itself brought simple financial services to millions of people. It is not easier to sell, and buy good and transfer money between people. Yet, much of the real poverty reduction and development happens when third parties use these newly establish financial channels, to provide creative financing mechanism and offer services and products that the poor have demanded, but been unable to get. Thus, big benefits can be achieved if mobile money systems take an integral role in the fight against poverty.
2. *Firms as a driver for mobile money:* The conversion of users and general mobile money penetration increases exponentially as the value of the overall ecosystem increases. One effective way to quickly boost the utility is to invite or otherwise enable businesses to easily incorporate of utilize mobile money in their business models.

9.2 Implications for Future Entrepreneurs

1. *M-Pesa and other mobile money systems can provide access to a blue ocean:* M-Pesa has shown that mobile money might be the key that can open access to millions of customers, in new uncontested markets.
2. *Opportunities are discovered:* Entrepreneurs need to work, live and experience the context to discover opportunities for new businesses.
3. *Context Matters:* Understanding and appreciation of context and culture is key to successfully developing a product or service that can take advantage of mobile money in Kenya. Yet, being a foreigner does not in itself disqualify anyone.
4. *Trial and Error takes time.* A good idea takes time to develop and unfold, and it involves a lot a trial and error and back and forth before the model is right.
5. *Smartphones is the future.* While M-Pesa is a game changing invention, the future lies in smartphones. Entrepreneurs should be aware of this, and be wary of building the business on soon outdates technology.

6. *Creative Business Models*. The key to success seems to be business model innovation. The products are often similar, or incrementally different. The key possibility opened by M-Pesa is to make an innovative business model.
7. *Firms and MNCs*: Larger corporations can successfully harness the benefits of mobile payments if they allow local people to drive innovation, and maintain a flexible approach to trial and error.

10 Suggestions for Future Research

10.1 Liability of Foreignness among Founders

All startups interviewed were started or managed by expats. In fact it was difficult to find startups leveraging M-Pesa that were founded or managed by locals. This could be a coincidence, but from general observation there seems to be a large degree of expats working in this field. This could be an interesting area for future research, as this in some way challenges the liability of foreignness theory discussed by Zaheer (1995) Petersen & Pedersen (2002) as well as Johanson & Vahlne (2009) among others.

10.2 Startup theory

Since all the firms analyzed were startups it would be interesting to look at startup theory. The literature and understanding of startups have grown rapidly within the last ten years. As opposed to earlier where startups were seen as "small versions of large firms", often referred simply to as SMEs, there is now increasingly an understanding that small new startups are radically different in focus, structure and process than their large corporate or more established counterparts, leading to a whole new body of literature focusing only on startups (Blank, 2013; Ries, 2011).

11 Conclusion

It is difficult to overstate the far-reaching impact M-Pesa has had on Kenyan society. By drastically lowering transaction costs and by facilitating access to millions of potential customers in Kenya, M-Pesa has opened the door for entrepreneurs to reach a millions of people at a fraction of what it previously cost. This have induced significant innovation in the filed, as entrepreneurs have discovered various business opportunities that leverage the M-Pesa ecosystem. The innovations enabled are both product and process innovations, as well as architectural, modular and radical to the firms, and are present in all parts of society. In addition to being sound businesses, a lot of the innovations also have a big social dimension and try to address a social problem. This is often driven by passion from the founder, and in general the founders play a big role.

Existing literature help explain many parts of the process, but are inadequate when it comes to explaining the specific process innovation undertaken by entrepreneurs in emerging markets, where few competitors or existing services exist.

Despite its radical success M-Pesa might already soon be technologically outdated as smartphone penetration is growing at an unprecedented speed, opening a whole new set of possibilities and potentially inducing even more innovation in the field.

For the firms depending heavily on M-Pesa the ecosystem can be a double-edged sword. On one hand M-Pesa have enabled them to capture a new market, not reachable before. Yet, on the other hand they are locked-in and confined to countries with high mobile money penetration limiting their growth potential. Once they do enter a new market however, they increase the value of the overall mobile money eco-system, and can themselves become enablers for mobile money usage in new markets. The latter means, that countries or entities interested in establishing a mobile money ecosystem should make it easy for firms and entrepreneurs to incorporate the mobile money ecosystem into their products.

12 Bibliography

- Abernathy, W. J., & Utterback, J. M. (1978). Patterns of industrial innovation. *Technology Review*, 40–47.
- Acemoglu, D., & Robinson, J. (2013). *Why Nations Fail: The Origins of Power, Prosperity, and Poverty*. Retrieved December 9, 2015, from <http://www.amazon.com/Why-Nations-Fail-Origins-Prosperity/dp/0307719227>
- Arrow, K. (1962). Economic welfare and the allocation of resources for invention. *The Rate and Direction of Inventive Activity: Economic and Social Factors, I*, 609–626.
<http://doi.org/10.1521/ijgp.2006.56.2.191>
- Banerjee, A. V., & Duflo, E. (2011). *Poor Economics: A Radical Rethinking of the Way to Fight Global Poverty*. PublicAffairs. Retrieved from
https://books.google.com/books?id=em3_AgAAQBAJ&pgis=1
- Betz, F. (2011). *Managing Technological Innovation: Competitive Advantage from Change*. John Wiley & Sons. Retrieved from <https://books.google.com/books?id=EVHxcjeHqjUC&pgis=1>
- Bhatti, Y. A. (2012). What is Frugal, What is Innovation? Towards a Theory of Frugal Innovation. *SSRN Electronic Journal*, 1–45. <http://doi.org/10.2139/ssrn.2005910>
- Blank, S. (2013). Why the lean start-up changes everything. *Harvard Business Review*.
- Cartwright, E. (2011). *Behavioral Economics*. Routledge. Retrieved from
<https://books.google.com/books?id=ZsGfSQAACAAJ&pgis=1>
- Chesbrough, H. (2006). Open Innovation: A New Paradigm for Understanding Industrial Innovation. *Open Innovation: Researching a New Paradigm*, 1–12. <http://doi.org/citeulike-article-id:5207447>
- Chesbrough, H. W. (2011). Everything You Need to Know About Open Innovation. Retrieved September 15, 2015, from
<http://www.forbes.com/sites/henrychesbrough/2011/03/21/everything-you-need-to-know-about-open-innovation/>
- Christensen, C. M. (1997). *The Innovator's Dilemma. Business*. Retrieved from
<http://www.amazon.ca/exec/obidos/redirect?tag=citeulike09-20&path=ASIN/0060521996>
- Christensen, C. M. (2006). The ongoing process of building a theory of disruption. *Journal of Product Innovation Management*, 23(1), 39–55. <http://doi.org/10.1111/j.1540-5885.2005.00180.x>
- Collins, D., Morduch, J., Rutherford, S., & Ruthven, O. (2009). *Portfolios of the Poor: How the*

- World's Poor Live on \$2 a Day*. Princeton, New Jersey: Princeton University Press. Retrieved from <https://books.google.com/books?id=esDhcbEHOfkC&pgis=1>
- Cook, T., & McKay, C. (2015). *How M-Shwari Works: The Story So Far. Reports by CGAP and its Partners*. Retrieved from <http://www.cgap.org/sites/default/files/Forum-How-M-Shwari-Works-Apr-2015.pdf>
- Croitoru, A. (2012). A review to a book that is 100 years old - The Theory of Economic Development: An Inquiry Into Profits, Capital, Credit, Interest, and the Business Cycle. *Journal of Comparative Research in Anthropology and Sociology*, 3(2), 137–148. Retrieved from https://books.google.dk/books/about/The_Theory_of_Economic_Development.html?id=-OZwWcOGeOwC&pgis=1
- David, P. A. (1985). Clio and the Economy of QWERTY. *The American Economic Review*, 75(2), 332–337.
- Diamandis, P., & Kotler, S. (2015). *Bold: How to Go Big, Create Wealth and Impact the World*. Retrieved December 9, 2015, from <http://www.amazon.com/Bold-Create-Wealth-Impact-World/dp/1476709564>
- Dosi, G. (1982). Technological Paradigms and Technological Trajectories: A Suggested Interpretation of the Determinants and Directions of Technical Change. Retrieved from <http://papers.ssrn.com/abstract=1505191>
- Elliott, J. (1980). Marx and Schumpeter on Capitalism's Creative Destruction: A Comparative Restatement. *The Quarterly Journal of Economics*, (August), 45–69. <http://doi.org/10.2307/1885348>
- Fagerberg, J. (2003). Innovation : A Guide to the Literature. *The Many Guises of Innovation: What We Have Learnt and Where We Are Heading*, 1–22. <http://doi.org/10.1093/oxfordhb/9780199286805.001.0001>
- Foxon, T. J. (2002). Technological and institutional “ lock-in ” as a barrier to sustainable innovation. *Change*, 1–9. Retrieved from <http://www.iccept.ic.ac.uk>
- Foxon, T. and Kemp, R. (2007). Innovation impacts of environmental policies. In C. Dora Marinova, David Annandale and John Phillimore, Edward Elgar (Ed.), *International Handbook on Environment and Technology Management* (pp. 119–139.).
- Freeman, C. (1988). *Japan: a new national system of innovation? Technical Change and Economic Theory*. Retrieved from http://www.lem.sssup.it/WPLem/files/dosietal_1988_V.pdf
- Freeman, C. (1994). Innovation and Growth. In M. Dodgson & R. Rothwell (Eds.), *The handbook*

- of industrial innovation*. E. Elgar. Retrieved from https://books.google.dk/books/about/The_handbook_of_industrial_innovation.html?id=se5OAAAMAAJ&pgis=1
- Freeman, C., & Perez, C. (1988). Structural crises of adjustment, business cycles and investment behaviour. *Technical Change and Economic Theory*. <http://doi.org/10.2307/2234048>
- FSD Kenya. (2006). Financial Access in Kenya Results of the 2006 National Survey, (October). Retrieved from <http://www.fsdkenya.org/finaccess/documents/FinaccessReportFINALMain.pdf>
- Godin, B. (2008). In the shadow of Schumpeter: W. Rupert Maclaurin and the study of technological innovation. *Minerva*, 46(3), 343–360. <http://doi.org/10.1007/s11024-008-9100-4>
- Godin, B. (2008). Innovation: the History of a Category. *Project on the Intellectual History of Innovation Working*, (1), 1–67. Retrieved from <http://www.amazon.com/dp/0374223130>
- Godin, B. (2015). *Innovation Contested: The Idea of Innovation Over the Centuries*. Routledge. Retrieved from <https://books.google.com/books?id=kIscBgAAQBAJ&pgis=1>
- Greenacre, P. (2012). Innovation Theory : A review of the literature, (May).
- Griliches, Z. (1957). Hybrid Corn: An Exploration in the Economics of Technological Change. *Econometrica*, 25(4), 501–522. <http://doi.org/10.2307/1905380>
- Henderson, R. M., & Clark, K. B. (1990). Architectural Innovation: The Reconfiguration of Existing Product Technologies and the Failure of Established Firms. *Administrative Science Quarterly*, 35(1), 9–30. <http://doi.org/Article>
- Hicks, J. R. . (1932). *The Theory of Wages*. Macmillan. Retrieved from <https://books.google.com/books?id=AXKXMgEACAAJ&pgis=1>
- Hinz, M. (2014). M-PESA : The Best of Both Worlds, (2011), 1–15.
- Hobday, M. (2005). Firm-level Innovation Models: Perspectives on Research in Developed and Developing Countries. *Technology Analysis & Strategic Management*, 17(2), 121–146. <http://doi.org/10.1080/09537320500088666>
- Johanson, J., & Vahlne, J.-E. (2009). The Uppsala internationalization process model revisited: From liability of foreignness to liability of outsidership. *Journal of International Business Studies*, 40(9), 1411–1431. <http://doi.org/10.1057/jibs.2009.24>
- Karlan, D., & Appel, J. (2011). *More Than Good Intentions: Improving the Ways the World's Poor Borrow, Save, Farm, Learn, and Stay Healthy*. Penguin Publishing Group. Retrieved from <https://books.google.com/books?id=JOMDsm5Gn9kC&pgis=1>

- Khanna, T., & Palepu, K. G. (2006). Emerging Giants: Building world-class companies in developing countries. *Harvard Business Review*, 84(10), 60–69.
<http://doi.org/10.1007/BF02701255>
- Kim, W. C., & Mauborgne, R. (2005). *Blue Ocean Strategy: How to Create Uncontested Market Space and Make Competition Irrelevant*. Harvard Business School Press. Retrieved from https://books.google.com/books?id=A-90l_KebjcC&pgis=1
- Kline, S. J., & Rosenberg, N. (1986). An Overview of Innovation. *European Journal of Innovation Management*, 38, 275–305. <http://doi.org/10.1108/14601069810368485>
- Kuznets, S. S. (1930). *Secular movements in production and prices: their nature and their bearing upon cyclical fluctuations*. Retrieved from https://books.google.dk/books/about/Secular_movements_in_production_and_pric.html?id=R T4vAAAAMAAJ&pgis=1
- Markides, C. (2006). Disruptive Innovation : In Need of Better Theory † Business-Model Innovation, (1997), 19–25. <http://doi.org/10.1111/j.1540-5885.2005.00177.x>
- Mas, I., & Ng'weno, A. (2010). Three keys to M-PESA ' s success : Branding , channel management and pricing. *Journal of Payments Strategy & Systems*, 4(4), 352–370.
- Muthiora, B. (2015). Enabling Mobile Money Policies in Kenya Fostering a Digital Financial Revolution, (January).
- Nemet, G. F. (2009). Demand-pull, technology-push, and government-led incentives for non-incremental technical change. *Research Policy*, 38(5), 700–709.
<http://doi.org/10.1016/j.respol.2009.01.004>
- O'Sullivan, D., & Dooley, L. (2008). Applying Innovation. *Innovation*, 424.
<http://doi.org/10.4135/9781452274898>
- OECD, & Eurostat. (2005). *Oslo manual: Guidelines for collecting and interpreting innovation data* (Vol. Third edit). <http://doi.org/10.1787/9789264013100-en>
- Omwansa, T. K., & Sullivan, N. P. (2012). Money, Real Quick: The story of M-PESA. Retrieved December 9, 2015, from <http://www.amazon.com/Money-Real-Quick-M-PESA-Guardian-ebook/dp/B007FPP7NI>
- Onarheim, B., & Biskjaer, M. M. (2014). Balancing Constraints and the Sweet Spot as Coming Topics for Creativity Research. In *Creativity in Design: understanding, capturing, supporting* (pp. 1–18).
- Petersen, B., & Pedersen, T. (2002). Coping with liability of foreignness. *Journal of International*

- Management*, 8(3), 339–350. [http://doi.org/10.1016/S1075-4253\(02\)00068-6](http://doi.org/10.1016/S1075-4253(02)00068-6)
- Prahalad, C. ., & Hart, S. L. (2001). The Fortune at the Bottom of the Pyramid. *Strategy and Business*. <http://doi.org/10.1073/pnas.0703993104>
- Radjou, N., & Prabhu, J. (2015). Frugal Innovation: How to do more with less. Retrieved September 6, 2015, from <http://www.amazon.com/Frugal-Innovation-more-Economist-Books/dp/1610395050>
- Radjou, N., Prabhu, J., & Ahuja, S. (2012). *Jugaad Innovation: Think Frugal, Be Flexible, Generate Breakthrough Growth*. John Wiley & Sons. Retrieved from <https://books.google.com/books?id=6rFt9FwuV4gC&pgis=1>
- Ries, E. (2011). *The Lean Startup. Working Paper*. <http://doi.org/23>
- Rothwell, R. (1994). *Towards the Fifth-generation Innovation Process. International Marketing Review* (Vol. 11). <http://doi.org/10.1108/02651339410057491>
- Ruttan, V. W. (1959). Usher and Schumpeter on Invention, Innovation, and Technological Change. *The Quarterly Journal of Economics*, 73(4), pp. 596–606. <http://doi.org/10.2307/1884305>
- Ruttan, V. W. (1997). Induced Innovation, Evolutionary Theory and Path Dependence: Sources of Technical Change. *The Economic Journal*, 107(444), 1520–1529. <http://doi.org/10.1111/1468-0297.00238>
- Schmookler, J. (1962). Determinants of Inventive Activity. *American Economic Review*, 52(2), 165–76. <http://doi.org/10.1126/science.151.3712.867-a>
- Scholz, R. W., & Tietje, O. (2002). *Embedded Case Study Methods: Integrating Quantitative and Qualitative Knowledge*. SAGE Publications. Retrieved from <https://books.google.com/books?id=mcvpbO3PLcwC&pgis=1>
- Schumacher, E. F. (1973). Small is Beautiful: Economics as if people mattered. *Technology*, 9, 277–288. <http://doi.org/10.1016/j.vaccine.2011.03.039>
- Schumpeter, J. A. (1934). The theory of economic development: an inquiry into profits, capital, credit, interest, and the business cycle. *Harvard Economic Studies*, 46(2), xii, 255 p. <http://doi.org/10.2307/1812657>
- Smith, D. (2005). *Exploring Innovation*. McGraw-Hill Education. Retrieved from <https://books.google.com/books?id=-F9yAAAACAAJ&pgis=1>
- Solow, R. M. (1957). Technical Change and the Aggregate Production Function. *The Review of Economics and Statistics*, 39(3), 312. <http://doi.org/10.2307/1926047>
- Stiglitz, J. (2001). Formal and Informal Institutions. In P. Dasgupta & I. Serageldin (Eds.),

- Perspective, Social Capital: A Multifaceted* (pp. 59–68). World Bank Publications. Retrieved from <https://books.google.com/books?hl=en&lr=&id=6PZ8bvQQmxEC&pgis=1>
- Sundbo, J. (1997). *The Theory of Innovation: Entrepreneurs, Technology and Strategy*. Edward Elgar Publishing. Retrieved from https://books.google.com/books?id=VurHZn3_8IcC&pgis=1
- Talbot, D. (2014). Facebook's Two Faces. *Technology Review*, 117(1), 77–80. Retrieved from <http://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=93251056&lang=es&site=ehost-live>
- Thaler, R. H., & Sunstein, C. R. (2008). *Nudge: Improving Decisions about Health, Wealth, and Happiness*. Yale University Press. Retrieved from <https://books.google.com/books?id=dSJQn8egXvUC&pgis=1>
- Vance, A. (2015). *Elon Musk: Tesla, SpaceX, and the Quest for a Fantastic Future*. HarperCollins. Retrieved from <https://books.google.com/books?id=Yd99BAAQBAJ&pgis=1>
- Von Hippel, E. (2005). Democratizing innovation. *Journal Für Betriebswirtschaft*. http://doi.org/10.1111/j.1540-5885.2006.00192_2.x
- Wainaina, E. (2015). 42% of Kenya GDP Transacted on M-pesa and 9 Takeaways From Safaricom Results. Retrieved September 8, 2015, from <http://www.techweez.com/2015/05/07/ten-takeaways-safaricom-2015-results/>
- Wolf, M. (2004). *Why globalization works*. Yale University Press.
- Yin, R. K. (2009). *Case Study Research: Design and Methods*. (L. Bickman & D. J. Rog, Eds.) *Essential guide to qualitative methods in organizational research* (Vol. 5). Sage Publications. <http://doi.org/10.1097/FCH.0b013e31822dda9e>
- Yunus, M. (2007). *Banker To The Poor: Micro-Lending and the Battle Against World Poverty*. PublicAffairs. Retrieved from <https://books.google.com/books?id=41sGGHUE5N4C&pgis=1>
- Zaheer, S. (1995). Overcoming the Liability of Foreignness. *Academy of Management Journal*, 38(2), 341–363. <http://doi.org/10.2307/256683>