

Lead Market Potential of Developing Countries

The Success of Mobile Money in Kenya
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Lead market Potential of Developing Countries:

The Success of Mobile Money in Kenya

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Preface

This document presents the results of an 8 months research started at TU Hamburg-Harburg in Germany and finished at TU Delft in The Netherlands. It is intended to be read by people with a basic knowledge of innovations in a macro-economic context. The focus of the study is to provide advice to policy makers, but the conclusions have been found to provide useful insights to companies in developing countries, multinationals of developed nations wishing to expand to developing countries and development aid organisations.

Anyone wishing to gain more insight into the hidden innovation potential of developing countries is invited to read this thesis as well. This document does not include complex mathematical models making it more accessible to a general public. Furthermore, the success story of MPesa, throughout the writing of this thesis has proved to be an interesting topic of many conversations.

To gain the most insight from this thesis readers are advised to read chapters 2, 3, 4, 5, 6, 7 and 8. Readers who are familiar with lead markets can skip chapter 2, but are advised to read through the summary of the chapter. The same holds for chapter 3 for readers who are acquainted to frugal innovation. Readers who are familiar with MPesa can start chapter 5 at paragraph 5.6, paragraph 5.7 is intended for readers who are unfamiliar with the landscape of mobile money in developing countries.

I wish all who look into this document a pleasant reading

Kay Potters
December 2017

Acknowledgements

I will not deny that this thesis has at times been a struggle. To research is to dive into unknown territory. To dive into unknown territory means to get lost. Getting lost is indeed what defined the start of this thesis. The help of many people, of which here I can only name a few, and their belief in my capabilities, persistence and person has shown me that getting lost is only the start of an incredible journey.

I would like to start by thanking my graduation committee: Prof. Dr. Cees van Beers, Dr. Ir. Bauke Steenhuisen and Dr. Ir. Bert Enserink for their time, feedback and support as well as their understanding of my struggles, their confidence that I would overcome them and their guidance to do so. I would like to give special thanks to my second supervisor Ir. Bauke Steenhuisen who has done far more than could have been expected from a second supervisor. His enthusiasm, criticism, suggestions and availability for supervision have been of incredible value to this thesis. I would also like to thank Rajnish Tiwari for supporting me through the first steps of the thesis.

I would also like to thank all interviewees for taking their time and providing their knowledge, which have been valuable input to this study.

In my personal sphere I would like to thank the incredible people I met, who made my exchange an unforgettable experience and provided me a home in Germany. Not only could I count on their support for this thesis, but their friendship that guided me through difficult times was invaluable to my personal life as well. My thanks go to Eetu Kivelä, Celine de Vincenzi, Moe Haifawi, Diana Marines, Victor Perez Martinez, Rob Buurstede, Shivaprasanth, Laura Vives Guilló and mi hermana pequeña Melany Gil Rueda. I would also like to thank my family: my father and mother, sister and especially my brother of who during the writing of this thesis have proven to be close to me no matter the physical distance.

Thank you all,

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Executive Summary

Lead markets are the markets that provide the main innovation impetus for a certain category of products, services or systems. A lead market is not necessarily the country where an innovation originates, but it is the country with the best market conditions for an innovation to be successfully introduced to the market. From here the innovation is further developed and eventually able to spread globally.

Lead markets are traditionally associated with developed countries, but the emergence of the phenomenon frugal innovation has challenged this assumption. Frugal innovations focus on the needs of people living on less than 2 dollars per day.

The current research on lead markets in developing countries is limited and has so far only focussed on products in India. By studying mobile money, a system innovation that has emerged in Kenya, this study expanded knowledge on lead markets in developing countries whilst answering the following research question:

How can lead market theory enable policy makers in developing countries to make innovation efforts in their domestic markets more effective?

To answer this research question three frameworks of lead market factors have been constructed. The first and most general framework has been based on literature studies of both lead market theory and frugal innovation. The second framework was highly specific as it was constructed from a case study on the Kenyan mobile money system MPesa. The third framework allowed to connect the first two and was constructed from interviews held with experts on lead markets and mobile money. The final framework is a combination of these three perspectives resulting in a generally applicable framework to assess the lead market potential of a country.

The lead market framework provides a means to understand whether an innovation suits a certain market. This enables policy makers to determine on which markets they should focus innovation efforts increasing effectiveness to the introduction and further development of a certain innovation. The following conclusions drawn from the study can guide the roles of policy makers and other actors:

- 1 Innovation in developing countries is driven by redefining the fulfilment of basic needs. This is largely ignored in developed countries and therefore provides specific opportunities for developing countries.
- 2 Leveraging existing technology and infrastructure can provide significant cost reduction.
- 3 Obstructive regulation is one of the biggest barriers for innovation
- 4 Innovation should be led by private companies that can benefit from its success
- 5 Monopolistic firms can facilitate the introduction of system innovations
- 6 External funding can relieve the burden of costs that is often experienced in developing countries
- 7 Diffusion of systems happens mostly through pull factors as it needs to be adapted to every market it enters.
- 8 A system cannot be exported, but knowledge about the system can
- 9 Technological advantages become relevant once a lead market has been established. For the emergence of a lead market technology plays a limited role.
- 10 Lead markets emerge from a combination of interacting factors.

- 11 Lead market factors are influenced by different actors. Bringing these together with a common goal highly increases the chance of becoming a lead market.
- 12 Trigger events make a need more visible and urgent thereby speeding up the uptake of innovation if they coincide with its market introduction.

Policy makers can use the framework to understand whether their domestic market is suitable for the development of a certain new technology. They should start by considering factors they cannot influence to understand in which sector the nation has lead market potential. Hereafter they should increase this potential through the factors that can be influenced by policy making. Their primary role is regulation; policy makers should take the role of a facilitator and are recommended to monitor innovation and adjust regulation accordingly. Policy makers play a large role in creating an attractive innovation climate. They should aim to bring together actors so that innovation potential can be fully harnessed.

Domestic players can use the framework to find sectors worth investing in. They are recommended to maintain close relationships with regulators, multinationals and developing agencies. Domestic players should bring in knowledge about local customers, identify local needs and adopt global technology to fulfil these needs.

Multinationals serve multiple markets. To remain competitive they aim to keep innovating. Lead markets can help multinationals to find the right markets to introduce innovations, reducing the chance of failure. Multinationals should realise that the fast economic growth of developing countries will increase their importance in the future. These markets further can provide entirely new perspectives on existing structures and technologies. For multinationals developing markets provide an opportunity to find new applications for existing technology as they are more accepting towards innovation that provide sufficient quality rather than the best possible technology. Multinationals can provide access to technology as well as access to global markets.

Development aid agencies should realise their role in innovation as well. The development of mobile money in Kenya benefitted largely from external funding. In general multinationals do not prioritise innovation in developing countries as the benefits are considered too low. Development aid organisations can provide a stimulus for innovation. This helps to create self-sustaining systems in developing countries and should therefore be prioritised.

Potential customers are important stakeholders for lead markets that should not be forgotten. Their preferences set the conditions for the market. This should be seen as a starting point of lead market potential.

The concept of lead markets in developing countries has hardly been researched. This study merely contributes to the start of a promising field that can aid developing countries to shape their future and the future of the globe.

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1 Introduction

In Western nations phones are hardly used to make payments. However, in Kenya this is common practice for already 10 years (CNN, 2017; ResMM2, 2017; Stepcic & Kabanda, 2016). Mobile money is so common in Kenya, that most people don't take their wallets with them when they leave their homes (ResMM2, 2017). Interestingly the economic position of this country would lead many to believe that merely the existence of mobile money would not be possible there, let alone that this country is already leading the industry for 10 years (GSMA, 2016a). This example defies the common thought that innovation only happens in developed countries.

In 2007 Kenyans witnessed the launch of MPesa, a mobile money system that made sending, storing and withdrawing money available to even the poorest part of Kenya's population who could not afford traditional banking services (GSMA, 2016a). MPesa has had a major impact on the economy of Kenya, and is commonly seen as a prime example of success in mobile money systems (Carey, 2016). The success of MPesa has inspired governments and companies in other nations to introduce mobile money in their markets as well (GSMA, 2016a). The following of Kenya's path in mobile money by other nations indicates that Kenya is a so-called lead market in mobile money. A lead market is the market that provides the main innovation impetus within a certain field of technology (Tiwari, 2016).

Traditionally lead markets have been associated with developed nations, for example Germany as a leader of the automobile industry (Beise, 2004). However, this assumption is challenged as developing nations, despite their fewer resources, have shown tremendous creativity and resilience through the emergence of frugal innovation.

Frugal innovations are those innovations that aim to fulfil the needs of people living of less than 2 dollars per day, these people are referred to as the bottom of the pyramid (Prahalad, 2005). Developing nations are becoming more conscious about their specific needs and capabilities, which have not been fulfilled by developed countries as these are either not capable or not interested in those needs (Bound & Thornton, 2012; Kaur, 2016). This leads to the thought that there are certain sectors in which innovation could be led by developing nations, meaning that developing countries have the potential to become lead markets.

Tiwari and Herstatt have applied this thought to frugal innovations and specifically to the small car industry in India (Tiwari, 2016; Tiwari & Herstatt, 2012, 2014). The result is a new model to describe lead markets, adapted to developing countries. However, the research on the lead market potential of developing countries is still limited to the work of Tiwari and Herstatt. In their research they focussed on products in India. This ignores innovations outside of the Indian context. Also the lead market potential in systems and services is not considered, despite increased use of ICT (Kariuki, 2015)..

Another issue of the lead market framework for developing countries is its context specific character. In different papers, different factors are put into the framework (Tiwari, 2016; Tiwari & Herstatt, 2012, 2014). This leads to the thought that the framework is still in development and does not yet have a general character making it difficult to apply to practical cases in its current form.

To contribute to the literature this thesis will add a systems perspective to the literature on the model of Tiwari and Herstatt; thereby take a broader approach on innovation and not merely focussing on products. Focussing on the Kenyan context will further contribute to the literature by diverting focus from India, which has already been extensively researched within the domain of frugal innovation, towards (Gurry, 2017; Kaur, 2016; Tiwari,

2016). This will aid in constructing a more general set of factors to further develop the lead market theory.

The purpose of this thesis is to find an answer to the following research question:

How can lead market theory enable policy makers in developing countries to make innovation efforts in their domestic markets more effective?

This research question will be viewed by using three methods: literature review, case study and expert interviews. Each method will result in a framework of lead markets. These three frameworks will then be compared to one another. Approaching a research question from three different angles is known as triangulation (Carter, Bryant-Lukosius, DiCenso, Blythe, & Neville, 2014).

The research is focussed on developing countries and the mobile money sector. It does therefore not consider innovations in mobile money outside of the developing world. It is assumed that Kenya is a lead market in mobile payment. For this reason other forms of mobile payment, such as NFC are ignored in this thesis. This is connected to the focal point of the lead market theory of this thesis, which is on lead markets as providing the main innovation impetus of a technology, thereby limiting the role of competing designs.

This chapter will familiarise the reader with the main concepts of the thesis. The research objective and research questions are shown in paragraph 1.1. Hereafter the methodology of this thesis is explained in paragraph 1.2. In paragraph 1.3 the main theoretical concepts are introduced. Hereafter the topic of the case study is introduced in 1.4. The structure of the thesis is presented in section 1.5.

1.1 Research Objective

It cannot be assumed anymore that developing countries depend on developed countries for innovation. Developing countries are becoming more conscious of their own capabilities and possess unique traits that they might even turn to their advantage (Bound & Thornton, 2012). Developing nations might even be lead markets in some specific sectors.

The idea that a developing country can be a lead market is a recent thought and therefore research on this topic is limited largely to the work of Tiwari and Herstatt (2014). Their research is focussed on India and only includes products. The goal of this study is to extend research on the lead market potential of developing countries. This can be represented in the following research question:

How can lead market theory enable policy makers in developing countries to make innovation efforts in their domestic markets more effective?

This is a broad research question and therefore needs to be focused. The focus will be on the mobile money sector. This is inspired by the large success of MPesa in Kenya. Because of this success Kenya is widely considered a lead market in mobile money. Furthermore, as MPesa is a system this will expand the knowledge on lead markets beyond the realm of products.

- 1 *What factors for lead markets in developing countries can be derived from the theory of lead markets?*
- 2 *What factors for lead markets in developing countries can be derived from the success of MPesa in Kenya?*
- 3 *What factors for lead markets in developing countries can be derived from experts?*

1.2 Methodology

A problem can always be looked upon from different angles. This will result in a different understanding of this problem. Hofstadter showed this in his book *Gödel, Escher, Bach* (2000). He attempted to understand human thought from 3 completely different perspectives. This though process is represented visually in Figure 1, where different lights cast different shadows of the object in the middle on the walls surrounding it. With each perspective taken a different shadow is investigated, thereby contributing to building an understanding of the object in the middle which represents the answer to the research question.

In scientific terms this is called triangulation. Triangulation means that the topic is approached from three different viewpoints (Carter et al., 2014). This approach allows research outcomes to be cross-referenced through use of different sources resulting in increased validation. The goal of triangulation is to increase the validation of the research. Approaching a question from different perspectives might provide different results. This does not mean the results themselves are false, but they could be part of an answer that cannot be fully understood by merely taking one perspective.

The perspectives for this thesis is not as far apart as those taken by Hofstadter, however this analogy provides a clear thought on the structure of the thesis. In this thesis 3 different frameworks were constructed based on three methods: literature review, case study and expert interviews.

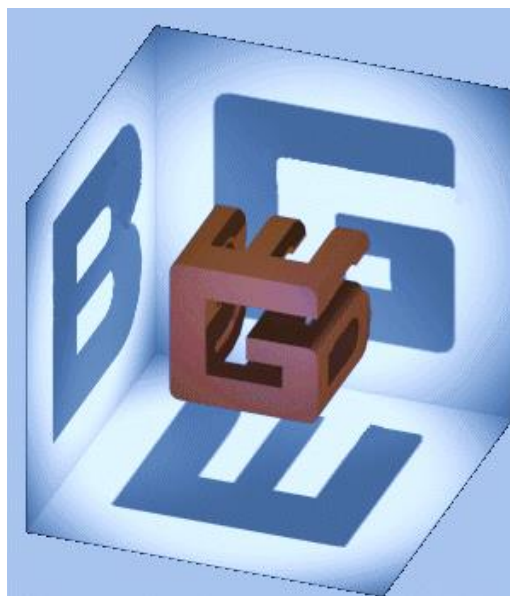


Figure 1: Gödel-Escher-Bach shadow representation (Hofstadter, 2000)

The three sub-questions are connected to the three different perspectives mentioned before and thereby divided the thesis into three different parts that are investigated through three different methods. The general outline of the thesis is visually represented in Figure 2.

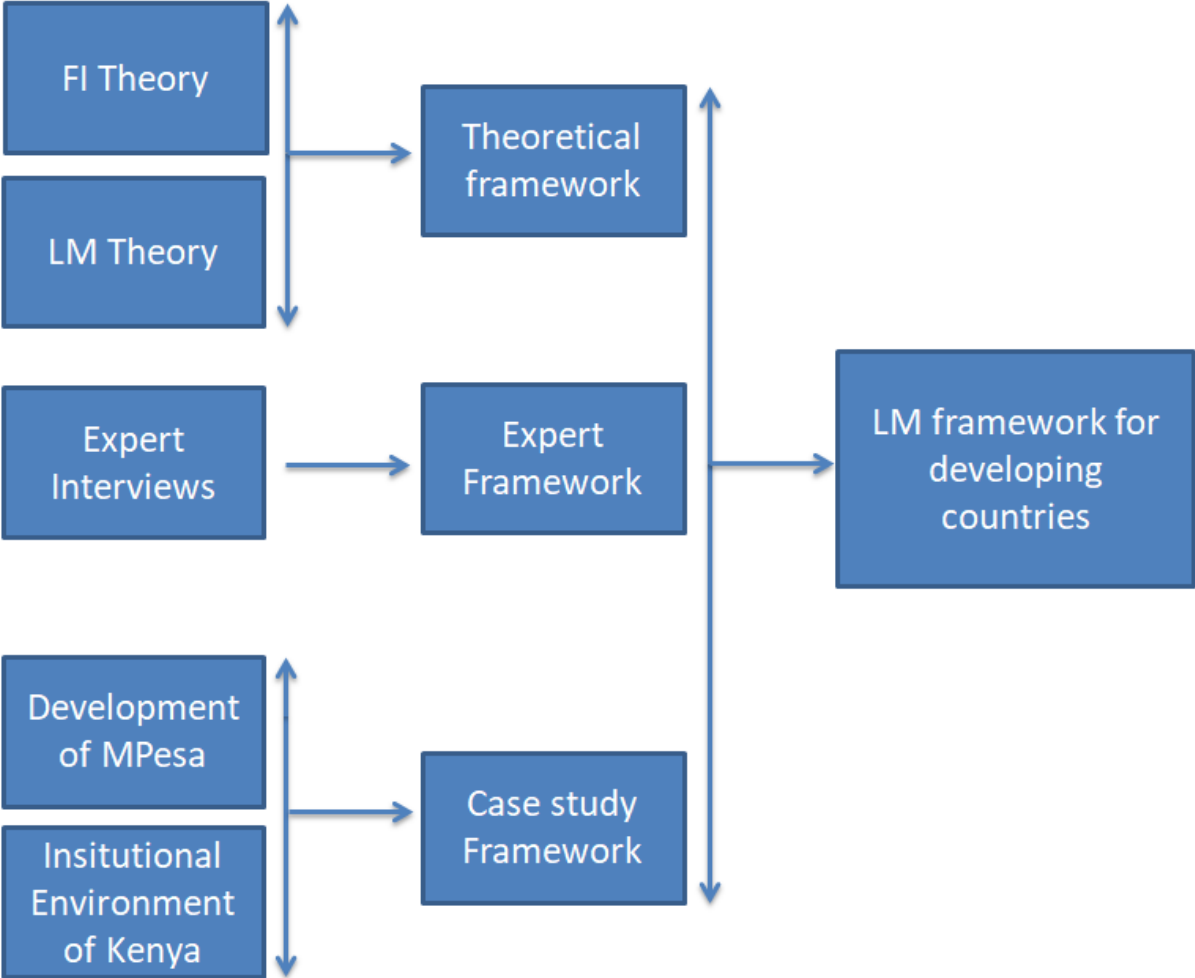


Figure 2: Outline of the Thesis

1.2.1 Literature Review

The first sub-question will be answered through a literature review. It will result in a theoretical framework based on the literature. Reviewing the existing literature is the starting point of a research as it allows the researcher to put his topic into context and build an understanding of the academic work that has been done so far (Kumar, 2011).

As mentioned, the framework on lead markets for developing countries of Tiwari and Herstatt was considered not suitable for this thesis in its present form. Therefore I will construct a theoretical framework of my own. The steps are shown in Figure 3.

The framework of Tiwari and Herstatt is an adaptation of the lead market framework constructed by Beise. The adaptation is based on adding the concept of frugal innovation. Therefore both of these theoretical concepts needed to be reviewed in order to build a framework. In this thesis firstly challenges of frugal innovation will be added. Furthermore, as

the current model is focussed on products it will be adapted to be applicable to systems and services as well.

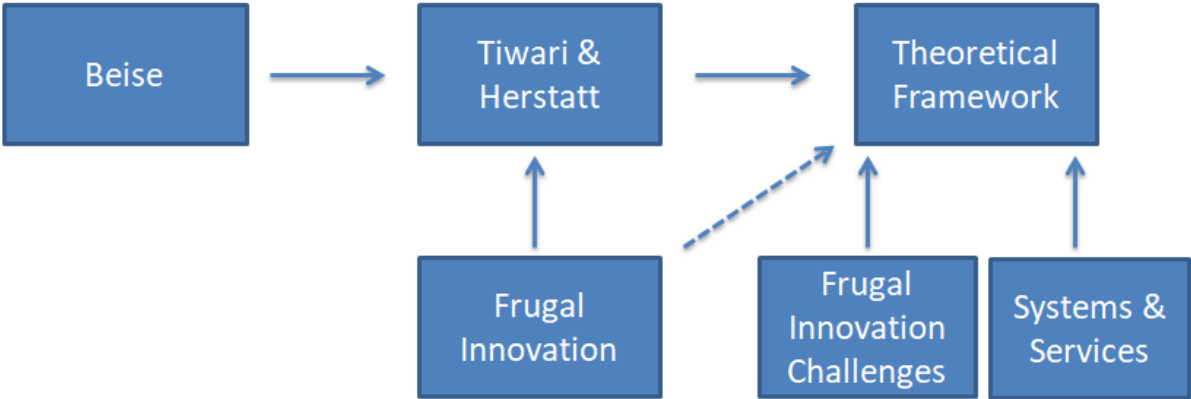


Figure 3: Outline of the Literature Review

Lead Markets

The first topic of the literature review is the lead market theory. Here the topic of lead markets is put into the perspective of other innovation theories. Going through the chronological development of lead markets helps to understand its characteristics and to eliminate misconceptions on the topic. A large part of the review is dedicated to the model of Tiwari and Herstatt (2014). Their research forms the basis of assessing the lead market potential of developing countries. I assessed the potential to directly apply the framework within this thesis, but found that further investigation is required, because of the different perspective on lead markets.

Relevant literature for this topic was found by consulting Dr. Tiwari. This led to finding research conducted by Beise and Tiwari & Herstatt. This research was used to trace back to origins of the lead market theory and supplemented by consulting the meta-search engine science direct. It was found that literature on lead markets is confined mainly to Germany. For this reason the literature review was based mainly on a few sources, these were also found most relevant in light of the research conducted in this thesis.

Frugal innovation has been the starting point of this thesis and the lead market theory was discovered through a paper written by Tiwari on the lead market potential of India in frugal innovations. Because the framework had to be revised and fitted to the needs of this research the earlier research done on frugal innovation was still found to be relevant within the scope of this thesis.

In their research Tiwari and Herstatt connected frugal innovation to lead markets by means of an assessment table (Tiwari & Herstatt, 2014, p. 200). For this they cross-referenced characteristics of frugal innovation with lead market advantage groups. This table is to be used as a tool in the construction of lead market factors. Because of the variety in views on frugal innovation as a phenomenon, the literature review will take theory on frugal innovation into account as well.

Frugal Innovation

The literature on frugal innovation serves the purpose of providing input to the construction of the theoretical framework. In their assessment table Tiwari and Herstatt used the characteristics of frugal innovation as input.

The literature on frugal innovation was found by consulting meta-search engines with the words. It was part of the first phase of the thesis and therefore conducted in an explorative manner.

As a starting point the terms frugal and frugal innovation were entered into Scopus, Science-direct and Google Scholar. This resulted in a first round of papers to understand the phenomenon of frugal innovation. From these papers more sources could be found.

It was discovered that the term frugal innovation has been used alongside various other related terms. These other terms were therefore investigated as well to understand their relationship with frugal innovation.

The mixture of terms in the literature indicated that the literature on frugal innovation is vast, but fragmented. For this reason a definition was constructed based on definitions collected from 16 papers. These definitions were compared to isolate common characteristics and from there a definition was constructed.

The characteristics also were describe as they serve as input for the assessment table described by Tiwari and Herstatt (2014, p. 200).

The literature presents frugal innovation as highly promising in eradicating poverty since its introduction to the academic world in 2005 (Prahalad, 2005). However, the grand promises of eradicating poverty are more difficult to achieve than Prahalad suggested (Karnani, 2009; World Bank, 2010).

This indicates that there are some challenges that frugal innovation has to overcome to reach its full potential. For this reason the main challenges of frugal innovation have been taken from the literature and were also used as input in finding lead market factors.

1.2.2 Case study

After establishing a theoretical framework it had to be understood how this could be related to practice. Therefore a real world case study was chosen to empirically find factors that could fit the lead market framework.

It was deliberately chosen to find information on a case and later feed this back into the lead market theory. This opposes the option of operationalizing the factors found in the theory and finding information on them. The second option encompassed the inherent danger that after searching long enough there could always be found information to fit the framework. Therefore the other option was chosen, setting up a case description, analysing it and relating it to the framework.

The case study was constructed by taking literature from various sources. The starting point of this was case studies found through Science Direct and Google Scholar. Based on the information in these case studies a desktop research was continued to find more on specific parts such as competition and technology. This information was found through papers, blogs, online videos and newspaper articles.

From this information a case description could be written. Here MPesa was described as well as how it had developed. Hereafter, the context in which MPesa was introduced was presented based on success factors found in the literature.

To better understand the Kenyan context, case studies from other mobile money systems had been added to the case study as well. The countries chosen for comparison were found through the information on MPesa.

From the case description an analysis was made on what gave Kenya the reputation of a lead market as well as the factor that contributed to Kenya becoming a lead market. This was done to understand whether this would result in a different understanding of the lead market theory.

To isolate the lead market factors from the case study first all contributing factors were listed. These were then distributed among the different advantage groups.

Hereafter it was analysed what factor contributed to Kenya's lead market reputation. These factors were then cross-referenced with the earlier found lead market factors.

To ensure a thorough analysis it was chosen to do a single case study. Furthermore, MPesa is a system and one of few frugal innovations outside of India of which a large amount of literature is available. This makes it a most suitable topic for a case study in this study.

MPesa was chosen as the topic of the case study for multiple reasons. Firstly as discussed in chapter 3 research on frugal innovation is strongly focussed on India and on products. MPesa is neither originating from India, nor is it a product. Therefore a case study on this system will add to the academic literature on frugal innovation. It further provides an example on the new possibilities that arise through the use of ICT, which is not yet incorporated in the lead market theory. Lastly the population size of Kenya puts to question the heavy emphasis on market size that Tiwari and Herstatt propose.

1.2.3 Interviews

To be able to connect the highly general theoretical framework and the specific framework from the case study several interviews were held. A total of 11 people were interviewed.

The interviews were split into two parts. The first part was focused on a general understanding of the lead market potential of developing countries and was held with 2 interviewees. The goal was to understand whether this could work from a theoretical perspective. In the second part the focus was on the mobile money sector and 9 interviews were held for this part. Here the lead market theory was seen as context-specific.

All interviews were designed to last between 30 and 45 minutes. However, due to technical difficulties 2 interviews were shorter (15 and 20 minutes). When the interviewee would have more time available the interviews were longer and could last up to 75 minutes. This was due to discussions that arose based on the answers given.

The interviewees were all designed to be structured, but depending on the interviewee had a semi-structured nature. During the interviews notes were taken. After the interviews these were elaborated. The answers of the interviews were grouped together to allow for further analysis.

Lead Markets

The interview consisted of a set of 8 questions. These were aimed at understanding lead markets from a theoretical perspective. The questions did not mention mobile money; because the experts of lead markets were not expected have any knowledge in that particular field. Unfortunately the expertise on lead markets is limited. Of the 7 experts that were found and contacted for an interview; only 2 were prepared to conduct an interview. Due to the limited amount of experts on lead markets and the time constraint of thesis it was decided to not look further for more experts.

Questions were asked on the theoretical possibility of developing countries to become lead markets as well as theoretical value of lead markets in relation to innovation theory and policy analysis. These two main topics formed the structure of the analysis on these interviews.

Mobile Money

The second set of interviews revolved around mobile money. A set of 7 questions was presented to the interviewees. The information given upfront was limited to explaining the concept of lead markets. This was to prevent influencing the interviewees up front. Out of 32 requests, 9 interviews could be held.

This set of questions was focused on mobile money. The goal was find out about the current situation of mobile money regarding lead markets, what factors made this happen and how mobile money will develop in the future.

The interviewees were asked to name what country currently leads mobile money and for what reason. The answers given were grouped in a table and compared. This helped to provide insight in what gives a country the reputation of a lead market. It was found that many answers overlapped and therefore similar answers were grouped together.

Questions regarding lead market factors were asked openly to prevent influencing interviewees upfront. This resulted in a list of contributing factors and a list of inhibiting factors. These lists were constructed as follows. First the answers of the first interviewee were listed. The answers of the following interviewees were compared to the answers. If the answer had been given before or was a different wording of the same answer it would be counted to the respective earlier provided answer. If not the new answer would be added to the list. Both lists were hereafter divided among the different advantage groups according to how they are understood in the thesis.

Later during the interviews, the interviewees were explained about the different advantage groups and asked again what factors would contribute to the success of mobile money. This resulted in a list of advantage group factors. Here again answers were counted if they were mentioned more often or added if they were not yet in the list. The advantage group factors could be directly placed in the lead market framework.

Hereafter the different lists were combined for comparison and the answers within the advantage groups were grouped together. In the grouped factors it was found that sometimes interviewees would provide answers that would not fit the advantage group. Likely this resulted from a misunderstanding about the advantage groups. This could be explained by the fact that the advantage groups were only introduced to them during the interview. In the comparison table these answers that were placed in the advantage group in which they belong. This was done to allow better structuring of the contribution, inhibitor and advantage group factors.

The contribution, inhibitor and advantage group factors were hereafter grouped together if similar answers were given. This resulted in a table in which the lead market factors from the interviews were listed.

Future of mobile money

To improve understanding on whether the lead market potential of developing countries is a sustainable concept questions were asked on the future of mobile money as well.

From the answers different future developments were found and it was analysed if the mobile money sector in Kenya was anticipating for these. Hereafter this was related to the theory of lead markets.

1.3 Theoretical concepts

This thesis is based on two theoretical concepts: lead market theory and frugal innovation. Lead market theory is the main topic of interest. Frugal innovation has been an important influence in connecting lead markets to developing countries. Both concepts will be explained in this paragraph.

1.3.1 Lead Markets

The main theoretical concept of the thesis is the lead market theory. According to Beise a lead market is the first market to adopt a dominant design of a certain technology (Beise, 2004). With this he follows the ideas described by Porter on competition between nations (Porter, 1998). Beise observed that many researchers attach the name of lead market to a country where the dominant design was first introduced. However, it can happen that the dominant design first gets adopted by another country and from there spreads out to the rest of the world. The countries that adopt the dominant design later are called lag markets.

In Beise's model lead markets are characterized by factors such as high per capita income, high customer sophistication, highly developed infrastructure, and high institutional standards (Beise, 2004). These are characteristics that are often lacking in developing countries. This leads to the assumption that developing nations cannot become lead markets.

Innovations are traditionally linked to high-cost R&D and highly sophistic customers (Tiwari & Herstatt, 2014). However, the concept of frugal innovations seems to indicate a different path of innovation is possible. This type of innovation, aimed at customers living of less than 2 dollars per day does not rely on heavy RD investments and a desire for the newest technology.

Using frugal innovation as a starting point, Tiwari and Herstatt found the following conditions are prerequisites for innovation developing nations:

- 1 The size of the potential demand in the domestic market can sufficiently offset the disadvantage created by the low per-capita income
- 2 The country is endowed with significant technological capabilities that allow substantial parts of product development process to be performed locally

This lead to the following definition of lead markets:

“A lead market is a national market, which primarily on account of the size of its domestic demand, its access to technological capabilities and its embeddedness in the global economy provides key innovation impetus to a particular category of products.” (Tiwari & Herstatt, 2014, p. 205).

Figure 4 shows the lead market model as proposed by Tiwari and Herstatt. It consists of 5 advantage groups. These advantage groups group together factors that increase a countries

lead market potential. The descriptions gives below represent the understanding of the advantage groups used in this thesis.

- Demand advantages, arise from the potential customer base and result in a relatively large need for the innovation and a desire for its further development.
- Cost advantages, result in a relative price advantage for the innovation.
- Market structure advantages, support further development of the innovation through actor linkages and interaction.
- Export advantages; result in other nations wishing to adopt the innovation as well as helping the spread of the innovation.
- Technological advantages: result in relatively strong technical capabilities that support further development of the innovation.

The lead market framework can be viewed as consisting of 2 layers. The first one is shown in Figure 4 and consists of the advantage groups. This forms a general framework that can be used as a framework to analyse potential lead markets. The second layer consists of the factors that make up these advantage groups. Whilst studying the lead market it was found that these have a more specific character and depend on the sector they are applied to.

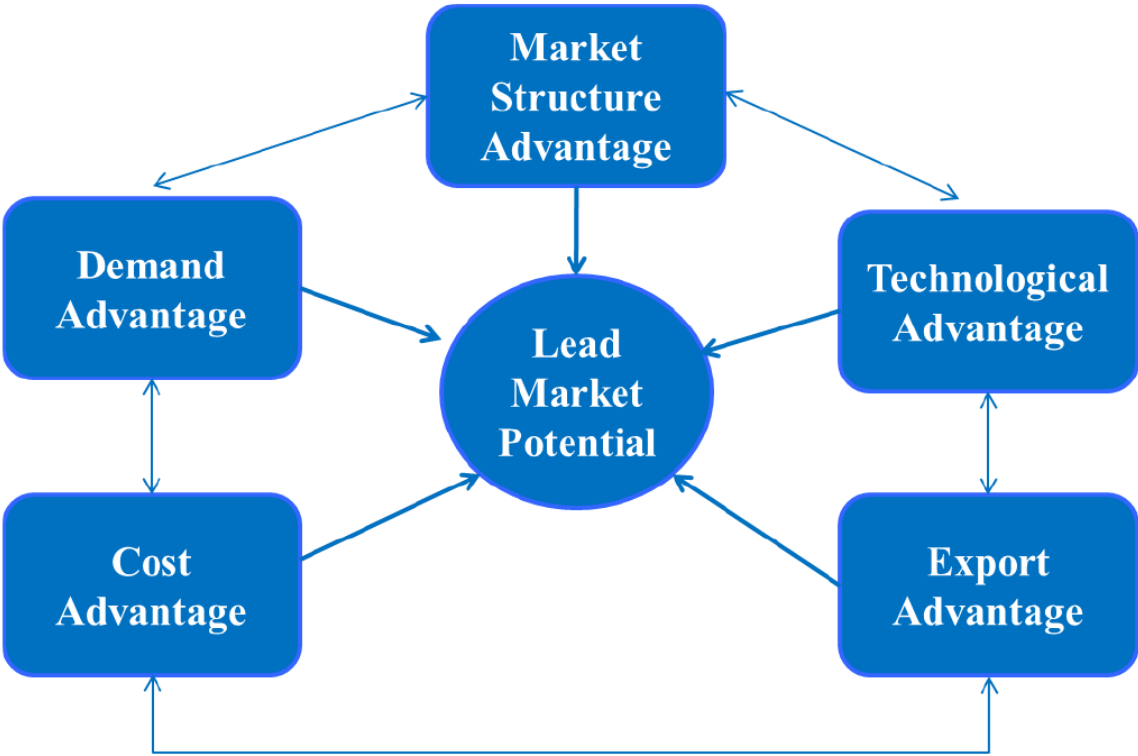


Figure 4: The Lead Market Model (Tiwari, 2016)

1.3.2 Theoretical concept 2: Frugal Innovation

It has been mentioned that extending the lead market theory to developing countries is based on the concept of frugal innovations. A review of 16 definitions of frugal innovation resulted in the following definition that will be used in this thesis.

Frugal innovation aims at serving resource constrained customers. Through a focus on core functions, costs are cut throughout the development process whilst providing a sufficient level of quality.

Despite a growing body of literature frugal innovation is still victim to many misconceptions, resulting in a distorted picture of this concept (Hossain, Simula, & Halme, 2016). One reason is that frugal innovation is part of a larger group called resource-constrained innovation (Agarwal, Grottke, Mishra, & Brem, 2017). To better understand frugal innovation it can help to distinguish it from related concepts. Two common misconceptions are considering frugal innovations to be downgraded Western products and mixing up the concept with other types of resource constrained innovations.

The first misconception is that frugal innovations are downgraded Western products. This arises from a failure to understand the difference between conventional innovation and frugal innovation (Basu, Banerjee, & Sweeny, 2013). Frugal innovations are focused on serving customers in developing markets. Therefore, they require significant reductions in cost. However, it is important that they still satisfy their intended customers' needs and thus remain at a sufficient level of quality (Hossain et al., 2016). This means that merely downgrading a Western product, possibly to a level with inferior quality, cannot be seen as a frugal innovation (Sun, Cao, Tan, & Shang, 2016).

The second misconception, of confusing frugal innovation with similar concepts, is related mainly to the quality aspect of frugal innovation. There are types of resource-constrained innovation that can be clearly distinguished from frugal innovation, but get confused easily. This is because simple quick fix solutions are often celebrated in innovation literature as showing the resilience of the poor (Karnani, 2009). However, Karnani argues that this is misleading as the poor are not always able to fully exploit these creative, but not commercially viable solutions. This can be related to a notion of Kamp, Ortt and Haraphap that the biggest barrier for innovations entering bottom of the pyramid markets is the inability of the poor to start their own business. The result is many quick fixes that temporarily deal with local problems and do not result in commercially viable activities (Aulbur, 2015). Usually these are criticized for lacking quality (Aulbur, 2015). These are grass-roots solutions tailored to a specific situation and are prone to face difficulties when trying to upscale them (Hossain, 2016). These quick fixes are misleadingly referred to as frugal innovations. Although the academic world has realised frugal innovation is a different concept, public literature often mistakes frugal innovation with other types of resource constrained innovations.

A common limitation in the literature is a heavy emphasis on product innovations. Often frugal innovations are considered to be products, but this limits the possibilities of cost reduction. Frugal innovation in this research is considered to be a management philosophy that can be applied throughout the value chain that the innovation itself is connected to.

Frugal innovation is about creating affordable goods and services, but does not put restraints on how this affordability can be achieved (H. Simula, Hossain, & Halme, 2015). Not only is it possible to lower costs of processes or material, but frugal innovation considers the essence of the product, service or system itself the only important feature. This allows the

innovator to eliminate all non-essential parts. More broadly frugal implies that one should consider tight constraints in time, resources and scope along with meeting a single prime design goal related to the user's needs (Sun, Cao, Tan, & Shang, 2016).

Considering frugal innovation to be a concept opens up possibilities beyond reducing the cost of a product. Simply trying to make a product cheaper is not always sufficient to reach customers at the Bottom of the Pyramid. They only have limited resources and are not always able to understand how an initially large investment can be cheaper over a long time period, therefore restructuring business models is just as important (H. Simula et al., 2015). One mayor challenge in frugal innovation is to connect local producers and customers (Kroll et al., 2016). For this reason it is important to not only rethink the design process, but also distribution and payments.

The above supports the thought that frugal innovation is not only about the development of products, even though much of the literature on frugal innovation is focused on frugal products (Agarwal et al., 2017; Aulbur, 2015; Basu et al., 2013; Hyvärinen, Keskinen, & Varis, 2016; Linda Manon Kamp, Ortt, & Harahap, 2015; Kroll et al., 2016; Tiwari, Fischer, & Kalogerakis, 2017). Rao in his paper on the disruptiveness of frugal innovation focussed on product features as well (2013). However, he does mention the importance non-product features related to market, organisational structure and resource allocation in the disruptiveness of an innovation. The recent development of information technology allows for the development of systems as well (Colledani et al., 2016; Sun et al., 2016). These systems might even become more important for frugal innovation as they allow the new business models that are often seen as crucial in the development of frugal innovations (Hyvärinen et al., 2016; H. Simula et al., 2015). When considering the possibility of disruptive innovations it might be that systems innovations can even have more impact than products as they can provide a basis for the development, distribution or selling of other products and services. The latter is exactly what happened with the introduction of MPesa in Kenya, which had a highly disruptive impact on the economy of Kenya (Carey, 2016), which will be introduced in the next 2 paragraphs.

This gap that is still seen in much of the frugal innovation literature is one of the reasons to focus the thesis on systems instead of products. Many of the concerns mentioned here cannot be recognized in the model that Tiwari and Herstatt build on frugal innovation as they only took products into account during their research. This means that to include system in the lead market model for developing countries it has to be revised and rebuild based on literature on lead markets and frugal innovation.

1.4 Case study theme: MPesa

MPesa is a mobile payment system commonly used in Kenya. It can be used to send money, make payments and withdraw cash (Vodafone m-pesa, 2014). Its success is enabling new ways of payments and thereby inspiring new business models in the country (Radjou, 2015). Examples are micro-financing organisations using the system to provide credit and the spreading the payment of solar power systems (Marincola, 2015).

In Kenya MPesa has changed the way that money is transferred completely (Marincola, 2015). It changed the way that cash is withdrawn, from going to the bank to going to one of the many MPesa agents. There are even more MPesa agents than there are ATM's in the country. The system has a significant impact on the Kenyan economy as already in 2015 two-third of the adult population used the system, transferring an equivalent to 25% of the country's gross national product (The Economist, 2015). It furthermore served as a platform for other innovations in the sectors of energy (M-Kopa), agriculture (M-Farm), healthcare (MedAfrica) and education (Eneza Education) (Harris, 2014).

This innovation has clearly had an impact on Kenya. It has enabled new businesses and has enabled customers at the bottom of the pyramid to participate in the economy. Furthermore, it had a significant impact on the macro-economic environment of the country (Carey, 2016). For these reasons, MPesa can be labelled a disruptive innovation. According to Christensen a disruptive innovation as it creates a new market and value network, whilst eventually displacing established market leading firms (2015).

As stated in the introduction MPesa was launched during a politically instable period (Carey, 2016). Trust in banks was low and many people thought of MPesa as a safer way to store their money. Also the Central Bank of Kenya was willing to cooperate with Safaricom with respect to its regulations on banking systems (Muthiora, 2015). From this it becomes clear that MPesa is not a system operating on its own, but works in a complex system. It was available at the right moment to receive the support it needed. One of the reasons for being less successful abroad has been subscribed to different legislative environments (Roberts, 2015). However, the impact of MPesa has not gone unnoticed and might inspire other countries to also revise their regulations regarding mobile payment (Muthiora, 2015).

MPesa is aimed at resource-constrained customers (CNN, 2017). As Safaricom CEO Bob Collymore said in an interview with CNN: *"We target the one shilling, the banking sector across the world has always ignored the so-called base of the pyramid. We haven't because we understand that the base of the pyramid needs to be served and there's also commercial viability in doing that"*

The system had a high impact at the people living at the bottom of the pyramid in Kenya and is expanding in other developing countries as well (CNN, 2017). By making use of SMS as a medium to transfer money costs could be kept low for both the development of the system as well as for the intended users. What is even more important is that this did not mean the quality of the system had been reduced. MPesa is considered a highly reliable system and through that it has gained a high amount of trust from the Kenyan population (Harris, 2014). For these reasons I will consider MPesa to be a frugal financial innovation.

What makes MPesa all the more interesting is that it has occurred outside of India. Generally India is considered the innovation hub of frugal innovation (Bound & Thornton, 2012; Gurry, 2017; Tiwari, 2016). The country has also been the focus of research for the lead market potential of developing countries (Tiwari, 2016; Tiwari & Herstatt, 2012, 2014). MPesa has

attempted to penetrate the Indian market, but has failed to gain widespread usage by the Indian population (Roberts, 2015). Although developments in India are fast it is still a highly cash based economy (Kathuria & Panigrahi, 2016). The State Bank of India is for example aiding ATM company Vortex to set up traditional banking in rural areas (Tiwari & Herstatt, 2014).

1.5 Thesis Structure

The thesis is structured as follows. The literature review is divided over chapters 2 and 3. Chapter 2 is focussed on understanding the lead market theory and chapter 3 on understanding frugal innovation. The information from the literature review is combined into a theoretical framework for lead markets in chapter 4. Chapter 5 will present the case study on MPesa to the reader and the resulting framework. A third framework based on interviews is constructed in chapter 6. In chapter 7 the information of chapter 4, 5 and 6 will be combined in to a final framework for lead markets. The conclusions drawn from this framework are presented in chapter 8. Based on these recommendations will be given in chapter 9. Limitation and topic of further research can be found in chapter 10. The thesis concludes with a reflection in chapter 11.

2 Literature Review I: Lead Market Theory

Before the first research question can be answered it is necessary to understand what lead markets are. Therefore this chapter will provide a definition of lead markets as well as an overview of the main theoretical thoughts.

Although there are multiple definitions and perspectives on lead markets only 2 largely accepted frameworks exist. The first and most commonly accepted is that of Beise (2004). The second framework has been established by Tiwari and Herstatt (2014).

The framework of Beise contains the hidden assumption that only developed countries can become lead markets. Tiwari and Herstatt argued that lead market potential exist in developing countries based on success of frugal innovations. Frugal innovations are innovations aimed to serve people living of less than two dollar per day (Prahalad, 2005).

First a definition for lead markets will be provided in paragraph 2.1. This will help the reader to understand what is meant by a lead market in this study. This is further supported by comparing lead markets to other innovation theories in paragraph 2.2. In paragraph 2.3 the framework by Beise is presented as well as the adaptations by Tiwari and Herstatt and the resulting second framework. Paragraph 2.4 shows a method to connect lead markets to frugal innovation, the concept of the next chapter. Paragraph 2.5 summarises the thoughts on lead markets used in this study.

2.1 Definition

Beise used the following definition: *Innovations that have been successful with local users in lead markets have a higher potential of becoming adopted world-wide than any other design preferred in other countries.* (Beise, 2004, p. 1012). An innovation is the successful introduction to a market of an invention (Bhasin, 2012). An invention is a new product, service, system or technology (Maranville, 1992).

The innovation that becomes successful world-wide is what Beise calls a dominant design (Beise, 2004). A design can be: a technical specification, software, a formula, a technology or a technological trajectory. From the lead market the dominant design diffuses towards other countries, called lag markets, sometimes pushing out alternative designs present in these lag markets.

According to Beise different designs compete for global dominance. In mobile money, the topic of the case study (chapter 5), different designs are still competing and a globally dominant design has not yet emerged (Schilling, 2017). However, Schilling describes developing countries separately. There might be different mechanisms at work in these countries possibly resulting in a regionally dominant design. The goal of the thesis is to understand these mechanisms and therefore the focus of this study will not be on the spread of globally dominant designs.

A dominant design does not necessarily originate from the lead market, but the lead market does provide the most favourable market conditions for the innovation and its further development (Beise, 2004). This is interesting for developing countries as they often lack the funds to come up with their high-tech innovations. However, if they become favourable markets to further develop existing technology it might attract foreign investments.

The thought comes closer to how Tiwari and Herstatt (2014) understand lead markets. They focus on lead markets as the main contributors to the development of a certain technology. And provide the following definition:

“A lead market is a national market, which primarily on account of the size of its domestic demand, its access to technological capabilities and its embeddedness in the global economy provides key innovation impetus to a particular category of products.” (Tiwari & Herstatt, 2014, p. 205).

Although the definition is suitable for this thesis it needs to be critically assessed. First of all there is a heavy emphasis on market size. According to Tiwari and Herstatt this can offset the lower income levels in developing countries. This thesis will be focussed on Kenya, a country with around 46 million inhabitants (CIA, 2017). Compared to countries such as India, China and even Brazil, Kenya is a small country. However, Finland with a population of only 5.4 million has been a lead market of cellular services (Beise, 2004). Many factors have contributed to Finland’s position as a lead market, but its demand size has been substantially lower than markets like Germany or the USA. It could be that demand size has been less relevant for the emergence of mobile money in Kenya.

Apart from understanding the role of demand it has to be verified whether the roles of technological capabilities and embeddedness in the global economy are as important as Tiwari and Herstatt suggest.

Another key notion is that the definition only concerns products. The current developments in ICT have resulted in new services and systems that cannot be treated as products, but have a major impact on the lives of many people. To understand these developments the framework of the lead market theory should be critically assessed and likely adapted to fit this study.

2.2 Lead Markets and Innovation Theory

The lead market theory is considered to be part of innovation theory (Quitow, Walz, Köhler, & Rennings, 2014). The added value of lead market theory can be understood by comparing it to these other theories. Table 1 provides an overview of innovation theories made by Quitow et al. (2014).

Table 1 shows different innovation theories and compares them on their aim, role of geography and role of competition. The sectorial, technological and national innovation systems provide perspectives on innovations systems at different levels. The multi-level perspective is a combination of these three approaches. However, what can be seen is that all these approaches focus on the development of new technology. The lead market approach can be viewed as a tool that focuses on technology demand that can be used to explain how technologies that are already developed can reach their intended customer base.

Innovation theory often rates a countries innovativeness based on the amount of innovations (Furman, Porter, & Stern, 2002; Nelson & Winter, 1977). However, merely producing innovations might not be the key in finding successful innovations. Many innovations fail very soon after their introduction. However, from the perspective of lead markets we can question if the innovation itself might be unsuccessful because it had been introduced in the wrong environment. The literature on lead markets shows many examples of innovations that were invented in one country and became successful in another (Beise, 2004; Beise & Rennings, 2005; Quitow et al., 2014). The lead market theory, rather than focussing on stimulating new inventions, helps to understand what market provides the best

environment for an innovation to develop further and expand globally (Beise & Cleff, 2004; Beise & Rennings, 2005).

This can be an advantage to developing countries. These might not have the means to develop new high-tech inventions themselves, but they might be capable to rethink existing technology to fit their markets so that this new technology can grow within the market of the developing country. Lead market theory helps to understand what markets are suitable to experiment with a new technology.

In Table 1 it can be seen that Like Beise, Quitzow et al emphasise the dominant design aspect of lead markets (Beise, 2004; Quitzow et al., 2014). However, it has already been mentioned that developing markets might be different from their developed.

Table 1: Overview of Innovation Theories (Quitzow et al., 2014, p. 11).

Framework	Aim	Role of geography	Role of competition
Lead market approach	To explain the emergence and diffusion of global dominant designs	Focused on the role of country-specific factors in shaping the competition between emerging technologies	Focused on the inter-relationship between country and technology-specific competition with a focus on emerging technologies
Multi-level perspective	To analyse long-term technological change, i.e. shifts in technological regimes	Not explicitly captured theoretically; Empirical studies mainly focus on single countries	Focus on the competition between different technological regimes
Technological innovation systems	To analyse the dynamic development of emerging technologies	Not captured theoretically; Empirical studies focused on single countries or comparisons	Not an explicit focus
National innovation systems	To analyse and compare country-specific institutions, actors and their interactions and how they shape innovation in a country	Single country studies and multi-country comparisons	Country studies point out strengths and weaknesses of country-specific NIS and help explain broad patterns of specialization
Sectorial systems of innovation	analyse and compare the dynamics of innovation at sectorial level	Country-specific dimensions considered but not the focus	Country-specific specialization considered but not the focus

2.3 Lead Market Frameworks

There are 2 theoretical frameworks available to assess lead markets. The first has been established by Beise. Tiwari and Herstatt adapted this framework to make it applicable to developing countries. Both frameworks will be discussed in this paragraph.

2.3.1 Beise

The most widely accepted framework in lead market theory is the framework constructed by Beise. This resulted in a broadly accepted view on lead markets, which had until then been a fragmented term as can be read in Appendix A:

The foundation of the lead market theory lies in Porter's work on competition among nations (Porter, 1998; Tiwari & Herstatt, 2014). From here it can be seen that some nations have advantages in certain technological sectors over others countries because characteristics specific to such a nation.

These characteristics can result in one country leading the technological development of a specific sector and being followed by others (Beise, 2004). They can be seen as the markets were multinational first successfully launch global products (Bartlett & Ghoshal, 1988). The most influential work on lead markets is that of Beise, who constructed a framework to put together different thoughts on lead markets Beise (Beise, 2004). A complete view on the early development of the lead market theory can be found in Appendix A:

Beise's model of the lead market theory consists of five advantage groups (Beise, 2004). If nations score relatively high on the factors that are part of these advantage groups they have a high potential of becoming a lead market. The five advantages and their accompanying factors are summarised in Table 2. As not all factors are self-explanatory they are shortly described below.

Price/cost advantages. This relates to a relative decrease in price of the dominant design. It can emerge from economies of scale, fast growth of demand or anticipation of input factors and complementary goods. The latter means that a country is well adjusted to prices of inputs and complementary goods, allowing them to produce their design at lower costs.

Demand advantages, encompasses the national environmental conditions that increase domestic demand for an innovation. Over time these emerge in other countries as well. Demand arises from per-capita income, needs and the availability of complementary goods. Domestic needs can be the first of a global trend for which lead markets are better prepared. From these needs complementary goods can arise. Again the lead market is first in anticipating for these complementary assets and thereby gains an advantage over other nations with respect to the dominant design.

Export advantages relate to the external orientation of a nation. This is reflected in a nation being concerned with global problems that might not even be so apparent within its borders. Domestic firms might further be oriented towards the global market in general and the local demand concerning the dominant design might be similar to that of foreign nations.

Transfer advantages are the fourth group of factors. This advantage is the ability of a country to influence the preferences of other countries. When a lead market exist is can demonstrate to other countries that the dominant design is usable and reliable, reducing the uncertainty for other countries regarding the design. Further factors such as language and other externalities can make adoption easier, such as the internet being in the well-spread English language making global adoption easier than the French Minitel system (Beise &

Cleff, 2004). The French gave up their own system as the perceived costs of not adopting the internet become higher than the benefit of Minitel. Here global network externalities became more important than local network externalities. The transfer advantage can further be increased by strong promotion of the technology in foreign countries by multinational firms or domestic users travelling to foreign countries. Sophistication of the users provides an advantage as it increase the reputation of the new technology. Strong property rights make it difficult for other firms to adjust a design and make foreign firms reluctant in adopting it. Lastly, policy convergence makes it easier for the dominant design to cross between nations.

Market structure advantages concerns the degree of competition within the domestic market. Higher domestic competition increases innovation (Porter, 1998). Competitive markets provide incentives for technological advantage as well as cost reduction. This in turn results in an advantage for domestic firms over foreign firms.

Table 2: Lead market advantages and factors according to Beise (2004)

Advantage	Factor
Price/Cost advantages	Size of demand
	Growth of demand
	Anticipatory factor costs
Demand advantages	Per-capita income
	Anticipatory needs
	Anticipatory availability of complementary goods
Export advantage	Sensitivity to global problems and needs
	Market orientation of domestic firms
	Similarity of local demand to foreign market conditions
Transfer advantage	International demonstration effects
	Uncertainty reduction
	Global and local externalities
	Structure and sophistication of demand
	Proprietary technologies
	Multinational firms and mobile users
	Cross-national policy convergence
Market structure advantage	Market competition

Regulatory Advantage Group

Alternatively a regulatory advantage group can be added to the framework (Quitow et al., 2014). This group had been added by Beise and Rennings (ResLM2, 2017). However, there are no factors presented for this regulatory advantage group and this alternative model did not become as widespread as the framework presented in Table 2.

The model used by Quitow et al cannot be considered a different framework, but it does indicate that in further research regulation became more important. It therefore appears that there is an important role for policy makers in shaping lead markets.

Quitow et al point out several other points of critique on Beise’s model in their work. These points of critique concern environmental innovations. Therefore they are considered to be outside of the scope of this thesis.

2.3.2 Tiwari and Herstatt

In paragraph 2.1 the definition of Tiwari and Herstatt was presented as an alternative to the established definition of Beise. Tiwari and Herstatt also constructed an alternative framework for lead markets (Tiwari & Herstatt, 2014). This framework followed from critique on Beise's model for focussing too much on developed countries. A potential hinder within this thesis that lead market theory is criticised for its focus on developed nations (Tiwari & Herstatt, 2014). Lead markets are characterized by factors such as high per capita income, high customer sophistication, highly developed infrastructure, and high institutional standards (Beise, 2004). This seems to exclude the possibility of developing nations to become lead markets (Tiwari & Herstatt, 2014).

Tiwari and Herstatt present the following challenges for developing countries that can hinder their lead market potential (2014, p. 197).

- 1 Deficits in physical infrastructure affecting operational efficiency
- 2 Negative stereotypes in target export markets resulting in barriers related to "country of origin"
- 3 Low per-capita income of domestic consumers resulting in thin margins, limited space for technological risks, and high dependency on economies of scale (threat of commoditization).

Tiwari and Herstatt further mention that developing countries are susceptible to external shocks reversing the lead market potential. Tiwari and Herstatt mainly attribute this to policy changes, as political forces in developing countries remain prone to taking ad-hoc, arbitrary decisions (2014, p. 198). They state that policy makers should strengthen national and sector innovation fields for example through tax incentives for R&D, because of the importance of technological capabilities. Policies should further stimulate outward and inward FDI as firms in developing countries can use it to generate new knowledge and engage in worldwide learning.

Tiwari & Herstatt (2014) noted that for frugal innovations, developing countries might be more likely to become lead markets. Frugal innovations are innovations that are meant to serve people living of less than 2 dollar per day (Prahalad, 2005). This results in a focus on core needs which in turn leads to highly cost effective innovations (Agarwal et al., 2017). The phenomenon frugal innovation forms the basis of the idea that developing countries can become lead markets. Therefore this concept will be explained in more detail in chapter 3.

Tiwari and Herstatt (2014) provide several examples of successful innovations that originated from developing countries. Examples are: the development of ethanol fuels in Brazil, GE's ultrasound device developed in China and the small car industry of India. This does require some adaptation of the lead market model and Tiwari and Herstatt state the following conditions to be prerequisites for developing nations to become lead markets:

1. The size of the potential demand in the domestic market can sufficiently offset the disadvantage created by the low per-capita income
2. The country is endowed with significant technological capabilities that allow substantial parts of the product development process to be performed locally

The first notion is to counter the assumption that lead markets can only arise through expenditure in research and development. Three aspects of developing countries were found relevant to support this. (i) The large household size in developing countries results in

combined purchasing power. (ii) The widespread income disparity allows for a large middle class in large populations, (iii) the formal economy of developing countries leaves a large part of the economic activity unnoticed. These three aspects all show that developing countries can divert the argument of a too low income. Precondition one also deals with the apparent lack of customer sophistication mentioned by Beise (Beise, 2004). He considers customer sophistication a signal for quality from the lead market towards other nations. The high demands that arise from sophisticated customers in a developed nation are assumed to be a breeding ground for innovation. However, it was found through examples of innovations in developing countries that customer sophistication is not necessarily a precondition for lead markets as was assumed by Beise.

The second notion counters one of Beise’s main statements. Beise considers technological capabilities as important as Tiwari and Herstatt, because foreign companies can invest introduce their innovations in the lead market instead of their domestic markets (Beise, 2004). This because he observed that many innovations did not start in the market from which they eventually spread out globally (Beise, 2004, p. 998). With these notions Tiwari and Herstatt adapted the lead market model so that it can be applied to developing countries. This model is shown in Figure 5.

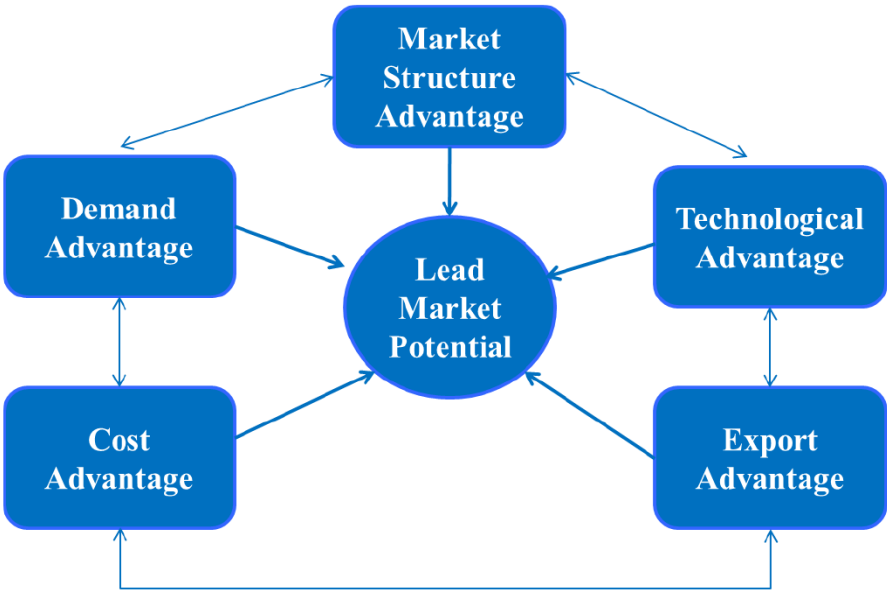


Figure 5: Lead market model (Tiwari & Herstatt, 2014)

Tiwari and Herstatt removed the transfer advantages groups from Beise’s model (2014). They noted that the label “made in Germany” is more effective than “made in India”. This “country of origin” effect reduces uncertainty about a new innovation because of the reputation of the country it emerges from, but is likely to only be relevant among developing countries. Furthermore, they found transfer advantages to be embedded already in export advantages as far as they apply to developing markets.

Another main difference is the addition of technological advantage group. This is because of four characteristics that appear typical for developing countries (Tiwari & Herstatt, 2014): (i) the local market offers significant cost advantages regarding engineering and manufacturing, (ii) a large base of skilled technical manpower, (iii) production-innovations at the low-cost manufacturing base and (iv) developed countries are unfamiliar with local market conditions and infrastructures of developing nations. This last observation results in

the lack of a frugal mind-set for engineers from developed countries. The frugal mind-set refers to the idea of using frugal innovation as a philosophy throughout the development process, thereby aiming for slightly reduced quality at a significant reduction of price. In developed countries this is difficult as engineers are trained to always aim at developing towards the highest available standards (Tiwari, 2016).

Tiwari and Herstatt have left out the proposed regulatory advantage group. The researchers were aware of this group, but found that regulation plays a role in every other advantage already (Tiwari & Herstatt, 2012). The danger of such a statement is that a reader of the model of Tiwari and Herstatt might overlook the importance of regulation.

- Demand Advantage: Describes market attractiveness (Tiwari & Herstatt, 2012). This is based on the demand of the domestic market for the product/service in which the country could become a lead market.
- Cost Advantage: Actual possibilities of economies of scale and level of factor costs (Tiwari & Herstatt, 2012). This increases if a nation is considered to have relatively low production costs and by large economies of scale (Tiwari, 2016).
- Market Structure Advantage: concerns the level of competition in a country (Tiwari & Herstatt, 2012). It further includes whether there is a strong domestic value-chain available in the country and the presence of large domestic players (Tiwari, 2016).
- Export Advantage: Transferability of domestic products to overseas markets (Tiwari & Herstatt, 2012). This happens when the domestic demand structure is similar to foreign market conditions and the countries industrial base allows it to export goods/services at competitive prices (Tiwari, 2016).
- Technological Advantage: The favourable impact of the national and/or sectorial innovation system (Tiwari & Herstatt, 2012).

Of the advantage groups described above Tiwari and Herstatt consider demand advantages and technological advantages the most important for developing countries (Tiwari & Herstatt, 2014). They firstly considered a large size of demand to be able to offset the thin margins on frugal innovations. Second, they considered technological capabilities to be socially embedded. To be able to fulfil customer needs in developing countries one needs first-hand knowledge on these needs.

Tiwari and Herstatt appear to not yet have one clear set of factors for their model. Table 3 shows how in different works of research different factors are presented. In the far left column the factor presented by Beise can still be recognised, but these become more specific in the case study on small cars, shown in the second column. In a case study on frugal innovation, shown in the third column, the factors are more general again. This makes it appear that the framework is still under construction and that a single set of factors for lead markets for developing countries has not been found yet.

Table 3: Lead market factors for developing countries

Group	Factors (Tiwari & Herstatt, 2012, p. 19)	Factors (Tiwari & Herstatt, 2014, p. 190)	Factors (Tiwari, 2016, p. 19)
Demand advantage	Size of Demand	Large & growing market with long-term potential (currently low penetration and a young population)	Size of domestic demand (B2B, B2C)
	Anticipatory needs faced by prospective customers	Prospects for sustained (long-term) economic growth	Growth prospects
		Low innovation resistance	Overall share of “frugal solutions” in the market Financial need for low-cost of ownership
Cost Advantage	Economies of Scale	Availability of significant economies of scale	Economies of scale
	Growth of demand	Manufacturing costs	Manufacturing costs
	Factor Costs	Cost of engineers	State incentives for production of “frugal” solutions
Export advantage		Tax incentives	
	International demonstration effects	Significant cost arbitrage	Significant cost arbitrage
	Similarity of local demand to foreign market conditions	Similarity of demand with target markets/customer segment	Similarity of demand with key target markets/customer segment
	Multinational firms and mobile users	[India’s] embeddedness in international trade (membership of worldwide organisation and free trade agreements)	Embeddedness in international trade
	Export incentives	Tax incentives for exports and special economic	Overseas presence of domestic MNEs

		zones for exports		
		Cross-national policy convergence		
Market advantage	structure	Market competition	A large competitive and fully liberalized industry	A large industry and competitive
			Presence of strong domestic & quasi-domestic players	Presence of strong domestic and global players
			A large base of domestic & global component suppliers	Industrial base enabling localization of the value chain
Technological advantage			Strong base of other supporting industries	
		Availability of skilled labour	A large base of skilled professionals and automotive engineers	Availability of skilled professionals & technical manpower
		Access to open knowledge networks	First-hand, tacit understanding of customer needs/wishes in resource-constrained contexts	First-hand, tacit understanding of customer needs/wishes in resource-constrained contexts
			A long-established R&D base of some key domestic automakers	
			Policy support for R&D	
			Relatively good protection of IPR	
			Access to open global innovation networks	

2.4 Lead Markets and Frugal innovation

Two frameworks for the assessment of lead markets have been presented in the previous paragraph. However, both do not appear directly suitable for the intended research. In paragraph 2.1 it was mentioned that this study will not focus on lead markets as homes to globally dominant designs. The focus is rather on the factors that allow a developing country to become a lead market. The framework of Beise shows a strong emphasis on spreading the innovation as he dedicates two entire advantage groups to this: export and transfer advantages.

The model of Tiwari and Herstatt again appears more suitable for the purpose of this study. However, this model does not present one clear set of factors to assess the lead market potential of a country. Furthermore, the factors presented are heavily focussed on products and on India, which could limit the applicability of the framework to other cases. Therefore, the model of Tiwari and Herstatt will only form the basis of the framework that will be used in this study.

Tiwari and Herstatt provide a method to construct lead market factors by combining lead market theory with frugal innovation shown in Table 4. Here Tiwari and Herstatt put the characteristics of frugal innovation in the left column and the lead market advantage groups in the top row. To be able to adapt the framework to this thesis we therefore need to build an understanding of frugal innovation. To exclude the heavy influence of products and divert from the focus on India a literature review of frugal innovation will be conducted in chapter 3.

Table 4: Sample assessment table for product lead market potential (Tiwari & Herstatt, 2014, p. 200)

Product characteristics No. (A) (B)		Lead market factors				
		Demand advantage (C)	Cost advantage (D)	Market structure advantage (E)	Export advantage (F)	Technology advantage (G)
1	Value proposition	Which performance should be offered at which price point to which customers?	Which production factors/methods, locations would be suitable for the given product performance?	What can we learn from our competitors? Which external suppliers can be tapped and involved?	Which countries could be targeted as export market with the given features/price point?	Which existing technological capabilities could be used to offer these features at lowest cost?
2	Robustness	Which robustness features (dust, heat, power cuts, etc.?) would be required or nice-to-have?	Which production factors/methods, locations would be suitable to integrate the required robustness features at lowest costs?	What can we learn from our competitors? Which external suppliers can be tapped and involved?	Which countries could be targeted as export market with the given robustness features?	Which existing technological capabilities could be used to offer these features at lowest cost?
3	User friendliness	What is the educational/economic background of users? How sophisticated features are required?	Which production factors/methods, locations would be suitable to integrate the required product features at lowest costs?	What can we learn from our competitors? Which external suppliers can be tapped and involved?	Which countries could be targeted as export market with the given robustness features?	Which existing technological capabilities could be used to offer these features at lowest cost?
4	Cost of Ownership (CoO)	What CoO is likely to bring the highest demand?	What material/process would allow the targeted CoO at lowest production cost?	Which potential cooperation partners can help reduce CoO and the production/R&D cost?	Which countries could be targeted as export market with the given CoO?	Which technologies could be utilized to reach the targeted CoO with lowest cost?
5	Volume opportunities	How can these features be combined to reap highest possible EOS?	How can EOS be leveraged to reduce costs of production/distribution?	How can volumes be leveraged to secure cooperation?	How to tap/organize exports to exploit EOS?	Which technologies allow scalability?

2.5 Summary

This chapter has introduced the reader with the lead market theory. Following Tiwari and Herstatt (2014), a lead market in this study is considered the market that provides the main innovation impetus in a specific technological field. This also means that the lead market provides the most favourable conditions for a certain innovation to emerge.

The theory can aid companies in choosing what market to focus their innovation efforts in a certain sector on. For policy makers it can provide insight in the potential of their nation in certain sector and on which sectors they should focus research investments.

Focussing on lead markets as markets that provide the most favourable conditions for the emergence of a certain type of innovations might also be favourable for developing countries. In that case the developing country can be considered a favourable market for the development of inventions from other markets. This follows the notion of Beise that lead markets are not always the country of origin of an innovation.

Two frameworks were presented in this chapter: Beise and Tiwari & Herstatt. The framework of Tiwari and Herstatt is an adaptation of Beise's framework. In the framework of Tiwari and Herstatt the lead market potential of developing countries is included as opposed to Beise's framework in which only developed nations are considered to have lead market potential. This comes forth mainly out of successes in frugal innovations.

However, the framework of Tiwari and Herstatt does not yet consist of a clear set of general factors. Furthermore, it is focussed fully on products and largely on the Indian market. This excludes innovations in other countries from the framework as well as developments in ICT. Therefore a new framework needs to be built based on the assessment table presented in paragraph 2.4. This first requires an understanding of the concept of frugal innovation, which will be treated in the next chapter.

3 Literature Review II: Frugal Innovation

In this chapter frugal innovation will be described. Understanding this phenomenon is required to build a theoretical framework for lead markets for developing countries as was described in paragraph 2.4. First a definition of frugal innovation is constructed in paragraph 3.1. Hereafter the characteristics of frugal innovation are described in paragraph 3.2. The main challenges of frugal innovation are described in paragraph 3.3. The insights of this chapter are summarised in paragraph 3.4.

3.1 Definition

Frugal innovation was first coined by Renault-Nissan CEO Carlos Ghosn in 2006 to describe the highly cost-effective Tata Nano (Sun et al., 2016). However, frugal innovation is more often mentioned in relation to *the fortune at the bottom of the Pyramid* (Prahalad, 2005). In this book Prahalad examined several cases of commercial companies bringing innovations to the poor. Although Prahalad did not come up with the term frugal innovation, many early papers started from his perspective of bringing affordable innovations to what he described as an untapped market of 4 billion people living of less than 2 dollars per day, he referred to as the bottom of the pyramid (Agarwal et al., 2017; Basu et al., 2013; H. Simula et al., 2015).

This however caused confusion as to what should be considered a frugal innovation and what not (Aulbur, 2015). Simula (2015) distinguished three types of frugal innovation based on motivation: (1) Grass-roots innovations, which are bottom-up solutions addressing a local need, (2) commercial innovations, which arise from companies using the frugal mind-set in their innovation process, (3) societal frugal innovation, which arise from a motivation to improve society. The first type has led to confusion with other type of resource constrained innovations that are focused on providing quick-fix solutions to local problems (Aulbur, 2015). The most commonly found term for this type of quick-fix solutions is the Indian word Jugaad (Aulbur, 2015; Kaur, 2016; R. Singh, Gupta, & Mondal, 2012). The reader can read up other terms for quick-fix solutions and how these differ from frugal innovation in Appendix B:.

A consequence of this confusion is that is variety in the definition of frugal innovation (Hossain et al., 2016). For this reason a definition of frugal innovation was constructed based on the literature. The process for this is described in (Appendix C:). The definition used in this study is provided below:

Frugal innovation primarily aims at serving resource constrained customers at the bottom of the pyramid. Through a focus on core functions, costs are cut throughout the development process whilst providing a sufficient level of quality.

The definition contains four characteristics that reoccurred in existing definitions. (1) Frugal innovations should provide sufficient quality to provide for the needs of its intended customers. (2) The level of quality is secondary to a constraint on price and therefore can be slightly below what would be expected by wealthy consumers. (3) This is to ensure that the intended customers at the bottom of the pyramid can be served with the innovation. (4) The frugal innovation itself can be a product, service or a system, but also a way of thinking to provide sufficient quality at a low price throughout the innovation process. This way of thinking is called a frugal mind-set (Tiwari et al., 2017). These characteristics are further elaborated in paragraph 3.2.

The definition shows a strong resemblance to the key criteria isolated by Weyrauch & Herstatt (2016). These are *substantial cost reduction, concentration on core functionalities, and optimised performance level*. It puts heavy emphasis on frugal innovation as a way of thinking applied throughout the development process. This addresses the issue that many frugal innovations have trouble in actually reaching their intended customers, because of their lack of fitting business models (Bound & Thornton, 2012; H. Simula et al., 2015; Singh Tuli, 2012). This is often the result of too much emphasis on the product itself whilst ignoring the environment in which it will be purchased.

3.1.1 Frugal innovation and Conventional Innovation

It has been made clear that frugal innovations are aimed a significant cost reduction. This might lead the reader to wonder whether this is not happening in all types of innovation and what makes frugal innovation different from conventional innovation.

Conventional innovations are focussed on the latest technology, but do not always consider what is actually needed by consumers (Hyvärinen et al., 2016). This can result in adding unwanted features that make the innovation unnecessarily expensive, a process referred to as over-engineering (Tiwari et al., 2017). Conventional innovation starts with performance attributes after which the price is lowered through commoditization (Rao, 2013). Frugal innovation starts with low pricing and optimizes performance after that. Frugal innovation is driven by the needs of the consumer, rather than what would be nice to have (Basu et al., 2013).

This does not mean that frugal innovation is exclusive to developing countries. Developed countries have shown increased interest in frugal innovations as well (Weyrauch & Herstatt, 2016). There is however a difference in what drives developed countries to engage in frugal innovation as can be seen in Table 5. Here the difference between developed and developing countries is shown with regard to macro- and micro-economic drivers of frugal innovations.

Table 5: Drivers of Frugal Innovations (H. Simula et al., 2015)

	Macro	Micro
Developed countries	Economic downturn	cost-awareness, innovation overload
Developing countries	population growth, economic development, urbanisation, governmental interventions, resource scarcity	changes in way of life/tastes/preferences, emergence of ICT, global community networks, demand for good-enough value-for-money solutions

3.2 Characteristics

Understanding how frugal innovation is different from conventional innovation and other resource constrained innovations provides us with a first basic understanding of the concept. However, this still does not define it. To bring together the fragmented literature this subchapter will bring forward four elements of frugal innovation based on the literature. These elements are compared to 16 definitions found in the literature shown in Appendix C:. The proposed elements are:

- Frugal innovation has to provide *sufficient quality*
- Frugal innovation deals with tight *resource constraints*
- Frugal innovation is aimed at customers at the *bottom of the pyramid*
- Frugal innovation is a *management philosophy*

3.2.1 Sufficient Quality

The quality of frugal innovations should be suitable to fit a specific purpose (Bhaduri, 2016). This can be for example through the use of older technology. Aakash tablets contain old processor types to save costs (Singh Tuli, 2012). As a result an Aakash tablet has a retail price of 60 euros, while an Ipad costs at least 280 euros (“Aakash4,” 2017, “Ipad price,” 2017).

This quality aspect distinguishes frugal innovation from many other resource constrained types of innovation (Aulbur, 2015). These are shown in Appendix B:. Sufficient quality should not be confused with downgraded Western products or quick-fix solutions (Sun et al., 2016). This undermines the awareness of resource-constrained consumers of quality. The poor want to pay less, but require a certain level of quality when they spend the few dollars they have available. A statement from an Indian manager captures this in numbers: “*to succeed in India you need a product that costs 30% of the global price and offers 95% of the performance*” (Tiwari & Herstatt, 2014, p. 6).

3.2.2 Resource Constraints

The statement from the previous paragraphs puts a lot of weight on reducing the costs of an innovation to make it a frugal innovation. The tight constraints on frugal innovation serve to make the products and services affordable and thus more acceptable (Basu et al., 2013). Frugal innovation can also be viewed as a response to resource constraints (Bound & Thornton, 2012). The constraints are the first design criterion for a frugal innovation. The aforementioned quality aspect should be achieved within the constraints that are set, as they are only secondary to them (Rao, 2013). Frugal does not put restraints on how affordability can be achieved (Simula, Hossain, & Halme, 2015). Not only is it possible to lower costs of processes or material, but frugal innovation considers the essence of the product or service itself. This allows the innovator to eliminate all non-essential parts. Hereby the innovator should focus only on the core functionality and add no unwanted frills (Hyvärinen et al., 2016; Tiwari, 2016). This adding of unnecessary sometimes even unwanted frills is referred to as over-engineering and makes a product unnecessarily expensive (Tiwari et al., 2017). Avoiding extra costs is in many cases achieved by means of leveraging existing technology rather than inventing something entirely new (Bound & Thornton, 2012).

3.2.3 Bottom of the Pyramid

The high importance of constraints comes forth from the intended customer of frugal innovations, resource-constrained customers (Agarwal et al., 2017). As mentioned in paragraph 3.1.1, frugal innovation started with the intention of serving customers in the developing world (Basu et al., 2013). However, the increased interest from the Western world that has increased the potential customers (Weyrauch & Herstatt, 2016). The people at the bottom of the pyramid is an often occurring term that describes resource-constrained customers (Kamp et al., 2015). This refers to a population of 4 billion people living of less than 2 dollars per day (Prahalad, 2005). These people are the intended customers of frugal innovations, but this does not mean that more fortunate costumers cannot benefit from these innovations. For instance in the business to business market, German companies already apply frugal innovations from India (Tiwari et al., 2017). Furthermore, emerging middle classes in developing countries could well benefit from frugal innovations as well even though they might be considered too rich too be part of the bottom of the pyramid.

3.2.4 Management Philosophy

What is also not directly clear is whether frugal innovation should be seen as products, services, processes, systems or even a management philosophy. The literature tends to focus on products. However, making cheap products is not always sufficient to reach customers at the bottom of the pyramid; the restructuring of business models is just as important (Simula et al., 2015). Costumers at the bottom of the pyramid only have limited resources and are not always able to understand how an initially large investment can be cheaper over a long time period. One mayor challenge in frugal innovation is to connect local producers and customers (Kroll et al., 2016). For this reason it is important to not only rethink the design process, but also distribution and payments.

The above indicates that frugal innovation is not only about the development of products, even though much of the literature on frugal innovation is focused on frugal products (Agarwal et al., 2017; Aulbur, 2015; Basu et al., 2013; Hyvärinen, Keskinen, & Varis, 2016; Kamp et al., 2015; Kroll et al., 2016; Tiwari, Fischer, & Kalogerakis, 2017). Rao in his paper on the disruptiveness of frugal innovation focussed on product features as well (2013). However, he does mention the importance of non-product features related to market, organisational structure and resource allocation in the disruptiveness of an innovation. The recent development of information technology allows for the development of services as well (Colledani et al., 2016; Sun, Cao, Tan, & Shang, 2016). These services might even become more important for frugal innovation as they support the new business models that are often seen as crucial in the development of frugal innovations (Hyvärinen et al., 2016; Simula et al., 2015). When considering the possibility of disruptive innovations it might be that services and system innovations can even have more impact than products as they can provide a basis for the development, distribution or selling of other products and services. To allow an open approach to frugal innovation I will not refrain from calling frugal innovations products or services directly, but rather name frugal innovation a philosophy. This follows the notions that frugal innovations can be considered a way of thinking, also called frugal thinking, referring to applying the principles of sufficient quality at minimum resource use to serve customers at the bottom of the pyramid throughout the design process and value chain (Bhaduri, 2016; Tiwari, 2016).

3.3 Challenges

Now that the reader has gained an understanding what defines frugal innovation it should be put into a context. Prahalad had pointed out frugal innovation as a highly promising way of alleviating poverty (2005). However, soon after Prahalad's findings critics on frugal innovation started to emerge. Karnani (2009) called frugal innovation a failed promise to alleviate poverty. Although this seems a rather quick conclusion it is important to look into the challenges that frugal innovation faces as they serve as a grounds for such statements.

Should a lead market emerge within this field than we need to understand these challenges so that they can be recognised and dealt with. To provide an insight into these questions the next section will look into the challenges of frugal innovation. Based on a literature review I isolated the following challenges: government, diffusion, culture and non-technological innovations. Understanding the main challenges will help to understand what prevents frugal innovations from becoming globally dominant design and thus helps to understand what prevents the countries in which they develop to become lead markets.

3.3.1 Governments

Tiwari and Herstatt (2012) consider regulations to be part of all advantage groups of lead markets. This indicates a considerable role for the government when describing a lead market in frugal innovations. Karnani argues that the government plays an important role in ensuring the quality of innovations at the bottom of the pyramid(2009). Therefore, this challenge is the first that will be elaborated further.

Governments should firstly enable business opportunities. Affordability is often considered a key issue in frugal innovation (Henri Simula, Hossain, & Halme, 2015). However, Kamp (2015) found that affordability is just 1 out of 17 barriers for frugal innovation, with the most important one being the inability to start entrepreneurial activities. According to this research the main problem is not the spending power of consumers, but rather the possibility to start one's own business. This certainly has an effect on what aspects should be tackled by governments and development aid organisations if they wish to make a contribution towards market development at the bottom of the pyramid, but funding should be at a high priority (Granqvist, n.d.).

Secondly government should recognise and include informal sector in policy making. This informal sector is characterised as all unregistered and unregulated activities (Hope, 2014). For example 80% of the transport sector in Kenya is informal and contributes to 35% of its GDP. Governments in Kenya and India attempt include the informal sector in their legislation to protect its workers, considering it a valuable addition to their technological and industrial policies (Becker, 2004). Although difficult to reach workers in the informal sector are willing to cooperate as research has shown they prefer to be included in the formal sector, which provides them secure contracts, worker benefits, social protection and organised representation (Hope, 2014).

Third, governments should further stimulate firms from developed nations to tap into local knowledge, whilst keeping them ethical and non-exploiting towards the vulnerable consumers at the bottom of the pyramid (Knorrington, Peša, Leliveld, & van Beers, 2016; World Bank, 2010). Governments should thus balance economic and social interests to ensure fair business practices.

Fourth governments also play important role in ensuring environmental protection (World Bank, 2010). Frugal innovation is commonly seen as a more environmentally sustainable solution with respect to conventional innovation (Basu et al., 2013). However, this is not intrinsic to frugal innovation and it should always be checked whether frugal

innovation is the appropriate strategy (Hyvärinen et al., 2016; Levänen et al., 2015). Governments should therefore be actively involved in ensuring that frugal innovations are actually not harmful to the environment.

Fifth government should facilitating innovation on a national level as it is considered a driving force for economies to generate wealth (Schumpeter, 1939; World Bank, 2010). The World Bank captures the role of the government in four notions:

- Supporting innovators through incentives and mechanisms
- Removing obstacles to innovative incentives
- Establishing research structures
- Forming a creative and receptive population through education

Kroll et al (2016) recognised the following instruments to influence innovation policy.

- Regulations and frameworks: These can drive innovation, but in the short run reduce it through compliance costs. The negative effect especially holds for small and medium sized companies.
- Patents: These appear to have a negative effect, through costs. Furthermore, frugal innovations incremental nature, by making small improvements on existing technology can make it hard to patent them.
- Institutional voids: This is common in emerging markets. They can drive frugal innovations as they result in a less tight environmental and regulatory environment.

According to Kroll, regulation should be aimed at outcomes rather than processes to achieve these outcomes.

Lastly governments should actively ensure that policies are implemented. How this can be done most effectively is mainly dependent on a countries technological capabilities and the strength of its institutional framework (World Bank, 2010). Other important factors in innovation policy are to create a competitive climate with a focus on promoting dynamic innovation over picking out winners and to build innovative parks that form the backbone of national innovation.

3.3.2 Diffusion

A common issue of frugal innovations is that they rarely diffuse from their local markets (Tran & Ravaud, 2016). The spread of dominant design towards other markets is an important part of lead markets and should therefore be taken into account in constructing a lead market framework (Beise, 2004).

Hossain, Simula & Halme (2016) distinguished 4 types of diffusion of frugal innovations (Figure 6):

- Local diffusion: The frugal innovation spreads within its home region.
- Proximity diffusion: The frugal innovation spreads out to nearby countries with relatively similar socio-economic conditions
- Distance diffusion: The frugal innovation spreads to developing countries in other continents.
- Global/Reverse diffusion: The frugal innovation spreads to developed countries

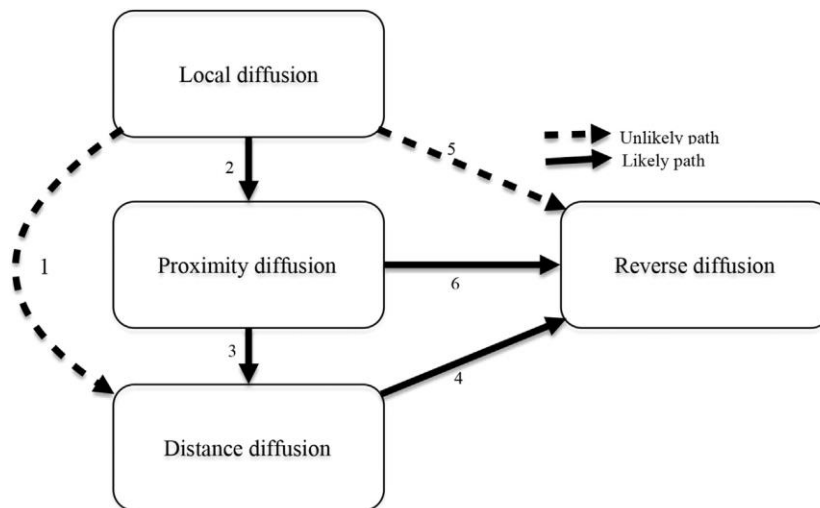


Figure 6: Diffusion Patterns of Frugal Innovations (Hossain et al., 2016)

In terms of lead market theory, local diffusion could be considered the emergence of a dominant design. Proximity and distance diffusion relate to the thought that dominant designs generally spread to countries with similar needs (Beise, 2004). The term reverse diffusion in Figure 6 relates to reverse innovation. Reverse innovations are frugal innovations that have been successfully introduced into developed markets (Simula et al., 2015). Reverse innovation shows that the needs of developing countries can sometimes become relevant in developed countries as well. However, this is a rare phenomenon and therefore it is considered better to focus on developing countries only in this study.

Related to local diffusion is the lack of infrastructure in developing countries (Tiwari & Herstatt, 2014). The lack of infrastructure results in missing connections between local producers and local customers, which inhibits diffusion (Kroll et al., 2016). Kroll describes three pathways for the diffusion of frugal innovations:

- 1 The initial inventor(s) develop their own growing business, expanding from segment to segment
- 2 The frugal solution diffuses through an expanding phenomenon of adaptation over time, without a clearly traceable birthplace
- 3 Solutions found in a local ecosystem serve as an inspiration to others, who aren't necessarily linked to this ecosystem.

The rise of ICT has inspired the introduction of frugal services and systems (Sun et al., 2016). ICT can also play a role in the diffusion of frugal innovations in general. Already platforms like the Honeybee network have been established to exchange frugal innovations. The spread of frugal innovations can also be increased through Western multinationals (Hossain et al., 2016). However, the difficulty is to raise awareness and interests with such companies. B2B marketing can be an effective tool as businesses trying to reduce costs are generally more open to frugal innovations than consumers in developed nations (Tiwari et al., 2017).

3.3.3 Culture

Ignoring cultural factors is one of the main pitfalls in introducing a frugal innovation to a market (Hyvärinen et al., 2016). Multinationals often fail to recognise the different context in which they operate when attempting to penetrate emerging markets (Tiwari, 2016).

In India frugal thinking, the application of frugal innovation as a management philosophy throughout the design process and value chain, is considered a mind-set that Indians developed through being used to dealing with scarcity (Bhaduri, 2016; Kroll et al., 2016; R. Singh et al., 2012). The resulting cost-effective frugal innovations from developing countries have raised interest of Western firms to engage in frugal innovation as well (Avidar, 2015; Bound & Thornton, 2012). However, Western firms have difficulties to apply a frugal thinking because: (i) engineers are not thought to limit resource use, (ii) technological development is seen as linear with new product development as a second step and (iii) there is a fear of cannibalizing high end products (Kroll et al., 2016).

Related to the previous paragraph culture also applies to innovation diffusion (Hossain et al., 2016). Innovations need to be adapted to different cultural contexts when they are introduced to foreign markets (Avidar, 2015). Failing to understand cultural factors can result in innovations successful to a home market being rejected in other markets despite having a high potential.

Culture is a highly abstract concept, but Hofstede (2010) quantified it into dimensions. The reader who is unfamiliar with the Hofstede dimensions can read up on these in Appendix D:. Tiwari proposes that the acceptance of frugal innovations is connected to the Hofstede dimensions (2016). He proposes that societies with high scores on long-term orientation and restraint are more open to frugal solutions. To a lesser extend power distance, individualism, masculinity and uncertainty avoidance have a negative effect on whether a nation wishes to engage in frugal innovation. Although Tiwari only proposes a connection between innovation and cultural dimensions, Table 6 shows there is indeed a relation between the Hofstede dimensions and innovation as well as openness to adopting innovations.

Table 6: Relationship between cultural dimensions and innovative capacity

Dimensions (G. H. Hofstede et al., 2010)	Effect on Innovative capacity		Effect on adoption of innovations	
	Halkos & Tzeremes (2013)	Strychalska-Rudzewicz (2016)	Jang, Ko & Kim (2016)	Everdingen & Waarts (2003)
Masculinity	-			-
Power Distance	-	-	-	-
Uncertainty Avoidance	-	-		-
Individualism		+ for Europe - For Asia	+	+
Long-term Orientation			+	+

3.3.4 Non-technical Innovations

Frugal innovation is generally thought of as merely creating products for the poor, but it is often forgotten that selling to the poor requires an approach entirely different from conventional selling strategies (Henri Simula et al., 2015). The development of appropriate

business models is one of the core competencies of frugal innovations (Basu et al., 2013). However other non-technological innovations should not be forgotten. Van der Have & Rubalcaba (2016) claimed social innovations are especially applicable to developing economies due to their interest in solving problems rather than achieving cutting-edge technology. In the developing economies of South America it was found there is an important role of organisational and marketing innovation (Pino, Felzensztein, Zwerg-Villegas, & Arias-Bolzmann, 2016). These types of innovations are often forgotten as the focus of frugal innovations is mainly on products (Henri Simula et al., 2015). However, in the current world services play an ever more important role. To be able to keep up with these development frugal innovation research should address the non-technical part of innovation as well.

The reader might have noticed that this challenge shows overlap to the characteristic *management philosophy*. The issue that frugal innovation research is too focussed on products is of high importance for this thesis. Therefore this issue is represented both as a challenge as well and a characteristic of frugal innovation.

3.4 Summary

This chapter was intended to find characteristics and challenges of frugal innovation. These will be used to construct a lead market framework for developing countries in the next chapter.

It was found that frugal innovations are different from conventional innovations mainly through a focus on price over high-end technology. Whereas conventional innovations are aimed at finding the best possible solution, frugal innovation focuses on core needs and how these can be achieved at low costs.

Frugal innovations provide a level of quality that is sufficient to provide for the needs of its intended customers. The level of quality is bound by price and therefore can be slightly below what would be expected by wealthy consumers. The innovations are intended to serve customers at the bottom of the pyramid, who are people living of less than 2 dollar per day. Frugal innovation is a management philosophy applied throughout the design process and value chain.

In this study frugal innovations can arise from both bottom-up as well as top-down processes. It is further possible that they emerge in both developed and developing countries. Frugal innovations are quality solutions that can serve customers on a large scale and should not be confused with non-commercial quick-fix solutions.

Four challenges are described in this chapter: the role of governments, diffusion patterns, culture and non-technical innovations.

Developing countries seem to have advantages with respect to frugal innovation because of their culture. Tiwari and Herstatt build on this and stated that developing countries can become lead markets in frugal innovation. In the next chapter the concepts of frugal innovation and lead markets will be combined to construct a lead market framework for developing countries.

4 Theoretical Framework

The purpose of this chapter is to find factors that contribute to the lead market potential of developing countries from a theoretical perspective. In chapters 2 and 3 the theoretical concepts lead markets and frugal innovations have been described. In this chapter both theories will be combined to construct a theoretical framework.

First, lead market factors will be found through the construction of an assessment matrix based on the example table given by Tiwari and Herstatt (2014, p. 200) in paragraph 4.1. This assessment table will be compared to factors derived from Tiwari and Herstatt in paragraph 4.2. This will result in a theoretical framework on lead markets for developing countries described in paragraph 4.3. The constructed framework is compared to the frameworks of Beise and Tiwari & Herstatt in paragraph 4.4. The conclusions drawn from this theoretical framework will be provided in paragraph 4.5.

4.1 Assessment Table for Lead Market Factors

Now that both frugal innovation and the lead market theory have been examined a framework can be constructed based on insights from both theories. As a starting point I will use the assessment table of Tiwari and Herstatt (2014, p. 200) (Table 4). This is a tool to combine frugal innovation and lead market theory in order to assess a country's lead market potential. In this chapter the assessment table will be used to construct a general theoretical framework.

In Table 7 the characteristics and challenges from chapter 3 have been put in the far left column, replacing the left column of Table 4. The characteristic management philosophy was considered unsuitable for this table as it cannot be directly related to the advantages. In the table management philosophy become part of the challenge non-technical innovations as there was considered to be some overlap.

The cells in the Table 7 contain questions that relate the factors on the left to the advantage groups on the top. The questions represent in what way the factors can contribute to the advantage groups. In this study lead markets are considered a policy making tool. The questions are therefore posed from a macro-economic perspective.

These questions can however not be applied directly to the framework and need to be rewritten into factors. This was done by considering what factors could influence the outcome of the questions. The cells of Table 7 are described in Appendix E:. From the descriptions factors could be isolated, which where than placed in Table 8. The cells in Table 8 show how the factors in the left column can provide an advantage within the groups presented in the top row. For example the question *What is the level of quality required by the potential customer?* (Table 7) depends on the *customer base* (Table 8).

Table 7: Assessment table to match Lead Markets to Frugal Innovation

Advantage Group	Demand Advantage	Cost Advantage	Export Advantage	Market Structure Advantage	Technological Advantage
Factor					
Sufficient Quality (value for money)	What is the level of quality required by the potential customer?	What quality level is acceptable to allow for low-costs?	How does the price quality relation offered compare to other nations?	Are other firms competing on the same, a higher or a lower quality level? How successful is their approach?	Are there sufficient technological capabilities within the country for innovation?
Resource Constraints	How do resource-constraints influence the desired innovations?	How can firms deal with a lack of resources in innovating? Do the countries resource constraints provide it with cost-advantages compared to other nations?	Are other countries facing similar socio-economic conditions resulting in similar issues?	What constraints does the competition face?	How do socio-economic conditions affect technological capabilities?
Bottom of the Pyramid	What are the core needs of the user? Are there enough potential customers to offset the thin margins associated with frugal innovations?	How can a low cost of ownership be achieved?	Can similar customers be found abroad, who can also benefit from the innovation?	How can the untapped market at the bottom of the pyramid be turned into a market opportunity?	What are the requirements to technological capabilities to fulfil needs for people at the bottom of the pyramid at low costs?
Government	How is/can demand be stimulated through government intervention?	How can regulation grant costs reduction for frugal innovation?	How can export be stimulated in a fair way?	How can a healthy competitive environment be created?	What policies can be applied to promote innovation without compromising the environment and stimulating inclusive innovation?
Diffusion Patterns	How can it be ensured that innovations that fulfil new demands reach their customers?	What should be done to reduce the costs of national diffusion of innovations?	How can diffusion of the innovation be strengthened?	Are there large national players supporting diffusion of the innovation?	How can technological capabilities be used to increase diffusion?
Culture	What demands are embedded into the cultural background?		How do local cultural traits aid in the spread of innovations?	Does the country culture support or avoid competition?	Does the cultural background provide a supporting climate for innovation and technological capabilities?
Non-technical factors	To what indirect demand can the technology contribute?	How can costs be kept low throughout the value chain?	Which non-technical factors that are present in the home country are lacking in the intended lag markets?	Which non-technical factors provide advantages that are not easily copied?	What is the role of non-technical factors in innovation?

Table 8: Factors derived from the assessment table

Advantage Group Factor	Demand Advantage	Cost Advantage	Export Advantage	Market Structure Advantage	Technological Advantage
Sufficient Quality (value for money)	Customer base	Low cost solutions	Price/quality ratio	Industry standards	Knowledge of frugal solutions
Resource Constraints	Acceptance of frugal solutions	Low wages	Similar needs in other countries	Enhanced competition	Knowledge of frugal solutions
Bottom of the Pyramid	Customer base	Demand for low-cost solutions	Similar needs in other countries	(Untapped) Niche market present	Understanding of local needs
Government	Stimulating policies	Subsidies and cooperation	Export orientation	Alignment of motivation	Educated population
Diffusion	Infrastructure (connecting supply and demand)	Economies of scale Existing infrastructure	Multinationals Reputation	Large domestic players	Leapfrogging opportunities Willingness to innovate
Culture	Acceptance of frugal solutions		Reputation	Competitive attitude	Innovative capabilities Manpower available
Non-technical factors	Specific needs	Existing infrastructure and institutions.	Similar institutions Similar needs	Actor relationships	Knowledge of local environment

4.2 Combining the Assessment Table with Tiwari and Herstatt

The left column of Table 9 was constructed by rearranging and rewriting the factors found in Table 8 as lead market factors based on the insight gained in chapters 2 and 3. This was done per advantage group. After each factor the element or challenge of frugal innovation that it was derived from is shown in brackets using the following abbreviations:

- Q quality
- R resource constraints
- B bottom of the pyramid
- G government
- D diffusion patterns
- C culture
- nT non-technical innovations

For example, the customer base (Table 8) of a developing country provides a demand advantage as those people are more willing to accept a sufficient level of quality than customers in developed countries. This is related to the amount of people living at the bottom of the pyramid in a country as well as the existence of resource constraints and the national culture. Further governments can promote frugal innovations. This is captured in Table 9 Interest in and acceptance of frugal innovations (Q, R, B, G, C). In the same way the other cells of Table 8 have been rearranged per advantage group.

To construct a more robust framework the lead market factors constructed from the assessment table were compared to the factors of the framework of Tiwari and Herstatt shown in Table 3. Table 3 shows a very diverse set of factors per publication. Therefore a selection needs to be made on which factors can be used in the framework. Some of the factors keep reoccurring making them appear more general and thus they were kept. Others were highly specific and were left out. The ones that were found to fit the general framework are shown in the right column of Table 9. The numbers in brackets indicate from which publication the factors were derived as the number refer to the year of publication of a paper or book.

Some factors of Table 3 were left out, because they were too specific for a single situation. In this chapter the goal is to find a general framework. As the reader might have noticed some factors from different papers have been combined. This happened if they were considered to be similar. For example manufacturing cost and cost of engineers (Tiwari & Herstatt, 2014) were considered part of factor costs (Tiwari & Herstatt, 2012).

Table 9: Factors of lead markets based on frugal innovation literature

Group	Factors from the Assessment table	Factors from Tiwari and Herstatt
Demand advantage	Interest in and acceptance of frugal innovations (Q, R, B, G, C)	Size of demand (2012, 2016)
	Familiarity with frugal innovations (R, B, G, D, nT)	Growth prospects (2014, 2016)
	Financial need for frugal solutions (R, B)	Innovation resistance/share of “frugal” (2014, 2016)
	Linkage between suppliers and potential costumers (G, D)	Need for low-cost ownership (2016)
Cost Advantage	Labour costs (Q, R, B)	Factor costs/Manufacturing & labour costs (2012, 2014, 2016)
	Large customer base allowing economies of scale (B)	Economies of scale (2012, 2014, 2016)
	{Leveraging possibility of existing } Institutions and infrastructure (R, D, nT)	
	Governmental Financial incentives (G)	Tax/State incentives (2014, 2016)
Export advantage	Superior price/quality ratio (Q, nT)	
	Similarity of demand (R, B, C)	Similarity of demand (2012, 2014, 2016)
	National climate supporting export (D, G, C)	Embeddedness in international trade (2014, 2016)
	Reputation (G, C)	
Market structure advantage	Competitive base within frugal innovation (Q, R, G, D, C)	Large competitive industry (2012, 2014, 2016)
	Unique advantages arising in the domestic market (nT)	Local industrial base (2014, 2016)
		Large domestic player (2014, 2016)
Technology advantage	Ability to turn low-quality bottom up innovation into commercial frugal innovations (Q, B, D)	
	Understanding of dealing with local problems (R, B, C)	First-hand understanding of customer needs (2016)
	Strong educational base (G)	Availability of skilled labour (2012, 2016)
	Strong infrastructure allowing to take opportunity of new developments and possibly leapfrogging existing technology (G, D, nT)	Access to open (global) knowledge networks (2012, 2014, 2016)

4.3 Framework Description

Table 9 can now be used as a basis to establish a general framework for the assessment of the lead market potential of developing countries. Most emphasis will be on the factors derived from the framework of Tiwari and Herstatt and those derived from the assessment table. In this paragraph the factors are explained per advantage group, they are summarised at the end of the paragraph in Table 10.

Beise's framework did not take a primary position in the establishment of this framework. However, the lead market framework of Tiwari and Herstatt is rooted in this older framework. Therefore the factors mentioned by Beise have been taken into account as well whenever similarities were found or to clarify some factors that had been developed further from this earlier framework.

4.3.1 Demand advantages

Demand advantages are those factors that contribute to creating more demand. Through this the innovation plays an important role within the lead market and therefore provides a stimulus for development. A high demand in comparison to other countries can ensure a leading position as it is most sensible to develop a technology where demand is high.

Size: Demand size is a reoccurring factor in both the theory and my own findings. It is an essential part and therefore kept in the framework.

Growth potential: Can occur from economic growth and population growth. These increase the amount of potential customer and increase the chance that current investments can be recouped in the future. A potential critique is that a market could become saturated. However, a lead market is an innovation hub and therefore this should be offset through continuous innovation within a certain field.

Acceptance of frugal solutions: For frugal innovation success it is important that there is a low resistance to adoption of frugal innovations. This can have various reasons such as a need for them through low funds or a wish because of motivations regarding sustainability and changes in way of life. However, non-state-of-the-art innovations can appear to be insufficient for certain target groups. Developing nations are likely more accepting towards frugal innovations (Tiwari, 2016).

Infrastructure: Following the systems approach in this thesis infrastructure can play an important role. Demand in itself is important, but if this is not connected to supply this will likely cause issues. A good infrastructure enables new innovations to reach potential customers and potential demand to reach entrepreneurs. Customer awareness is embedded in this factor as it is facilitated through infrastructure.

4.3.2 Cost advantages

Cost advantages are those that keep prices low. They make it more interesting for the consumers in the domestic market to try the innovation as the initial investment is perceived as not too high. Furthermore, low prices related to the innovation make experimenting more favourable within the lead market. They connect to export advantages as low priced products are interesting for foreign markets as well. Low prices can be a result of a competitive market relating this advantage to market advantages as well.

Economies of scale: large scale demand will enable cost reduction as fixed costs can be distributed over a larger amount of customers.

Costs of input, complementary and supporting factors: This refers to all the costs of inputs as well as complementary costs related to the innovation, which was named factor costs by Beise (2004). I choose to use this factor to embed manufacturing costs and engineer costs, which I consider both as input factors. This also encompasses infrastructural costs. Frugal innovations can lower costs by maximizing existing technology. Therefore using existing infrastructure can become a cost advantage for certain innovations, especially when dealing with systems.

State incentives: state incentives can promote frugal innovation. Within the costs advantage this can be through tax incentives and subsidies. However, as discussed earlier sub-paragraph 3.3.1 this should be done with care to prevent policies from backfiring.

4.3.3 Export advantages

Export advantages are those factors that give advantages in introducing the innovation into foreign markets and the willingness of foreign market to adopt the innovation. If an innovation is perceived as useful in other countries this can support the diffusion of the innovation.

Superior price/quality ratio: In the literature relatively low cost is already mentioned as an export advantage. However, this takes away the quality aspect embedded in frugal innovations. Therefore I propose to keep the quality aspect within this factor.

Similarity of demand: is an essential factor in lead market theory (Beise, 2004). An innovation has little chance of spreading to a nation where it is not perceived as useful. This might also mean that frugal innovations rarely spread to developed nations, because frugal innovations currently have a low acceptance in developed countries (Tiwari et al., 2017).

External orientation: this factor is mainly based on Beise's (2004) description of *market orientation of domestic firms*, relating to the familiarity with other markets of domestic firms. This includes factors related to government and infrastructure. For frugal innovation external orientation for consumers can be excluded as it is hardly present, due to the pressure of local problems in developing countries (Tiwari & Herstatt, 2014).

Embeddedness in international trade: this is the presence of the country in international trade agreements. I also include in this factor the presence of domestic multinational firms abroad.

Demonstration effects: a country's reputation can be turned into a great advantage. Reputation is a term that is hard to define, therefore I choose to use the term demonstration effects as introduced by Beise (2004).

4.3.4 Market structure advantages

In the model introduced by Beise (2004) this group solely includes the amount of competition in a country. However, Tiwari and Herstatt considered that this group encompasses factors based industrial base as well, such as the presence of global players and localisation of the value chain. It includes how the market itself is structured and how this creates lead market advantages in becoming the most innovative base in certain sector.

Internal competition: competition is a strong incentive for innovation. When a large amount of companies is present in the same industry innovation is key in keeping sales at a level on

which the firm can survive. This competitive industry might arise from urbanisation as this creates a large local pool of demand attracting companies.

Local industrial base: again infrastructure is likely to play an important role in frugal systems. The industrial base includes in my view related and supportive industries as mentioned in Porter's diamond (Porter, 1998), which can also be recognised in *the availability of a local value chain* as pointed out by Tiwari and Herstatt (2014). These contribute to keeping the industrial base and its innovative power local.

Regulatory support: This concerns advantages created by the way that the government structures the market. This includes quality standards and financial incentives. The quality standards can add to the demonstration effect and deal with the barrier of inferior quality. Another barrier that has to be avoided is that of lacking capital. The influence of the government can add financial help and supporting regulation making it easier to start a business. This will help in creating a strong competitive base in which even the larger players need to keep being innovative.

Presence of strong domestic and global players: The presence of global players embedded in the market structure ensures that knowledge that could benefit the innovation can be taken from abroad. Through global players the knowledge can enter the domestic market. The presence of strong domestic players will likely provide an incentive for the competition to attract this knowledge from abroad.

Historical development of the market structure: Table 9 showed the option of unique non-technical advantages. There might be a unique way that a market is structured. For instance the close cooperation in between suppliers and manufacturers created an ideal environment for the Just in Time system (Steers, Sanchez-Runde, & Nardon, 2010). The Americans had to adopt this system to their own culture to be able to benefit from it. Similarly there might be a unique cultural heritage present in the mobile payment market of Kenya or any other market for that matter enabling advantage in the market structure that will prove difficult to copy.

4.3.5 Technological advantages

Technological advantages arise from the availability of sufficient know-how in a nation. This know-how can arise from various sources. Tiwari and Herstatt (2016; 2012) mainly focus on the firm as a source, however in their book they appear to include other sources as well (Tiwari & Herstatt, 2014).

Availability of skilled manpower: the level of education in a country forms the basis of the amount of skilled manpower. Further by naming the factor like this the importance of governmental institutions on their influence as mentioned in paragraph 3.3.1 becomes clear. Skilled manpower is a result of incentives aimed at stimulating education. However, this education should be aimed at innovation.

Knowledge infrastructure: Based on the factors *R&D base, policy support and access to global innovation networks* in Table 3 I suggest this factor as important in an established lead market to ensure continuous innovation on a national level. Knowledge centres can appear as universities, technological parks and similar places where knowledge is concentrated. Furthermore, their connection is important as this can result in knowledge sharing which can contribute to innovation.

First-hand knowledge of customer needs: not only is it important that technical knowledge is available. It should be the right knowledge for the problems at hand. This is a factor that

explains for a large part the difficulties of Western firms, which are home to a large amount of technological know-how, in establishing a customer base in a developing nation (Tiwari & Herstatt, 2014).

Table 10: Summary of Lead Market Factors

Group	Factors from table
Demand advantage	Market size
	Growth potential
	Acceptance of frugal solutions
	Infrastructure
Cost Advantage	Economies of scale
	Costs of input, complementary and supporting factors
	State incentives
Export advantage	Price/quality ratio
	Similarity of demand
	External orientation
	Embeddedness in international trade
	Demonstration effects
Market structure advantage	Internal competition
	Local industrial base
	Regulatory support
	Presence of strong domestic and global players
	Historical development of the market structure
Technological advantage	Availability of skilled manpower
	Knowledge infrastructure
	First-hand knowledge of customer needs

4.4 Comparing the Framework to the Literature

This framework added to the literature by taking a different perspective on frugal innovation. Whereas Tiwari and Herstatt focussed only on products, this framework incorporates services and systems. This because the rise of ICT has made innovations that are not classified as products increasingly important. This has been incorporated mainly by highlighting infrastructure and complementary factors.

This framework further generalises the proposed framework of Tiwari and Herstatt, for there was no clear set of factors. During the process of establishing the framework of this study the focus been moved away from India resulting in a general set of factors.

Further the importance of regulation has been incorporated in this framework. Tiwari and Herstatt recognised this importance, but there is no clear reference to regulation in their framework. Therefore factors have been added to make regulation more visible.

The advantage groups of Tiwari and Herstatt have been left intact as well as the understanding of these advantage groups as they were considered suitable for the purpose of this study. However, it could not be confirmed nor de-confirmed whether they are as important as Tiwari and Herstatt suggest.

This study further follows the thoughts of Tiwari and Herstatt on lead markets who view them as markets that drive innovation in a specific sector.

Compared to Beise this framework creates a different understanding of lead markets as it has been tailored to developing countries.

This framework puts more emphasis on market structure advantages. Beise only related this to competition, but during the development of this framework it was found that market structure advantages are broader and relate to the interaction of actors within a market as well. This also makes the framework more valuable for policy makers as regulators are often actors in a national innovation network.

Keeping the technological advantage group emphasis lead markets as places where innovations are further developed. Beise's framework is very indirect towards this notion as technological capabilities cannot be recognised in the factors he mentions.

Beise presented two advantage groups related to innovation diffusion: export and transfer advantages. Following Tiwari and Herstatt this framework combined these groups into the export advantages, because the focus of this thesis is not on innovation diffusion, but rather on the development.

Beise considered the anticipation of needs an important feature of a lead market to ensure innovation diffusion. However in developing countries there are unfulfilled needs, for which solutions already exist in developed countries. This means that the innovation of the developing country should provide more value than the already existing solution increasing the threshold for adoption by developing countries.

What is not yet known is what the importance of cost advantage will be. Beise as well as Tiwari and Herstatt considered these of large importance. Although these make the innovation cheaper the theory on frugal innovation showed that this is insufficient for the innovation to reach a large customer base, which is important in becoming a lead market. The case study and interviews might provide more insight to this matter.

4.5 Conclusions

This chapter concludes the literature review of the thesis, consisting of chapters 2, 3 and 4. It combines literature on both lead markets and frugal innovation. Factors of lead markets were found through the construction of an assessment table in which factors found in frugal innovation literature were cross-references to the advantage groups of lead markets. These were compared to factors that could be found directly in the literature of lead markets for developing countries.

The chapter was written to answer the question "*What factors for lead markets in developing countries can be derived from a theoretical perspective?*" to which the answer can be found in Table 10.

The resulting framework presents a general set of factors that incorporates frugal services and systems; hereby the framework contributes to the earlier framework of Tiwari and Herstatt. This study further contributes to the literature by emphasising the importance of infrastructure and regulation.

This has a consequence for policy makers who are in many countries involved in the construction of decent infrastructure. Moreover they are crucial in providing enabling regulations that support innovation and remove barriers.

This study focuses on the emergence of lead markets rather than the diffusion of a globally dominant design. The emphasis is on lead markets as drivers of innovation in a certain sector rather than exporters of a specific innovation that lead the industry. This

means that the framework of Beise is less relevant to the study as most factors of the framework concern export. This focus on export becomes even less relevant because needs in developing countries are considered to be different from those of developed countries in this study.

Based on this notion innovation policy in developing countries should focus on fulfilling basic needs in developing countries. The lead market theory can provide insight in the sectors in which the nation has high potential and thus are worth focussing investments on. Frugal innovation provides a means how to fulfil such needs.

Policy makers can enhance the lead market potential through all advantage groups. They can strengthen infrastructure and increase acceptance of frugal innovations to increase demand. They can use state incentives to reduce costs. Improving foreign relations contributes to export advantages. Policy makers have a large influence on the market structure as regulations influence the factors in this group. They can further enhance technological advantage through education policy and strengthening knowledge networks.

Some factors are however out of the reach of policy makers. They are influenced by players in the market. Policy makers should ensure good relationships to firms as cooperation can likely further strengthen factors that are not directly influenced by policy making.

5 Case study MPesa

From a theoretical perspective developing countries can become lead markets. This has been shown in a theoretical framework that allows us to assess the lead market potential of a developing country. Here a new framework will be constructed, because verifying the theoretical framework might result in a self-fulfilling prophecy.

However, this should be investigated further empirically to see whether the theory reflects reality. This will be done by means of a case study on the mobile money system MPesa. Its large success has resulted in the common thought that Kenya is a lead market (The Economist, 2015). The case study is chosen as MPesa is a system that emerged outside of India, this broadens the research on lead markets in developing countries. The chapter will be used to answer the following research question.

What factors for lead markets in developing countries can be derived from the emergence of MPesa in Kenya?

This chapter starts with an overview of MPesa and a definition of mobile money in paragraphs 5.1 and 5.3. Hereafter in paragraph Appendix F: the reader is explained how MPesa works. Next a description of the system's development is given accompanied by a brief actor analysis in paragraph 5.4. The national environment surrounding the development of MPesa is further investigated in 5.5. Paragraph 5.6 provides an overview of mobile money in other countries. Next the impact of MPesa on Kenya is discussed in paragraph 5.2. Hereafter lead markets factors will be extracted from the case study in paragraph 5.7 and paragraph 5.8 provides an insight in why Kenya is considered a lead market. In paragraph 5.9 it is discussed how these two paragraphs are related to each other. The conclusions of the chapter are provided in paragraph 5.11.

5.1 MPesa: Overview

MPesa is a Kenyan mobile money platform in introduced by Safaricom, the leading mobile operator in Kenya (Eijkman, Kendall, & Mas, 2010). The name comes from Pesa the Swahili word for money and M standing for mobile (Hughes & Lonie, 2007). The system allows for the deposit, withdrawal and sending of money through mobile phone technology (Vodafone m-pesa, 2014). MPesa is a form of mobile money referred to as peer to peer payment (Steers et al., 2010). This means that money is send directly from one person to another. Mobile moneys involve three participants in general: a consumer, a retailer and a trusted third party to make the transaction.

Figure 7 provides an overview of how MPesa is used for transactions. Consumers can deposit money at a retailer, after which the retailer converts the deposits into electronic-money (e-money) of equal value. The consumer can send this e-money to other mobile money accounts. The receiver can withdraw the received e-money as cash at another retailer. The popularity and spread of MPesa has made e-money is a generally accepted form of direct payment throughout Kenya (Hughes & Lonie, 2007). It is so widespread that regular wallets have become obsolete in Kenya. A more detailed explanation on how MPesa works can be read in Appendix F:.

A big advantage of MPesa is that opening an account only requires an ID card and can be done in 5 minutes (Muthiora, 2015). The people living at the BOP usually do not have

the funds to open a bank account and through MPesa they are able to access financial services.

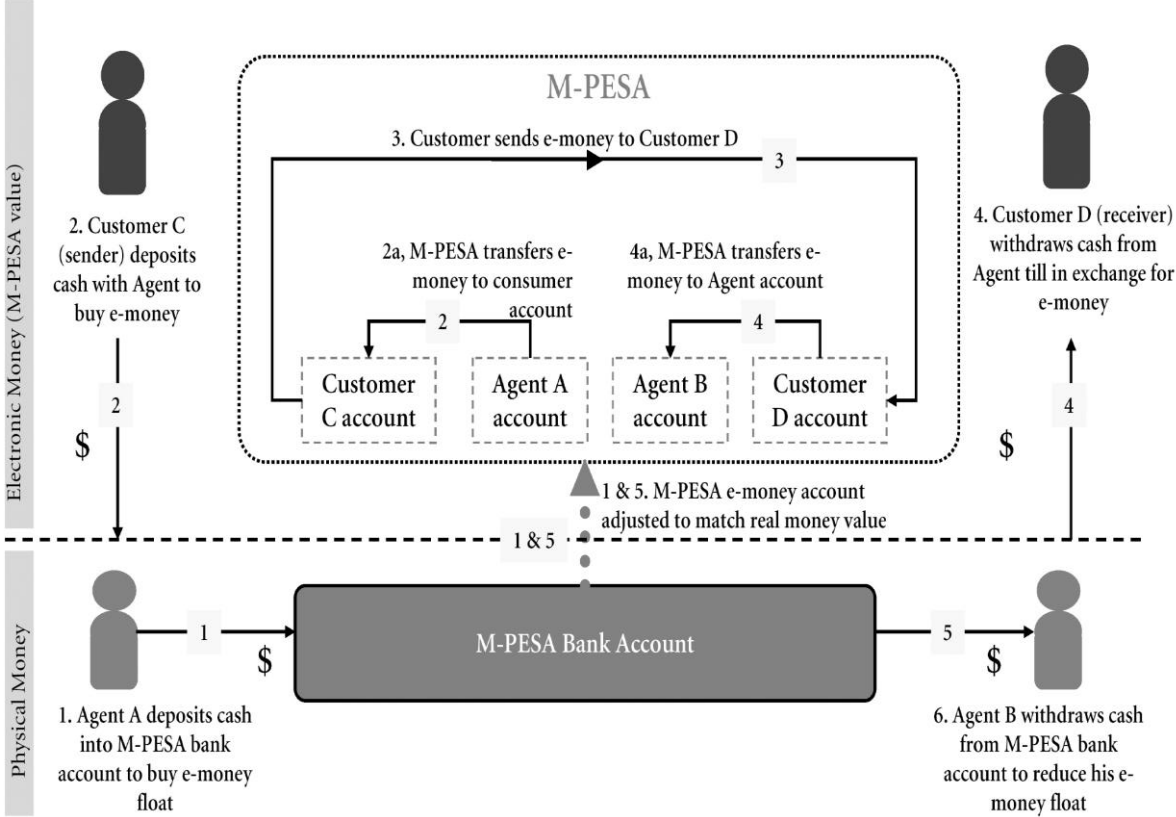


Figure 7: Overview of M-Pesa service (Hughes & Lonie, 2007)

MPesa was chosen as the topic of the case study for multiple reasons. Firstly as discussed in chapter 3 research on frugal innovation is strongly focussed on India and on products. MPesa is neither originating from India, nor is it a product. Therefore a case study on this system will add to the academic literature on frugal innovation. It further provides an example on the new possibilities that arise through the use of ICT, which is not yet incorporated in the lead market theory. Lastly the population size of Kenya puts to question the heavy emphasis on market size that Tiwari and Herstatt propose.

5.2 MPesa: Impact

The success of MPesa has enabled new ways of payment, which in turn has been the basis for new business models (Radjou, 2015). MPesa can be considered a disruptive innovation as it creates new markets and value networks, whilst eventually displacing established market leading firms (Christensen, 2015). In Kenya MPesa has changed the way that money is transferred completely (Marincola, 2015). MPesa redefined financial systems and services, there are even more MPesa agents than there are ATM's in the country (Bessant, 2014; Muthiora, 2015).

It has a significant impact on the Kenyan economy and in 2015 two-thirds of the adult population used the system to transfer 25% of the country's gross national product (The Economist, 2015). After its launch in 2007 it took only 2 years before it was used on a regular basis by more than half of Kenya's adult population (Bessant, 2014; Jack & Suri, 2011).

By 2009 MPesa had reached 70% of households and 50% of the poor population in Kenya (Jack & Suri, 2011). By 2015 59% of the adult population used the system on a 30 day basis (Muthiora, 2015). It has been so widely accepted and used that often people forget to bring cash with them only to be surprised to find that there are places in Kenya that have not yet adopted mobile money (Stepcic & Salah, 2016). For these reasons MPesa has been described as a disruptive innovation (Bessant, 2014). This means that the innovation has created a new market and value network, whilst eventually displacing established market leading firms (Christensen, 2015).

The success of mobile money has inspired many new innovations in Kenya and new mobile money products are frequently introduced to the market (Hughes & Lonie, 2007; Mutegi, 2017; Saigal, 2015). Not telecom companies have introduced financial products services based on mobile money, but entrepreneurs in various disciplines have created business based on MPesa in various sectors such as micro-financing (Musoni), energy (M-Kopa), agriculture (M-Farm), healthcare (MedAfrica) and education (Eneza Education) (CIPESA, 2015; Harris, 2014; Marincola, 2015; Muthiora, 2015).

Current policies cannot fill the upcoming job gap resulting from a large amount of young Africans entering the job market (World Economic Forum, 2017). Mobile money can help young Africans to start their own micro enterprises.

The goal of MPesa was to increase financial inclusion (Hughes & Lonie, 2007). MPesa has been able to contribute to the original goal of alleviating poverty by means of financial inclusion (Hughes & Lonie, 2007). Mobile money has helped 2% of Kenyan households to escape extreme poverty (GSMA, 2017). Mobile money, and thus indirectly MPesa, has contributed to 11 out of 17 of the sustainable development goals set by the UN. MPesa has facilitated savings for poor people as it does not require minimum deposits, allowing them to increase their effective income between 5% and 30% (Bessant, 2014; Carey, 2016). The system further makes it possible to distribute payments over time (Carey, 2016).

MPesa allows for the absorption of financial shocks as relatives at a distance are able to provide each other financial help (Jack & Suri, 2011). Disaster relief agencies have adopted a mobile money system such as MPesa as a money distribution system to allow people in crisis areas to buy food themselves (Bessant, 2014).

Mobile telephony in general has contributed to the empowerment of women in Kenya (Macharia, 2016). The increased use of ICT has allowed women to take an active role in society. MPesa has allowed women to keep funds away from abusive husbands as well as allowing them the possibility to engage in businesses (Carey, 2016).

Despite all positive development MPesa has not been free of critique. Larger payment are relatively cheaper making the system more costly to low-income people even though the system was intended to alleviate poverty (Jack & Suri, 2011). Further the system could incentivize corrupt deals among phone companies to keep prices high (Carey, 2016). Also the disappearance of the need to bring money physically from one location to another might estrange urban workers from rural families. Lastly the text based nature of MPesa excludes illiterate people who are likely to belong to the Bottom of the Pyramid (Ndiwalana, Morawczynski, & Popov, 2010).

In overall MPesa has a positive effect on the Kenyan economy. It has proven to be a convenient form of payment that has opened up unforeseen possibilities of new business. The large integration in the daily life of Kenyans shows how much MPesa has changed Kenya itself. It paved the way for mobile money to go global making it an important

contribution to alleviate poverty globally possible more than any another innovation or policy has been able to.

Mobile money already exists since 2001, but only become a global phenomenon after MPesa was introduced in Kenya (Hasnain, Komu, & Blackburn, 2016). The large success of MPesa generated a desire on other nation to follow Kenya's successful example (GSMA, 2017). After introduction MPesa became a platform for many innovations. For these reasons we assume that Kenya is a lead market according to the following definition, as was introduced in chapter 4.

"A lead market is a national market, which primarily on account of the size of its domestic demand, its access to technological capabilities and its embeddedness in the global

5.3 Mobile money and Mobile payment

Mobile money is defined by GSMA, an organisation that represents the interest of telecom operators worldwide, as "A service in which the mobile phone is used to access financial services" (GSMA, 2010). This definition has later been extended with the criteria below in (GSMA, 2017):

- The service must be available to the unbanked, e.g. people who do not have access to a formal account at a financial institution.
- The services must offer at least one of the following products:
 - Domestic or international transfer;
 - Mobile payment, including bill payment, bulk disbursement, and merchant payment; or
 - Storage of value.
- The service must offer an interface for initiating transactions for agents and/or customers that is available on mobile devices.
- The service must offer a network of physical transactional points outside bank branches and ATMs that make the service widely accessible to everyone.
- Mobile banking services that offer the mobile phone as just another channel to access a traditional banking product are not included.
- Payment services linked to a traditional banking product or credit card, such as Apple Pay and Google wallet, are not included

The last criterion refers to a possible confusion of mobile money with mobile payment: "a payment transaction processing in the course of which the payer employs mobile communication techniques in conjunction with mobile devices for initiation, authorisation or realisation of payment" (Turowski & Pousttchi, 2004, p. 260). The distinction can be further clarified based on ownership (ResMM2, 2017):

Mobile money is what it is called when a service is offered by a mobile operator who owns the platform it uses to provide a service.

Mobile payment/banking or Finserve is a business that offers a service but does not own the platform.

5.4 MPesa: Development

In this paragraph the development of MPesa will be described. The information presented here will serve as input for an analysis of the case later in this chapter.

5.4.1 Setting the Stage

In 2003, Nick Hughes, commonly considered the “father” of MPesa was part of a Vodafone team charged with fulfilling Vodafone’s contribution to the millennium development goal of reducing worldwide poverty (Hughes & Lonie, 2007).

However, a common issue in innovations aimed at the bottom of the pyramid is to attract funding. Companies often prefer short term benefits for shareholders through channels they are familiar with (Hughes & Lonie, 2007). Other reasons that make it difficult to attract funding for social innovation can be: misalignment to core business, the limited experiences with new technology, low expected profit margins and internal competition for funding.

Hughes diverted this by applying for funding at the UK’s Department for International Development (DFID) (Hughes & Lonie, 2007; Yizhen, 2015). DFID had recently set up a fund intended to improve financial inclusion in Africa. This fund was set up to cover 50% of the development cost for companies wishing to improve financial access in developing countries (Sadoulet & Furdelle, 2014).

Having been granted this fund, Nick Hughes managed to convince Vodafone to provide the necessary manpower to start up a project aimed at financial inclusion (Hughes & Lonie, 2007). Within the target zone East-Africa Vodafone owned 40% of shares of Safaricom, a telecom company in Kenya, making Kenya a likely choice for further development of the project.

In Kenya there were few people with bank accounts, but text-based mobile phones were omnipresent (Hughes & Lonie, 2007). Therefore it was chosen to develop a text-based system. Perhaps unaware, through this the Vodafone team applied a frugal mind-set as they were leveraging existing technology.

This was not a new idea. In several African countries including Kenya airtime was used as a means to transfer money (McKerney et al., 2003). This showed that there was already a Jugaad (Appendix B:) solution for mobile money available in the informal sector (paragraph 3.3.1). The first commercial version of mobile money could be found in the credit-transfer scheme MCell in Mozambique, which had also been funded by DFID (Bessant, 2014).

5.4.2 Gathering Support

The choice of setting up a text based system would result in the creation of electronic money or e-money (Hughes & Lonie, 2007). The Central Bank of Kenya (CBK), the regulating authority required that no new currency would be created. Vodafone needed to cooperate closely with this actor to ensure this requirement would be met and for the project to be allowed to continue.

The Commercial Bank of Africa (CBA) was a partner of Vodafone in setting up an MPesa bank which would control this MPesa account as Safaricom was not allowed to own the e-money on the MPesa account (Muthiora, 2015).

Safaricom took the role of a local mobile network operator in the project. Safaricom employees were required to handle customer service regarding MPesa as well as managing cash flows to and from the main MPesa bank account, which was set up to store electronic money (Hughes & Lonie, 2007).

Faulu, a micro-financing organisation was approached for cooperation in the pilot. 500 of their clients were included in a pilot were they would repay their loans through MPesa. To do so agents from Faulu's retail network were trained to convert cash into electronic money and vice-versa. Vodafone was responsible for training these agents.

It can be seen that undertaking a project in Kenya meant that the UK-based company Vodafone needed to include many local actors to gain local support for the initiative (Hughes & Lonie, 2007). The most important actors were also highly influential on the requirements that were set for MPesa. In Table 11 the found relationships between requirement and actors are presented. The early involvement of these actors allowed Hughes to handle the actor complexity involved in the MPesa project. The requirements show how actors' interests were involved in MPesa which ensured that local support could be created.

Table 11: Relationship between Requirements and Actor

Requirement MPesa (Hughes & Lonie, 2007)	Actor	Relationship
Understanding the systems and capabilities of Safaricom	Safaricom	Local telecom operator with local market knowledge
Targeting the unbanked	Vodafone	The project was Vodafone's contribution to eradicating poverty
	DFID	The available funding was intended to increase financial inclusion
Exact match between e-money and real money to prevent creating a new currency	CBK	Approval of the regulator was needed to continue the project.
	CBA	Safaricom was not allowed to own the e-money.
Customer interface on a basic model phone	DFID	Basic phones were widespread amongst the intended customer (the unbanked).
Finding customers with a real market need for the service	Faulu	Faulu could provide a customer base to test the product
Establishing retail outlets to deposit and withdraw cash from the e-money account	Faulu	An existing agent network was required to ensure distribution

5.4.3 Pilot

The importance of relationship between actors became even clearer with the legal issues that appeared during the pilot. Neither Vodafone nor Safaricom had a banking license, the newly developed MPesa system could not fit into the banking laws of that time and telecom laws were not suited to handle money transfers (Muthiora, 2015). In 2005 the CBK took an open approach and decided to treat MPesa as a non-banking service, freeing it from rather stringent banking laws (Bessant, 2014). MPesa was imposed limits on daily transaction size and amount and the CBK would strictly monitor progress, but apart from this Safaricom was granted freedom in the further development of mobile money (Bessant, 2014). The fact that 38.4% of Kenyans were excluded from financial services and banks were closing rural branches due to high operational costs might have provided an incentive for this open attitude (Muthiora, 2015).

During the pilot it became clear that innovations involving money highly depend on trust. For example, the biggest issue for Faulu was that agents were unfamiliar with handing people cash based on a text message (Hughes & Lonie, 2007). As customers got more familiar with the system local entrepreneurs saw opportunities to act as agents in places where these were not yet available (Hughes & Lonie, 2007). Furthermore, people started to use the system for other activities apart from the intended payback of loans. The most important example is that of urban workers using MPesa to send money to relatives in the countryside. This process of urban workers sending money to relatives in rural areas is known as remittance.

5.4.4 Nationwide Launch

After the pilot many participants did not want to give up the system (Hughes & Lonie, 2007). MPesa proved to be a platform with many opportunities, but the involvement of micro-financing organisation proved to be too complex during the pilot. From the pilot it was discovered that MPesa could apply to the many Kenyans working in urban areas that wished to send money home to their families in rural areas. Therefore MPesa was launched nationally through the successful “send money home” campaign (Carey, 2016).

The success of MPesa is still famous worldwide as soon after its launch MPesa attracted a large customer base, with already 7.7 million subscribers served by 23,000 agents two years after its launch (Jack & Suri, 2011). Hereafter growth continued as can be seen Table 12, where the main figures of MPesa in 2017 are shown

The large growth of MPesa also increased its risk and thus required more regulation (Muthiora, 2015). Still the CBK kept its test and learn approach and regulations were further developed alongside the development of mobile money, which is explained further in Appendix G:. Due to the increased inflow of cash into the MPesa account a trust fund was set up to handle the MPesa account. Through this the CBK wished to mitigate risk as Safaricom would not be able nor allowed to invest money deposited in MPesa.

Table 12: Overview of MPesa (GSMA, 2017)

Registered percentage of adult population	Revenues	Active customers	Agents
90 %	\$399 000 000	16 600 000	101 000
ATMs /100 000 adults	Commercial Bank branches /100 000 adults	Mobile money outlets /100 000 adults	
11	6	538	

5.4.5 Further Development

After its launch in 2007 MPesa has seen a fast rise in its user base and after 10 years 96% of Kenyan households have at least one MPesa account (Logan, 2017). During this time Safaricom added new features to MPesa with varying success (Muthiora, 2015). MPesa has provided a platform to create new businesses in solar power, agriculture, education and health (CIPESA, 2015). Some notable innovations are shown in Table 13.

The success raised concerns with banks of MPesa M-Kesho showed a move towards cooperation with banks and was developed in cooperation with Equity Bank. However, disagreements between Equity Bank and Safaricom led to a failure of M-Kesho. Later Safaricom launched M-Shwari, in cooperation with CBA, which did prove successful (GSMA,

2017). These example show how in Kenya banks and telecom companies are cooperating ever closer. This trend is still continuing.

Through MPesa, Kenya become the first country to sell government bonds through a mobile platform with the introduction of M-Akiba (News24, 2017). Before the launch of M-Akiba the Kenyan government already accepted MPesa as a form of payment (Stepcic & Salah, 2016).

These developments show how in Kenya mobile money is strongly integrated in society. It also shows that Kenya that mobile money is under continuous development in Kenya. This pioneering of technology backs the assumption that Kenya leads the mobile money sector.

Table 13: Safaricom innovations based on MPesa

Year	Feature Introduced
2008	Bill payment and bulk payment (Muthiora, 2015) Pesapoint: ATM allowing withdrawal from MPesa accounts) (Muthiora, 2015)
2009	Grundfos LifeLink: prepaying for water through MPesa (Muthiora, 2015) Kilimo Salama: insurance for crop failure (Muthiora, 2015)
2010	M-Kesho: pairing MPesa to bank accounts providing mobile savings, credit and insurance products (Muthiora, 2015)
2012	M-Shwari: relaunch of M-Kesho (Muthiora, 2015)
2016	M-Akiba: Government bonds sold through MPesa (Muthiora, 2015)
2017	1Tap: Combines MPesa with NFC technology in wristbands, phones and stickers (Maina, 2017)

5.4.6 Expanding Globally

Although the focus of this thesis is on Kenya it is worth mentioning that MPesa has been able to expand to other countries as well. A notable example where MPesa had a high impact is Afghanistan (Bessant, 2014). Under the name Roshan the Afghani government uses the system to pay their police force. This has led them to discover that using their old system 10 % of the salaries went to “ghost” policemen. Freeing up these funds led to an increase of the salaries of the real police force. MPesa is available in the following countries in 2017: Albania, the Democratic Republic of Congo, Egypt, Ghana, India, Kenya, Lesotho, Mozambique, Romania and Tanzania (Vodafone Website, 2017). However, the success of MPesa differs between the countries. In India for example MPesa was unable to replicate the success it had in Kenya despite high expectations (Roberts, 2015).



Figure 8: Spread of MPesa (Vodafone Website, 2017)

5.5 Mobile money in Kenya

The reader has now been presented what MPesa is, how it works and how it was developed. In the next section we will look deeper into the environment that surrounded the development of MPesa and the influence it had.

5.5.1 Regulatory environment: Telecom Led VS Bank Led approach

In Kenya the CBK adopted a test and learn approach, meaning that regulations would follow innovation (Muthiora, 2015). This was officially ratified by a non-objection letter issued by CBK to Safaricom, which meant that the CBK would not interfere with the development of mobile money through regulation. This allowed Safaricom to experiment with mobile money without being hampered by an incomplete and unsuited legal framework (Muthiora, 2015).

This attitude of the regulator might have been one of the most important factors in the development of mobile money in Kenya. It can be observed that regulators in many other countries have attempted to follow the Kenyan model (GSMA, 2017). It was also the key factor contributing to a large difference in success of mobile money between the socio-economically comparable countries Kenya and Mexico (Suárez, 2016). Suarez found that the regulatory approach in Mexico explained only 2% of the population using mobile money at the time that this was over 50% in Kenya.

He distinguishes two types of regulatory approaches:

- Telecom led, where the mobile money industry is set up by telecom providers as in Kenya
- Bank led, as in Mexico where the banking industry sets up the mobile money industry.

The telecom led approach provides more incentives for the development of mobile money as it creates a new industry for those who can profit from it, the telecom providers. Banks are less interested as they consider it to harm their current business. Furthermore, the bank led approach generally comes forth out of a strong connection between banks and regulators, which result in a heavily regulated mobile money industry even before it has been introduced to customers. Following a bank-led approach generally results in a failure to introduce mobile money (GSMA, 2017).

In Kenya banks have tried to convince CBK to ban MPesa, because of unfair competition (Muthiora, 2015). However, the CBK considered the financial inclusion of people who until then had been ignored by banks as more valuable. Next to this trust in the banking sector was low due to a high amount of corruption (Carey, 2016). Lastly, Safaricom maintained good relationships with the CBK by anticipating regulations and tightly cooperating with the CBK in forming regulations (Muthiora, 2015).

5.5.2 Politics: Timing of MPesa

Kenya is considered East-Africa's most stable country, making it a popular location for the headquarters of many multinationals (Barkan, 2011). However, when MPesa was launched in 2007 a series of violence erupted in Kenya following controversial elections (Aljazeera, 2017; CIPESA, 2015). Here 1500 people were killed and over 300 000 were displaced from their homes (Barkan, 2011). For Kenyan citizens the turmoil made it difficult to transport cash or even go to work (Carey, 2016). MPesa allowed people to lessen the financial burden on those who were most struck financially by the violence, the poor, as it was possible to send them money through the mobile system.

MPesa also became a popular platform to safely store money (Carey, 2016). The corruption among banks mentioned in the previous sub-paragraph, caused people to have more trust in MPesa than in the banking sector. This resulted in the adoption of MPesa by many users. The accompanying network effect further increased the value of MPesa, which further sped up adoption.

Even in 2017 elections remain controversial in Kenya (Aljazeera, 2017). However the recent elections have had a negative effect on MPesa. Safaricom has been accused of aiding to rig elections (Moseki, 2017). This has resulted in a political party encouraging its supporters to boycott Safaricom, which has raised concerns among MPesa agents for their businesses. Kenya is considered East-Africa's most stable region, but its history and demographics make it susceptible to political turmoil (Barkan, 2011). The 2017 boycott is an example of the susceptibility to political shocks of lead markets in developing countries (2017, p. 198).

5.5.3 Competition in Kenya

Safaricom undoubtedly dominates the mobile money market in Kenya (Figure 9). The company currently has a 69% market share (Kenyan WallStreet, 2017a). This figure has not been lower than 65% (Jack & Suri, 2011). The lead market theory suggests that competition is required for a country to become a lead market (Beise, 2004; Tiwari & Herstatt, 2014), but from these figures it appears there is only little competition in Kenya.

Table 14 shows the development of competition in Kenya. Three strategies can be recognised.

The first strategy is to increase competition by allowing new entrants. It can be seen that various companies have entered the mobile money market: (i) telecom operators, (ii) 2014 Mobile Virtual Network Operators (MNVOs), which are operators that do not own a telecom network and (iii) banks (Mutegei, 2017; Muthiora, 2015; Paybefore, 2017). The appearance of MNVOs makes entering the market easier as it is not required to own a network (Heinrich, 2014). The entry of banks into the mobile money market seems to indicate a shift in their strategies. Instead of trying to work against mobile money banks are adopting the technology to enhance their own services. This seems to indicate a trend in which mobile money and banking are become more integrated. Already in regulations the boundary between banking and telecom has become less strict through the introduction of mobile money.

Another strategy to increase competition is the reduction of barriers for using other services. An example is the, sharing of agent networks (GSMA, 2017). Safaricom's large agent network gave it a too strong advantage over its competition as these places would only serve MPesa clients before. Sharing of the agent network allows Airtel users to deposit and withdraw cash at MPesa outlets as well. Barrier could be further reduced by interoperability, this means that all operators share each other's networks (GSMA, 2017). Safaricom has however refused this so far (Carey, 2016).

Weakening Safaricom's position is a last strategy to increase competition In 2015 Safaricom's competitors, mainly Airtel Kenya, called for regulators to split MPesa from Safaricom to allow for more competition (Omar, 2015). Government officials have responded to the demand by allowing an investigation into the matter by Analysys Mason, a UK

consultancy group (Genga, 2017). They have suggested that MPesa should indeed be split from Safaricom. The Kenyan government has refused to do so as it does not wish to punish a company for being innovative.

It appears that companies are not able to compete against Safaricom without help from the Kenyan government. Safaricom’s network effects, the strong reputation of MPesa and the institutionalisation of MPesa make it difficult for new entrants to compete (Bessant, 2014; Stepcic & Salah, 2016). It is for this reason the Kenyan government was advised to split MPesa from Safaricom (Genga, 2017).

At the same time it can be questioned what the added value would be of a more competitive market. For 10 years Kenya has been able to lead the mobile money market and the lack of competition has not stopped Safaricom from innovating. The literature of lead markets suggests that Kenya will likely fall behind countries with more competition in the future, but at this point that cannot be denied or confirmed.

Table 14: Development of competition in Kenya's mobile money market

Year	Strategy	Description
2007	Stopping MPesa	Banks lobby to close MPesa (Muthiora, 2015)
2009	Entry Telecoms	No-objection letter granted to Zain (Airtel), Essar Telecom and Yu Cash (Muthiora, 2015)
2010	Entry Telecoms	No-objection letter granted to Orange Money, Tangaza Peasa and MobiKash (Muthiora, 2015)
2014	Sharing agent networks	Safaricom allows agents to sell airtime of competitor Airtel (Carey, 2016) Competition Authority of Kenya enforces Safaricom to allow its agents to sell airtime of Airtel (GSMA, 2017)
2014	Entry MVNOs	Airtel grants licences to Finserve Africa (by Equity Bank), Mobile Pay and Zioncell to use Airtel’s telecom network to enter the mobile money market (Heinrich, 2014)
2015-2016	Weakening Safaricom	Competitors request the Kenyan government to split MPesa and Safaricom (Omar, 2015). UK consultancy group, Analysis Mason advises to split MPesa and Safaricom, but government officials refuse (Genga, 2017).
2017	Entry Banks	9 Kenyan banks partner up with Visa to introduce a QR-code based payment system called mVisa (Paybefore, 2017)
2017	Entry Banks	CBK approves the development of the Kenya Interbank Transition Switch, a mobile money system operating through Kenya’s banking system. It is set up by a partnership of the 6 banks led by the Kenyan Bankers Association (Mutegi, 2017)



Figure 9: Market share for the Kenyan mobile money market (Kenyan WallStreet, 2017a)

5.5.4 Culture

In chapter 3 it was mentioned that culture might have an influence on innovation as well. The development of MPesa described in paragraph 5.4 indicated the existence of an entrepreneurial culture in Kenya. This came forth in the experimentation with early versions of MPesa and the informal sector adopting it to start businesses. Earlier in Kenya an informal version of micro-financing already existed where money pools would rotate amongst users (Hope, 2014). It seems that an entrepreneurial culture can be recognised through the presence of an active informal sector in Kenya. However, this informal sector is not fully put to use yet. Many innovators come up with promising innovations based on MPesa, but often lack funding (Pickens, 2010). It seems MPesa has decreased, but not eliminated the entrepreneurship barrier addressed by Kamp et al. (2015).

The overall innovativeness of Kenya's culture can also be assessed through Hofstede's dimensions as described in subparagraph 3.3.3. The score in Table 15 would indicate a low level of innovative capacity. High PD, MAS and UA scores are associated with a negative effect on innovative capacity as well as a low score on ID (Everdingen & Waarts, 2003). This would oppose the idea of an entrepreneurial culture in Kenya. However, Hofstede's dimensions as well as the literature connecting it to innovative capacity are highly Eurocentric. A study that included countries from far east Asia stated that in that region a low level of ID indicated a higher innovative capacity (Strychalska-Rudzewicz, 2016). This might explain why the scores on the dimension oppose the existence of an entrepreneurial culture in Kenya.

Table 15: Kenya's scores on the Hofstede Dimensions (G. Hofstede, n.d.)

Dimension	Score of Kenya
Power distance (PD)	70
Individualism (ID)	25
Masculinity (MAS)	60
Uncertainty avoidance (UA)	50

5.5.5 Technological Environment

The success of MPesa in Kenya can partly be explained by the high adoption rate of mobile phones in Kenya (Jack & Suri, 2011). In 2008 the penetration of mobile phones for people older than 15 years was already 83 % (Bessant, 2014). Like many African countries Kenya has made few investments in landlines for telecommunication and leapfrogged towards mobile telephones (Jack & Suri, 2011). The high presence of simple mobile phones resulted in Vodafone’s choice to base MPesa on SMS technology (Hughes & Lonie, 2007). In this way it can be said that Vodafone was able to leverage existing technology to innovate.

As can be seen in Figure 10 Kenya is the 2nd country in terms of technology hubs dedicated to mobile money with 26 hubs (GSMA, 2016a). A study that compared the national innovation systems of Kenya and Ghana further showed that Kenya should try to enhance actor linkages and human resources in science and technology (Koria, Bartels, Andriano, & Koeszegi, 2014). Further importance should be given to the diffusion of ICT in the country. The study showed that financing is not of much concern in Kenya. However, funding is mainly based on FDI and few financial support comes from Kenyan companies (Anderson, 2015).

Further the country has the reputation of a technology leader in Africa (UN Africa Renewal, 2013). The country has specialised itself in digital solutions of which MPesa and Ushadidi, a platform for crowdsourcing during natural disaster are the most famous examples. This can further be seen in the contribution of Kenya’s ICT sector to its GDP that rose from 9% in 2009 to 12% in 2015 (Anderson, 2015).

To enhance the reputation of a technology leader and to further increase capacity the Kenyan government is building on what is to become East-Africa’s largest technology hub Konza, nicknamed Silicon Savannah (Anderson, 2015; Ochieng’, 2016; UN Africa Renewal, 2013). This project is promising, but is currently hampered by lack of finance, lack of infrastructure and political uncertainty.

It appears however that the main power of mobile money is that MPesa itself is a source of innovation. MPesa allows new purchasing schemes with are strongly developed in Kenya (GSMA, 2013; Pickens, 2010).

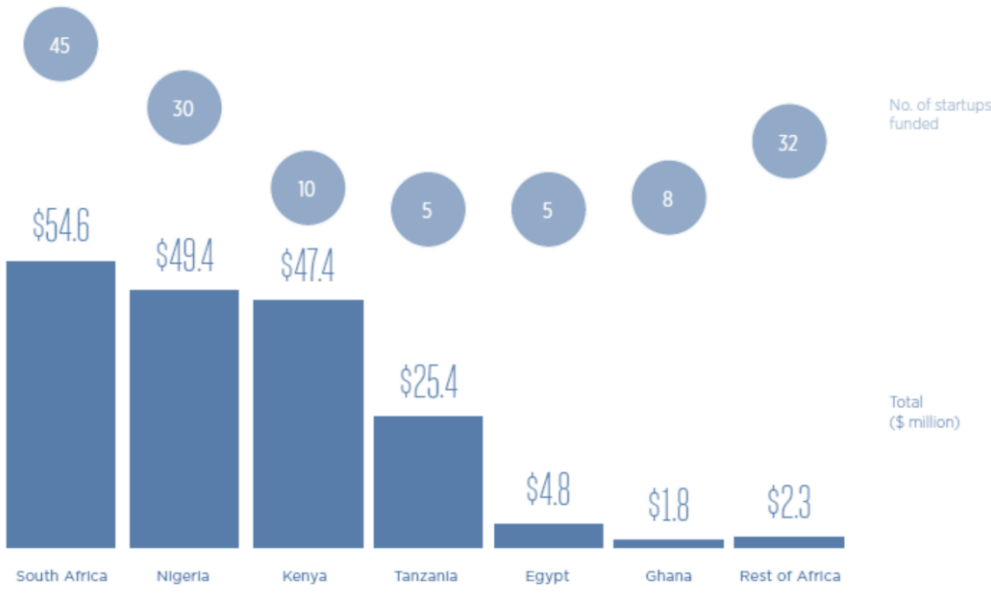


Figure 10: Funding received for technological start-ups in African countries in 2015 (GSMA, 2016a)

5.6 Mobile Money in Developing Countries

So far only Kenya has been assessed under the assumption that it is the lead market of mobile money. However, Kenya is not the only country with a developed mobile money sector anymore. Currently there are 277 mobile money systems worldwide operating across 92 countries (GSMA, 2017). Of these systems 35 have reached over a million users. Sub-Saharan Africa is already home to many mature mobile money markets, but the fastest growth can currently be seen in Asia where 40% of the new mobile-money accounts were opened world-wide in 2016. Also mobile money has begun to penetrate markets in Latin-America, with many countries following Kenya's regulatory model.

Assessing other nations can help to understand the value of the factors that contributed to the success of mobile money in Kenya and it can show whether Kenya is indeed a leader in mobile money.

The following countries were selected for comparison Tanzania, Zimbabwe, Uganda, Bangladesh, Pakistan, Paraguay, the Philippines and Nigeria. An overview the development of mobile money in these countries can be found in Appendix H:

Like Kenya; Tanzania, Zimbabwe and Uganda have an adult population of which over 40% regularly use mobile money and seen an explosive growth of mobile money after its introduction (Evans & Pirchio, 2015; GSMA, 2017). Further, Pakistan and Bangladesh are included for the size of their markets and because they are home to the world's largest mobile money platforms EasyPaisa and bKash respectively (Runde, 2015). Paraguay was included as it is home to the most successful platform in Latin America and expectations are that Latin American countries contain a high potential for mobile money (Tellez & McCarthy, 2012). The Philippines is included as it is home to the first successful mobile money system world-wide (Buenaventura, 2014) Lastly Nigeria was included, as it is the country with the most mobile money platforms in one country (GSMA, 2016b). India and China are generally market of interest in research on developing countries are considered large innovation hubs (Tiwari & Herstatt, 2014) However, these markets are innovation in mobile payment rather than mobile money and are therefore outside of the scope of this thesis (ResMM2, 2017).

None of these countries that have shown interest in adopting systems similar to MPesa are considered high-income economies (World Bank, 2017). Kenya is considered a lower-middle income country like Bangladesh, Nigeria and Pakistan. Paraguay falls under the higher-middle income countries and Tanzania, Uganda and Zimbabwe are considered low-income economies. This shows that mobile money is being adopted throughout the developing world and that income level is of little relevance. It also confirms the earlier made assumption that no distinction needs to be made between.

Kenya might not be the country with the largest amount of registered users, but Kenya is still the largest market in the percentage of the population subscribed to mobile money and in the amount of regular users (GSMA, 2017). Other countries with a larger market size have not been able to surpass these figures, which could mean that market size is a less crucial factor than suggested by Tiwari and Herstatt (2014).

Other countries mostly seemed to have followed Kenya's path with respect to remittance as could be seen for Tanzania, Uganda, Bangladesh as well (Economides & Jeziorski, 2016; Mitha, 2013; Ndiwalana et al., 2010). Different approaches to the introduction of mobile money can also be found. In Pakistan, Zimbabwe, Paraguay and the Philippines mobile money started as a cooperation between banks and telecom operators

(Gwanyanya, 2017; Sibghatullah, 2016; Tellez & McCarthy, 2012). Pakistan and the Philippines even preceded Kenya with this partnership approach.

The existence of a need for mobile money is further increased by the lack of banking services and penetration of mobile phones (GSMA, 2016b). This could be recognised in Bangladesh, the Philippines and Paraguay (Hasnain et al., 2016; Mitha, 2013; Tellez & McCarthy, 2012).

In terms of competition Kenya seems to fall behind countries such as Tanzania, which pioneers interoperability (CGAP, 2015). However, other markets with one company dominating the mobile money market like Bangladesh and Pakistan have also been able to allow for a successful mobile money market (Mitha, 2013; Sibghatullah, 2016). In Nigeria the large amount of competition has not been a guarantee for success. This shows competition can be helpful, but is not crucial to the development of mobile money.

In Nigeria, like Mexico, a bank-led regulation scheme has been hampering development of mobile money (Llewellyn-Jones, 2016). Regulation has been a crucial factor in all countries for the development of mobile money (GSMA, 2017; Tellez & McCarthy, 2012). Even though support of the banking sector has been helpful in some countries support of the regulator is more influential.

Technological capabilities are also not a guarantee for mobile money success. Nigeria is considered Africa's second technological hub, but this also did not help to overcome regulatory constraints (GSMA, 2016a). They have been helpful in Paraguay where agent training was important to the success of Tigo mobile money (Tellez & McCarthy, 2012). Still it seems that other preconditions need to be met before technological capabilities can become effective.

The similarity of demand and regulatory schemes seems to have contributed to the introduction of mobile money in Uganda and Tanzania, which are neighbouring Kenya (Economides & Jeziorski, 2016; Ssettimba, 2016). All countries have primarily been inspired by the success of mobile money in Kenya, but could not simply copy the Kenyan approach (GSMA, 2017). Each country needed to adopt mobile money to its own infrastructure and institutional framework. This puts the exact role of export advantages in system innovations to question. Export advantages do remain important, but in system innovations lead market the system itself is not what is exported. For MPesa it seems that Kenya's regulatory scheme and its telecom led approach could be called its export products instead of mobile money itself.

Kenya has been home to a unique combination of factors that contributed to the success of MPesa. The timing of MPesa's introduction in Kenya might explain why it grew faster than in the Philippines were condition were similar. Tiwari and Herstatt have labelled this the occurrence of a trigger event.

In terms of providing innovations for mobile money in the developing world it appears that MPesa still is an important platform. MPesa has undoubtedly kick-started mobile money making it the most important system in the short history of mobile money. This can be recognised from the many other nations that have been inspired by the success story in Kenya. However, mobile money is growing in other countries whilst in Kenya it has fully matured. This will likely have implication for Kenya's position as a lead market.

5.7 Case study Framework

Now that we have looked into the case of MPesa and the environment in which it operates it is time to relate this back to the earlier established theoretical framework. This can be used to see whether the predicted factors apply in the framework. To do so I will firstly summarise the factors found in the case study. Hereafter, I will distribute them among the different advantage groups and shortly discuss them. The result of this paragraph will be the construction of a lead market framework based on the case study shown in Table 17.

5.7.1 Overview of Case Study Factors

The success of mobile money in Kenya, notably with MPesa, depended on multiple factors. Below they have been summarised. Hereafter they are distributed among the different advantage groups of lead markets that were introduced in paragraph 1.5.

1. A simple system that was easy to understand
2. Financial aid through funding by the DFID
3. Ownership relationship between Vodafone and Safaricom
4. High amount of training for agents
5. Opportunities seen and seized by local entrepreneurs
6. No regulatory restrictions/telecom led system
7. Effective campaign addressing familiar needs
8. Innovative attitude of Safaricom in increasing product diversity and expanding abroad
9. Political instability: creating a need, because of a low trust in the existing solutions
10. Cooperation in the formation of a regulatory framework
11. The strong position of Safaricom in telecom (before the introduction of MPesa)
12. The existing infrastructure of Safaricom agents
13. The trust in the Safaricom brand
14. High market penetration of mobile phones
15. Vodafone's presence in other markets

5.7.2 Demand Advantages

Demand has played an important role in the development of mobile money. Mobile money cleverly improved the existing informal solutions for the remittance market and allowed financial access to a group that until then had been excluded from financial services. It shows how a local innovation can uncover a need that has not yet been met. Vodafone was able to turn this resource-constrained solution into a commercially viable frugal innovation.

The election violence is a clear trigger event that increased demand for the MPesa system. It shows the importance of timing for the introduction of MPesa. It seems that the trigger event was not responsible for achieving critical mass, but it does explain partially why mobile money spread so fast as the need for an alternative next to the distrusted banks became more pressing.

Demand fulfilment of a mobile money system required of course an underlying infrastructure and the presence of mobile phones. MPesa was supported by a highly developed mobile network. With mobile phones having a penetration rate of 83% among the population older than 15 in Kenya in combination with a reliable network it was a sensible

choice to use it a medium (Bessant, 2014; Stepcic & Kabanda, 2016). Without these complementary services mobile money is not possible.

The existence of demand factors is the first requirement for a lead market. A lead market anticipates needs that will become present later in other markets (Beise, 2004). Mobile money confirms that demand factors are the most important advantage group for a lead market.

5.7.3 Cost Advantages

From the case study it can be observed that Hughes had trouble to find funding within Vodafone for a project aimed at financial inclusion (Hughes & Lonie, 2007). The availability of public funding through the DFID was therefore important to initiate the project that would later become MPesa. The fees could be kept at a low level, because initial costs could partly be recouped through this external funding.

Furthermore, Safaricom used its existing telecom and agent network to build the MPesa platform. Therefore relatively little investment was needed to launch MPesa. Also Safaricom already had a solid income through its telecom network. Because it did not fully rely on MPesa costs could be kept low.

Cost advantages have been important for MPesa, but it cannot yet be clearly assessed how important these have been. The cost advantages do not seem to have contributed to the price of MPesa. External funding had been present for the first mobile money system in Madagascar and in the Philippines existing networks could also be leveraged. Although MPesa was cheaper than alternative systems it does not seem that the cost of the system has driven as convenience appears to have been more important.

5.7.4 Export Advantages

The lack of financial services exists throughout the developing world. The GSMA reports that after the introduction of mobile money the number of unbanked fell from 2.5 to 2 billion (2016a). This shows that the lack of financial services is an important driver for mobile money, but also that this need that was present in Kenya provides a basis for lag markets to adopt mobile money as well.

Furthermore, Kenya has a famous reputation in mobile money. Mainly as it is the first country where mobile money had such an impact on society. In 2015 the Economist deemed it the leader of mobile money (The Economist, 2015). Still to this date it has the highest percentage of active users (GSMA, 2017). This success has resulted in a desire of other countries to copy Kenya's success story.

The export of mobile money has been mainly driven by Kenya's success and the similarity of needs in other developing countries. Generally this advantage group would also include push-factors of the lead market. This can be recognised in Vodafone's presence in foreign markets, this has led to the introduction of mobile money in some other markets. However, Kenya's role has been limited in actively spreading the introduction of mobile money as it needs to be adapted to specific conditions in each market. The role of domestic markets has been limited in mobile money, whilst in product innovations they would actively export a product abroad.

In developing countries mobile money seems to allow the fulfilment of a need for financial services. This need arises from a lack of banks. In developed countries this need is

not felt and innovation regarding cashless payment focuses on improving the existing trusted system rather than introducing financial services to customers unfamiliar with such a service.

Table 16: Google search Results for Mobile Money per country

Country	Kenya	Tanzania	Uganda	Zimbabwe
Search results	11 million	8.2 million	7.7 million	6.9 million
Country	Pakistan	Bangladesh	Paraguay	Philippines
Search results	14.2 million	3.9 million	1.4 million	5.6 million

5.7.5 Market structure Advantages

One of the most critical factors might have been the regulatory support that MPesa was given through the non-objection letter. This has later been called the telecom-led approach and the GSMA advises countries to take this as a starting point to ensure mobile money’s success (GSMA, 2016a; Suárez, 2016).

The cost advantages seen earlier due to Safaricom’s established network of course depend on Safaricom’s monopoly in the telecom market. In the emergence of Kenya’s lead market position competition has not played a role, which puts to question how important competition is. However, as we have seen competition is increasing in foreign markets and it is not yet sure what effect this will have on the Kenyan mobile money market.

5.7.6 Technological Advantages

As seen in the case study when MPesa started to get more users, entrepreneurs sought to take the opportunity and become agents representing the system (Hughes & Lonie, 2007). Safaricom’s high amount of training resulted not only in vast network, but also ensured quality of services provided through MPesa. Also Vodafone might have been largely responsible for the funding of the project, but it choose to cooperate with Safaricom, a local company that understood the local market. The entrepreneurial culture of Kenya appears to have contributed to the continuous innovation, however this cannot be confirmed.

Kenya is further recognised as the regional innovation hub in East-Africa and one of the mayor technological hubs of the African continent. With the increasing importance of the ICT sector and the building of Konza in combination with high amounts of FDI, the country seems to prepare itself for a more digital future.

Technological factors are clearly present in the Kenyan market. However they do not appear to have a large contribution to the introduction of MPesa, but rather seem to be a result of it. Their value lies in turning Kenya into a continuous innovation hub of innovation. Therefore technological factors are important in maintaining a lead market position rather than achieving it.

5.7.7 Case Study Framework for Lead Markets in Mobile Money

The factors that contributed to the success of MPesa and thereby the lead market potential of Kenya in mobile money are summarised in Table 17. It can be questioned whether looking at success factors is enough to explain the lead market potential of a country. Therefore the next paragraph will assess the case study from a different perspective.

Table 17: Lead market factors for the MPesa case study

Group	Factors from table
Demand advantage	Lack of financial services
	High unbanked population
	High penetration of mobile phones
	Instability of the established political system
	Latent need for remittances
	Telecom infrastructure coverage
Cost Advantage	Public funding
	Leveraging of [Safaricom's] telecom network
	Leveraging of [Safaricom's] agent network
Export advantage	Similar needs in nearby countries
	High media coverage
Market structure advantage	Supporting regulatory environment and relationship between the private and public sector
	A large domestic player (Safaricom)
Technological advantage	High amount of agents
	Agent training
	Understanding of the local market

5.8 Kenya's Lead Market Reputation

In paragraph 5.2 it was concluded that Kenya can be called a lead market. The previous paragraph shows how Kenya became a lead market. This raises the question whether these factors that show that Kenya is a lead market should be considered also in constructing the lead market framework. The following factors are indications that Kenya is a lead market.

1. Mobile money is the standard way of doing transactions
2. The transaction volume is equivalent to 25% of Kenya's GDP
3. Many innovations are based on mobile money and it allows the development of new business models
4. Kenya has a regional reputation for technological leadership and is 3rd in attracting FDI in Africa.
5. Kenya's regulatory approach, the telecom led model, is considered a prerequisite for successful implementation of mobile money
6. Kenya has the largest number of regular users
7. Kenya was the first to reach 40% regular users
8. The second country to gain 40% regular users, Tanzania was also the second country where MPesa was introduced. Showing mobile money could diffuse.
9. The country has a larger number and wider spread of mobile money agents than ATMs.
10. The integration of mobile money took only 2 years after launch
11. The uptake of mobile money in Kenya resulted in many benefits such as poverty reduction, financial inclusion, and gender equality.

These reputation factors that help to understand why Kenya is considered a lead market are a result of the factors that contributed to its emergence as a lead market. In Table 10 the reputational factors have been cross-referenced with the lead market factors of Table 17.

It can be observed that certain lead market factors have resulted in certain reputation factors, these linkages are marked in blue with an X in the middle. The links show how these reputational factors emerge from the lead market factors and what the result is of Kenya's lead market position. It could also mean that if the factors in the left column are influenced this might affect the reputational factors in the top row. It can be concluded that the reputational factors are already present in the framework through factors that caused them and that they do not need to be added to Table 17.

In the discussion on foreign markets it could be seen that mobile money is developing fast in other nations. These nations might take over Kenya's lead market reputation and some of the reputation factors can already be recognised in these other markets, such the higher presence of mobile money agents than ATMs. The reputational factors could therefore indicate whether the lead market position of the lead market is threatened.

This could provide new insight on the anticipation of lead markets. The anticipation of lead markets refers to a model created by Tiwari and Herstatt (Appendix I:). The focus on products made this model unsuitable for this study. However it does show that lead market emergence might be foreseen.

The relationship show here between lead market factors and reputation might not help to anticipate new upcoming lead market, but it might provide insight as to whether a country can maintain its lead market position. However, to go deeper into this matter is outside of the scope of this study and left to future research.

Table 18: Linkages between lead market factors and reputation factors

Reputation factors	Mobile money as standard for transactions	High transaction volume	Mobile money is a basis for many innovations	Reputation in technology	Foreign direct investment	Regulatory approach seen as standard	Amount regular users	(First with) 40% regular users	Follow up in success is where MPesa expanded first	More agents than ATMs	Fast rise of mobile money	Social benefits
----- Lead market factors												
Lack of financial services	X	X					X	X			X	
High unbanked population	X	X									X	
High penetration of mobile phones				X			X	X			X	
Instability of the established political system												
Latent need (for remittances)		X	X									
Telecom infrastructure coverage				X						X	X	
Public funding					X							X
Leveraging of [Safaricom's] telecom network	X		X	X					X		X	

Leveraging of [Safaricom's] agent network		X		X	
Similar needs in nearby countries		X		X	
High media coverage	X		X		X X
Supporting regulatory environment and relationship between the private and public sector		X		X	X
A large domestic player (Safaricom)			X	X	
High amount of agents					X
Agent training					X
Understanding of the local market			X		

5.9 Revising Lead Markets

The comparison between lead market causes and effects does bring back the question as to what is exactly a lead market. From the definition given by Tiwari and Herstatt a lead market provides the main innovation impetus in a sector. This innovation impetus is one of the effects of being a lead market. It is sure that because of the success of mobile money in Kenya it provided an inspiration for other nations to engage in mobile money as well. This shows the lead-lag market relationship indicated by Beise (2004). However, the aspect of globally dominant design has not been assessed here. This is because MPesa has so far been an innovation that has only been of concern to developing countries. Developing countries have different market conditions that call for different solutions in mobile money (Schilling, 2017).

“A lead market is a national market, which primarily on account of the size of its domestic demand, its access to technological capabilities and its embeddedness in the global economy provides key innovation impetus to a particular category of products.” (Tiwari & Herstatt, 2014, p. 205).

In paragraph 1.5 this definition has been criticised for its strong emphasis on demand size, technical capabilities and embeddedness in the global economy. Although important, these three do not appear to have been the main factors for the success of mobile money in Kenya.

The first main factor, demand size, refers to the lead market potential of countries like India and China, which have enormous populations. Tiwari and Herstatt (2014) mention Brazil and Indonesia as well, so it is not clear where the threshold lies for the size of domestic demand. With around 46 million Kenya's population size is considerably lower even though it is still the 30th largest country worldwide (CIA, 2017). In earlier literature Beise (2004) considered Finland with a population of only 5.4 million to be a lead market of cellular services. Here almost the entire population adopted cell phones. Therefore it can be concluded that domestic demand does not mean that a large market size is required.

The second main factor is access to technological capabilities, but it can be questioned whether this was one of the most crucial factors. Kenya has high technological capabilities that are known throughout Africa, but Vodafone was the main deliverer of manpower at the start of the project (Anderson, 2015; Hughes & Lonie, 2007). The existence of mobile money in Madagascar and the Philippines showed that the technology was invented elsewhere (Hasnain et al., 2016). Access to technological capabilities for MPesa refers to capabilities of both Vodafone and Safaricom. These were helpful, but the real advantage lied in the possibility to leverage existing technology rather than developing it further. The development of technology has mainly been a result of Kenya's lead market position rather than a cause.

The third main factor, embeddedness in the global economy, can be recognised in the relatively large amount of FDI that Kenya receives compared to other African countries (GSMA, 2016a). In the case of MPesa the external funding received resulted in a cost advantage rather than an export advantage. Vodafone's choice to develop mobile money in Kenya was partly due to the country's economic position, but could also largely be prescribed to Vodafone's large stake in Safaricom's shares (Barkan, 2011; Hughes & Lonie, 2007). It seems therefore that embeddedness in the global economy was not one of the main factors

influencing Kenya's lead market position as it was not Kenya's Safaricom that spread mobile money, but the multinational Vodafone.

The most crucial element in the case study appeared to be regulation as the emergence of MPesa in Kenya led to a new regulatory model called the Telco-led model (Suárez, 2016). It seems that this chapter not only provides insight in how Kenya got into a lead market position and why it is considered to lead the mobile money market, but it also puts questions to what this means for our understanding of lead markets.

5.10 Revising Frugal Innovation

The case study can also be a basis to reflect on the other theoretical concept: frugal innovation. First of all it can be questioned whether MPesa is indeed a frugal innovation. The issue of literacy is said to exclude some of the poorest of Kenya's population. However, the innovation still had an enormous impact on people not only in Kenya but in developing countries world-wide. The innovation has been intended to serve the poor and has largely done so.

MPesa has also shown a focus on core functions by starting as a remittance service. This clearly refers to applying a frugal-mind-set. The result was a system focussed on serving the bottom of the pyramid that was able to deal with resource constraints in developing countries whilst providing sufficient quality. Throughout the development of the system a frugal mind-set had been present. For these reasons MPesa can be considered a frugal innovation according to the definition used in this study.

More interesting is to wonder what MPesa means for frugal innovation in general. There are lots of product innovations that have impacted the lives of people at the bottom of the pyramid. But MPesa, being a system that provides financial services has granted the poor a whole new range of options regarding finance. It has granted financial resilience by allowing the poor to become more self-sufficient. Mobile money shows how the lack of a fulfilment of basic needs can be turned into an advantage as Kenya is still ahead of many countries in building a cashless economy.

MPesa shows that how promising system innovations can be for frugal innovation. These will likely play an increasing role in the future and developments such as the Aakash tablet that aims to provide education and internet access to the poor should be closely monitored (Singh Tuli, 2012).

MPesa further provides insight in the role of governments, infrastructure and culture in frugal innovation as well as the importance of pull-factors in its diffusion. It has been able to deal with the challenges mentioned in chapter 3 that are often ignored.

5.11 Conclusions

In this case study it was confirmed that Kenya is a lead market as other markets have adopted its approach to mobile money, mainly regarding regulations and it has been an innovation hub of innovations based on mobile money and also stimulates other countries to invest in the further development of mobile money. It can further be recognised by its reputation in mobile money. This reputation stems from factors that enabled the success of MPesa (Table 17). It is important to notice that it cannot be said that a single factor caused the success of mobile money in Kenya, but rather a combination of factors interacting in a complex actor network. This becomes clear when looking at other nations that have seen a successful introduction of mobile money as they show condition similar to that of Kenya.

The dominant position of Safaricom allowed it to leverage its existing telecom network. Its connection to Vodafone brought in manpower and the funding of DFID.

Next to these factors MPesa was the right innovation introduced in the right environment at the right time. The right innovation as it was able to solve gaps in the financial system that excluded many potential users. The right environment due to the combination of a large domestic player supported by a multinational, investor and most importantly supportive regulator acting in a system with. The right time due to the instable political environment that resulted in even more need for a safe way to send money.

The factors that have been most important in mobile money differ from those considered most important by Tiwari and Herstatt. Demand size, access to technological capabilities and embeddedness in the global economy where important, but for MPesa have not been more important than other factors.

The existing network of Safaricom and the penetration of mobile phones reduced the importance of a large market size to recoup investments. Still demand size was large due to the high penetration rate, so it is important but should not be emphasised as it distract attention from other important factors.

The same holds for access to technological capabilities. The technology of MPesa is simple. The main strength of Safaricom was not the technological development of MPesa, but its marketing it. Furthermore, lead markets are not per se the countries where a technology is invented, but those where technology is successfully introduced to a market.

Embeddedness in the global economy was of little relevance as it is difficult to implement a system in another context. Conditions among markets are highly different so a different approach is required for the introduction of mobile money in each market. Vodafone played in the introduction of MPesa into 10 markets, but pull factors have been more important.

The case study shows through the interaction of factors how different advantage groups interact and that factor in all groups should be present to ensure a lead market. At the same time it can be concluded that the importance per group can be different.

The importance of actors and how they interact shows the importance of market structure advantages. The role of competition, which Beise thought to be the only factor of this group, is very limited. The government in Kenya is not attempting to increase competition. This has stimulated banks to find other ways of competing with MPesa, which might change Kenya's competitive environment in the near future. However, so far a more competitive environment has not proven to be an advantage in mobile money.

Cost advantages were less important than what would be expected for a developing country. These were present, but have not resulted in a lower pricing than in other nations. The pricing was enough to incentivise the uptake of mobile money, but demand for the innovation has been more important. This could indicate a certain customer sophistication level present in Kenya, which would counter Beise's (2004) main argument for lead markets not being able to exist outside of developed nations.

Diffusion of mobile money has been mostly passive. Demand pull played a far larger role than demand push factors. This has consequences for how to understand export advantages and their importance which seem less than Beise would imply

The main driver of mobile money has been the lack of fulfilment of a need for financial services by established systems. The established systems resembled those in developed

countries and have been unsuitable for Kenya and other developing countries. By constructing a system tailored to the needs of the poor the financial sector in Kenya has seen a disruptive change. Developed countries so far are following a different path in which mobile money is extended the system that is already present. Therefore mobile money in developing countries can so far be considered a separate development.

However, the future for Kenya is still open. Other markets are growing fast in mobile money. It is also possible that other designs for financial inclusion will gain popularity and eventually replace mobile money in its current form. Kenya's current lead market position ensures it has top knowledge in mobile money, making it a market worth investing in. It further can export knowledge on mobile money and its regulatory approach. To keep this position Kenya should keep investing in innovations in mobile money. Moreover the country should aware not to be halted by its established system as this is exactly why developed countries fell behind in the first place.

6 Expert Interviews

The case study in the previous chapter resulted in a very specific framework, whilst the theoretical framework has been very general. The interviews can provide a means to relate these two frameworks, because the specific answers provided by individuals can be combined and generalised. The interviews further provide the possibility to arrange factors according to how often they are mentioned revealing their relative importance. For these reasons a third framework is constructed in this chapter based on interviews.

In paragraph 6.1 it will be discussed whether developing countries can become lead markets. In paragraph 6.2 factors a framework is constructed for lead market factors in mobile money based on the interviews. The theoretical relevance of lead market theory for policy making is discussed hereafter in paragraph 6.3. The conclusions as the chapter are presented in paragraph 6.4.

6.1 Lead Market Potential of Developing Countries

This study is conducted under the assumption that lead markets can exist in developing countries. This was based on the thoughts of Tiwari and Herstatt (2014). In this paragraph this idea is validated through interview firstly from a theoretical perspective on lead markets, followed by perspectives on lead markets in mobile money.

6.1.1 Lead Market Theory

The experts on lead markets agree that developing countries can become lead markets (ResLM1, 2017; ResLM2, 2017). However, they do see this as an exception to the established rule. According to ResLM1: “The idea of a lead market is that it anticipates a new development that will become relevant in other countries later” (2017). In developing countries innovations emerge because basic needs have already been met and there is money left to go beyond these basic needs (ResLM1, 2017). Therefore innovation in developing countries should focus on redefining basic needs.

To expand globally, the question is whether a solution that is “good enough” in a developing country is considered “good enough” for developed countries (ResLM1, 2017). An innovation usually diffuses globally in two steps: (i) fitting the innovation to user requirements and (ii) making it cheap. This might also apply to systems, especially within the context of developing countries because their populations have specific needs and are more concerned with costs.

However, becoming a global lead market might actually be harmful for a developing country. If their innovation caters the needs of developed countries these might try to become lead markets themselves. This is likely to happen as developed countries have more funding available for research (ResLM1, 2017; ResLM2, 2017). Therefore it might be better for developing countries to focus on leading regional markets. This does however depend mainly on whether the needs of developing countries are the drivers of the market.

For a developing country to become a lead market it is important that the market is driven by conditions that are associated with developing countries, such as rough conditions and the need for low costs and simple technology (ResLM1, 2017). Frugal innovation is therefore an important contribution to the lead market potential of developing countries as it is driven by needs specific to these countries (ResLM2, 2017). These drives will result in specific demand

advantages that are unique to developing countries. ResLM2 considers these advantages most important.

The experts consider cost advantages most important hereafter as they can help to overcome a lack of purchasing power and reduce the importance of willingness to pay (ResLM1, 2017; ResLM2, 2017). ResLM1 pointed out that social innovation is generally a driver in developing countries (2017). This can also contribute to cost advantages as it reduces the need for funds.

Although this puts a heavy emphasis on costs multinationals should take customer sophistication of the poor into account. Not recognising this is a common misconception (ResMM1, 2017). Even the poor show a level of customer sophistication as they have options on how to spend their money and make choices not solely based on price. An example is that there was a cheaper alternative to MPesa, but this system performed lesser in quality, reliability and feedback (FMM4, 2017). This shows how that the poor despite wanting cheap innovations also require a certain quality.

ResLM2 considers market structure and technological advantages of limited value, because the development of the former is relatively limited in most developing countries and the latter requires large investments in R&D. This R&D should be found through FDI although some very large countries might be able to offset it due to their size. The last statement coincides with the definition of lead markets as used in this thesis (Tiwari & Herstatt, 2014). He mentioned cutting cost usually through up-scaling as the most important factor for developing countries to become lead markets (ResLM1, 2017).

In short for a developing nation to become a lead market mainly depends on finding a need that is driven by factors specific to a developing country, whilst finding ways to deal with a lack of funds as can be derived from Table 19.

Table 19: Contributing and inhibiting factors to the lead market potential of developing countries

Success factors	
The technology is driven by needs in developing countries (rough conditions, simplification and low costs, lack of centralised systems)	(ResLM1, 2017)
Market size	(ResLM2, 2017)
Existence of demand	(ResLM2, 2017)
Inhibiting factors	
Low income level	(ResLM1, 2017)
Low willingness to pay	(ResLM1, 2017)
Lacking industrial base	(ResLM2, 2017)
Lack of strong R&D	(ResLM2, 2017)
Lack of technology specialisation	(ResLM2, 2017)
Technology offers that are only interesting to the local environment	(ResLM2, 2017)

6.1.2 Mobile Money

Table 20 provides an overview on the lead market in mobile money as perceived by the experts on mobile money and why they consider a specific country a lead market. In the far right column answers have been put into categories to create a better overview.

All respondents mention Kenya, sometimes in combination with other nations. MPesa was often used as an example when talking about lead factor in mobile money. This confirms

the thought of Kenya being a lead market in mobile money and thus the possibility of a developing country being a lead market.

Other markets that were mentioned were China and India, but this was related to mobile payment (ResMM2, 2017). In mobile payment the network is not owned by the operator separating it from mobile money, which is the focus of this study. These markets have not been mentioned in the case study, because the focus is on mobile money.

In mobile money upcoming markets Tanzania, Pakistan, Uganda, Zimbabwe (ResMM2, 2017). The USA is mentioned as a country where mobile money technology is invented, but is unlikely to be relevant as a market because its customers are not open to accepting mobile payment due to an already functioning established system (FMM2, 2017). Developing countries that lack established systems can turn this into an advantage.

All the markets that were mentioned to have lead market potential are developing countries (World Bank, 2017). This indicates that the mobile money sector is dominated by developing countries.

Using the categories it can be seen that the perception of a lead market in mobile money is mainly due to high penetration levels, which was mentioned 9 times. The penetration of mobile money is highly visible. It is likely that this is the reason it was mentioned so often.

Hereafter innovation was mentioned second most often, with 8 counts. The large presence of mobile money has resulted in the technology to become a facilitator and a platform for innovation (ResMM2, 2017). This factor shows more compliance to the theory as a lead market is said to provide the main innovation impetus to a technology.

The perception of a lead market is influenced by usage levels. This refers to the actual use of the technology rather than how much it is spread out in society, which here is considered to be penetration. Usage was recognised 4 times in the reasons mentioned as well as reputation.

Lastly impact can be seen as a reason as to what makes a country considered to be lead market. Financial inclusion was put under this category as in the case of MPesa it was the initial goal of mobile money and is further a form of impact on society.

The other reasons; infrastructure, regulation, acceptance and phone penetration; were mentioned once each and were not considered to fit one of the categories. These reasons are more fitting to be lead market factors rather than lead market perception.

Table 20: Perceived Lead Markets in Mobile Money

Interviewee	Perceived Market in money	Lead in mobile	Reason	Category
FMM1	Kenya		Transaction volume, Amount of transactions Amount of agents. Spread of mobile money Amount of innovations based on mobile money	Usage Usage Penetration Penetration Innovation
FMM2	Kenya & England (provided money and manpower)		Hard to replicate in success Mobile money penetration rate.	Reputation Penetration
FMM3	Kenya		Number of subscribers Transaction amount	Penetration Usage
FMM4	Kenya		Attempts to replicate Kenya's system by other countries Presence of mobile money Additional activity	Reputation Penetration Innovation
FMM5 Singh, Piyus	India		Government focus on demonetisation Introduction of novel cashless payment systems, using biometrics or social security number	Regulation Innovation
	China		Technological advancement Public acceptance of technology Spread of mobile phones	Innovation Acceptance Phone penetration
	Kenya		Seen as the world example for mobile money Used by 80% of households 2 years after introduction	Reputation Penetration
RegE1	Kenya		High usage Customer penetration Integration in daily life Filled the gap of the banking system	Usage Penetration Innovation Impact
RegE2	Kenya		Rapid growth in a short time	Penetration

		Regulation Infrastructure	Regulation Infrastructure
ResMM1	Kenya	Commonly accepted High fulfilment of original goal of financial inclusion Innovations and business models based on mobile money Integration of banking and telecom High social impact	Reputation Impact Innovation Innovation Impact
ResMM2	Mobile payment China	Super-apps that include payment are integrated in daily life	Innovation
	Mobile money Kenya	Largest number of frequent users No need for wallets	Usage Penetration
	Pakistan	Largest number of registered accounts	Penetration
	Tanzania		

6.2 Lead Market Framework for Mobile Money

This sub-chapter concerns the questions on mobile money. Interviewees were asked questions about what country leads the mobile money sector as well as success factors and inhibitors. To prevent answers from being influenced the interviewees were first asked to name success factors unstructured. Hereafter, more success factors were found by going through the framework. This often led to enriching the picture provided earlier.

Sometimes answers were found unfit for certain advantage groups. In the results these have already been placed under the correct group. For example, on respondent mentioned “reputation in technology” as a technological advantage, whilst this actually provides an advantage to exports.

Table 21: Most important factor for mobile money success according to interviewees

Interviewee	Factor in interview	Generalised Factor	Advantage Group
FMM1	Combination of needs, advertising and bad alternatives. Mainly trust in Safaricom and its market share	Trust	Demand
FMM2	People [in leadership positions]	Leadership	Technological
FMM3	Leadership	Leadership	Technological
FMM4	Government support and a dominant private player	Regulation	Market Structure
FMM5 Singh	Infrastructure, network, high literacy and common language	Distribution	Demand
RegE1	Lack of banking services	Needs	Demand
RegE2	Value proposition	Needs	Demand
ResMM1	Regulation	Regulation	Market Structure
ResMM2	Regulatory support	Regulation	Market Structure

Table 21 provides an overview of factors considered most important in mobile money by the respondents. The answers were generalised and associated with one of the advantage groups so that they could be used in the construction of Table 27. Regulation appears the most often as most important (2017) as it was mentioned by ResMM1, ResMM2 and FMM4. The case study suggests that regulation has been the most crucial factor also.

The aforementioned importance of people could be connected here to. Good relations between the regulator and the private company might have opened a window of opportunity to introduce mobile money relatively free from government involvement.

FMM3, mentioned that it is important that a firm believes in the added value of financial inclusion, because it takes years to recoup mobile money investments (2017). The

case study already showed that this belief was held by the regulatory authorities as well. At times they had to protect Safaricom from accusations of unfair competition (Muthiora, 2015). There has been a shared belief held by both the telecom operator, Safaricom, as well as the regulator, CBK, that mobile money could become a key element in increasing financial inclusion.

Latent needs can be recognised in the answers of RegE1 and RegE2. Of course a service cannot sustain itself if it will not be sold, and through the need for remittances Safaricom was able to find a way to introduce mobile money. The campaign applied to the common man in Kenya and people could identify with the issue of remittance (RegE2, 2017).

The variety in answers shows that it is difficult to say whether one factor can really be considered the most important. This is represented in the answer of FMM1 who mentions that there was a combination of various factors.

Looking at the most important factors does however help to see which ones should be given the highest importance. The mentioning of the regulator shows that policy makers have a large influence in the success of mobile money, but cannot neglect external factors.

An interesting thought provided by some interviewees MPesa's success is not due to factors specific to Kenya, but rather due to the people involved in starting up MPesa (FMM2, 2017; FMM3, 2017). This appears to be of high importance as it was also mentioned that the CBK had a CEO at the time who was willing to allow Safaricom a high amount of freedom during its experimentation with mobile money (ResMM1, 2017). People and leadership have even been mentioned as the most important factor for mobile money success as can be seen in Table 21.

Some interviewees consider this a sign that national condition were of a lesser importance. This could be recognised in the hiring of MPesa staff members abroad to facilitate the introduction of mobile money there (FMM1, 2017; FMM3, 2017). It was also said that if MPesa was not developed, mobile money would have taken off somewhere else (FMM4, 2017). However, the case study shows clearly how the condition in Kenya provided the right environment for mobile money to develop. This leads to the conclusion that company level factors such as the right staff and strong leadership are important contributions, but they do not reduce the importance of a supportive environment for innovations. Elsewise, MPesa would have not struggled so much to introduce mobile money to South Africa and India (FMM1, 2017; Roberts, 2015).

6.2.1 Understanding the Tables

To understand the following paragraphs better the reader is explained to how to read Table 22 to Table 26. These tables show the factors that were found through the interviews for the different advantages groups.

Factors were found through 3 questions. Firstly interviews were asked open what factor they consider important for success in mobile money, these answers named contributing factors are found in the far left column. Secondly, they were asked about factors that would inhibit success in mobile money these are presented in the third column as inhibiting factors. Usually these inhibiting factors were the opposite of earlier mentioned contributing factors. Therefore they were attributed to the success factor that they oppose. Thirdly, the interviewees were explained the different advantage groups and asked what other factors could be important within these groups. These answers, called advantage groups factors are shown in the fifth column. Some answers were given multiple times,

therefore after each answer the amount of times it was mentioned is provided. The last two columns were constructed from the previous answers. Many answers were similar and could be grouped together in a combined factor.

The factors mentioned in Table 21 were included within the table of their respective advantage group. They were counted double in Table 22 to Table 26. They are shown with a plus sign to show that the scores were added from Table 21.

6.2.2 Demand Advantage

The first advantage group is that of demand. This group encompasses factors that result in an increase of demand and is thus related to consumers. The factors mentioned in this group are those that will result in a higher demand for mobile money. Cost Advantages
Factors that result in a relative price reduction compared to other countries cost are called cost advantages. This increases the lead market potential of a country as it is able to provide an innovation at lower costs.

The first factor that came forward in the interviews was that of regulation. Supportive regulations can help to decrease costs. In Kenya mobile money was not taxed for a long time, whilst in some other countries high taxes resulted in little uptake (ResMM2, 2017). In the demand advantage group it was already said that a high perceived costs reduced the uptake of mobile money. Regulation can further be used to reduce barriers to open accounts, which can result in lower prices as mobile money providers are less restricted (RegE2, 2017). Other financial incentives provided by the government might further decrease the cost of mobile money (P. Singh, 2017). However, low costs are not a guarantee for a large user base. Even the poor show customer sophistication, which is often ignored by multinationals entering BOP markets (ResMM1, 2017). Kenya saw the introduction of a system cheaper than MPesa, but this system lacked the confirmation text message after each transaction that people knew from MPesa (FMM4, 2017). This reduced service made the system less attractive to potential customers.

Secondly, a mobile money system relies on its availability anywhere at any time (FMM3, 2017). Distribution might appear less obvious for an electronic system, but in Kenya Safaricom was able to leverage its already present network of agents to sell mobile money next to their existing business (FMM4, 2017). This was lacking in for example Ethiopia where this had to be constructed out of nothing. According to FMM4 this explains why, despite a supporting government, mobile money was not able to grow fast in Ethiopia.

Table 22 shows the factors that were mentioned within this group.

The first factor is the presence of a latent need. As can be seen from the responses that are part of this factors this need can arise from a specific cultural context or political situation. Consumers need to be able to relate the value of a new technology in their daily life. Safaricom was able to connect to the common Kenyan with this value proposition (ResMM1, 2017). The lack of customer need is the main cause of failure of mobile money in South-Africa (ResMM1, 2017).

The second factor is telecom infrastructure. A proper infrastructure is a key element to create demand as it ensures a reliable and omnipresent network. This network forms the foundation on which mobile money is build. FMM4 pointed out that a reliable connection also results in a system that is trusted, which is of high importance in mobile money. People need to trust the system if they wish to put their money in it. This factor has been presented in the theoretical framework as well in chapter 4. It was already shown that it was missing in the framework of Tiwari and Herstatt. That framework considered products, but even in those a reliable infrastructure should not be neglected as it helps distribution and thereby the spread of even a product innovation.

Acceptance of technology is the third factor. There seems to be a culture in Kenya that makes people more willing to try new technologies (FMM4, 2017; ResMM1, 2017; ResMM2, 2017). This can also be recognised in the propensity to use ICT. ResMM1 mentioned for example that Facebook is used by many rural Kenyans whilst this is not as widespread in rural areas in Uganda. Further, the micro-financing sector had been established in Kenya for a long period, MPesa was meant to ease the repayment structure (Hughes & Lonie, 2007; ResMM1, 2017). Although MPesa did not become a micro-financing system, this history made Kenyans familiar with financial systems and services.

The fourth factor, mobile phone penetration, builds upon the telecom structure. This factor encompasses the spread of mobile phones as well as their system compatibility and affordability. More general this can be seen as a complementary good to the service. Mobile money is an addition to mobile phones (ResMM1, 2017). Demand could be created by adding value to a device that many people already had mobile phones. This factor also encompasses compliance between phones and infrastructure (RegE2, 2017). MPesa had compatibility with IPHones and Chinese brands as they were incompatible with the simple menu (FMM4, 2017). At that time only the SMS based system was of interest to Safaricom as this was the most general used system (FMM3, 2017). Currently apps are being developed for MPesa (RegE1, 2017). Mobile money systems add a service to owning a phone (ResMM1, 2017). This makes this a highly important factor.

Trust was mentioned as a fifth factor. Safaricom was already an established brand before it introduced MPesa (FMM2, 2017; FMM3, 2017; FMM4, 2017). Putting money into a company exposes a customer to a high amount of risk. Therefore the customer needs to trust that the company provides a safe environment to store money and will return it upon request. FMM4 mentioned that at the start of MPesa many people put a little money on their account just for a few hours to check whether the system is trustworthy. Also connectivity contributes to trust in the system as people need to always be sure that their transfers will reach the intended target (FMM3, 2017; RegE2, 2017).

Lack of banking services, was the sixth factor. This seems a factor specific to developing countries, especially when thinking of it as a lack of a traditional system. MPesa eased the sending and storing of money. This was for many people not yet possible as the

most common institution that allowed them to do so, banks, were out of reach for the often poor Kenyans. In many Western countries this problem is not present and this often hampers the spread of mobile money. GSMA considers mobile money as a possibility to bring banking to the poor (Bessant, 2014; GSMA, 2016a).

Seventh in Table 22 is the factor bad alternatives. The poor had a system for remittances by sending money via bus drivers (FMM4, 2017). This was a very time consuming and unreliable system. The political unrest in 2007 can be connected to this as a trigger event as it exposed the vulnerability of this system. However, this trigger event is considered a separate factor. Bad alternatives is presented separated from lacking banking services, because it shows the poor found a way to divert the issue of being underserved by the traditional banking system. However, this resulted in a quick-fix solution with little commercial viability. Here there is a clear difference between a commercial large scale frugal innovation, represented by MPesa and a quick-fix Jua Kali, represented by the bus drivers, as was presented in chapter 3 and Appendix B:

Some factors were only mentioned a few times. Therefore it is less obvious whether they should be considered in the framework of not.

Literacy was mentioned a few times. MPesa requires its users to be literate, which excludes the poorest and thus does put to question whether it actually contributes to financial inclusion (FMM4, 2017). However, FMM3 claims that MPesa was able to fully reach its development goals and that impacting peoples' lives has always been the main driver of the system (2017). FMM3 states that literacy is helpful, but not required to use MPesa as literate relatives can help these people understand the basic MPesa menu.

Social unrest has been introduced already as a triggered event that helped gain a large user base for MPesa (FMM4, 2017; P. Singh, 2017). It indirectly contributed to demand as it made the existing way of sending money by bus unreliable. This factors shows how an issue associated with a developing country could turn out to be a key contribution for the introduction of a technology.

Perceived affordability was mentioned twice (RegE1, 2017). This seems odd when considering a system that is in essence aimed at serving the bottom of the pyramid. Cost perception contributes to the uptake of technology rather than its costs and was therefore mentioned as a demand factor.

Economic growth was only mentioned one time (ResMM2, 2017). This might be because mobile money was foremost aimed at customers at the bottom of the pyramid. The goal of mobile money was therefore to ensure that economic condition were of little importance.

Demand advantages for mobile money seem to have played a key role in the emergence of mobile money as they were most often mentioned. They originate predominantly from the existence of a need for mobile money itself (RegE2, 2017; ResMM1, 2017; P. Singh, 2017). In the Kenyan context this rose mainly from the family structure of urban workers with relatives in rural areas (FMM3, 2017; FMM4, 2017; ResMM2, 2017). A high quality and well spread telecom infrastructure provided a basis for mobile money to be built upon (FMM2, 2017; FMM3, 2017; RegE2, 2017; ResMM2, 2017; P. Singh, 2017). This was strengthened further by the large spread and thus familiarity with mobile phone technology (FMM4, 2017; RegE2, 2017). It is said that this resulted from a high acceptance of new technology that is inherent to Kenyan culture (FMM3, 2017; FMM4, 2017; ResMM1, 2017). The lack of traditional services and the low quality of alternatives resulted in an even higher demand for

mobile money (FMM1, 2017; FMM4, 2017). Trust has not yet been identified as a factor, but it is often mentioned. It ensured that people were willing to try out mobile money and trust the operator with their money (FMM2, 2017; FMM3, 2017). To a lesser extent literacy, social unrest and perceived affordability were mentioned to be influencing demand.

With this combination of factors Kenya has shown a unique structure that might be difficult to find in other countries and can explain why Kenya is still considered to be a global leader in mobile money.

6.2.3 Cost Advantages

Factors that result in a relative price reduction compared to other countries cost are called cost advantages. This increases the lead market potential of a country as it is able to provide an innovation at lower costs.

The first factor that came forward in the interviews was that of regulation. Supportive regulations can help to decrease costs. In Kenya mobile money was not taxed for a long time, whilst in some other countries high taxes resulted in little uptake (ResMM2, 2017). In the demand advantage group it was already said that a high perceived costs reduced the uptake of mobile money. Regulation can further be used to reduce barriers to open accounts, which can result in lower prices as mobile money providers are less restricted (RegE2, 2017). Other financial incentives provided by the government might further decrease the cost of mobile money (P. Singh, 2017). However, low costs are not a guarantee for a large user base. Even the poor show customer sophistication, which is often ignored by multinationals entering BOP markets (ResMM1, 2017). Kenya saw the introduction of a system cheaper than MPesa, but this system lacked the confirmation text message after each transaction that people knew from MPesa (FMM4, 2017). This reduced service made the system less attractive to potential customers.

Secondly, a mobile money system relies on its availability anywhere at any time (FMM3, 2017). Distribution might appear less obvious for an electronic system, but in Kenya Safaricom was able to leverage its already present network of agents to sell mobile money next to their existing business (FMM4, 2017). This was lacking in for example Ethiopia where this had to be constructed out of nothing. According to FMM4 this explains why, despite a supporting government, mobile money was not able to grow fast in Ethiopia.

Table 22: Demand advantages from interviews

Demand							
Contributing factors	Count	Inhibiting factors	Count	Advantage group factors	Count	Combined factors	Total count
Need for remittance	4 + 4	No need	2	Rural families with workers in urban areas	3	Latent need for remittances	20
Campaign	1	Lack of customer interest	1	Cultural motivation to take care of parents in rural areas	1		
Value proposition	1			Meeting specific needs	3		
Stable network	3	Bad network quality/ connectivity	2	Infrastructure	2	Telecom Infrastructure	18
Network coverage	2	Bad coverage	3	Connectivity	1		
Distribution	1 + 2			Telecom infrastructure ^T	1		
				Coverage ^T			
Acceptance mobile money	1			Acceptance of mobile money as payment	1	Acceptance of technology	10
Willingness to try	3			Propensity to use ICT ^T	1		
				Leapfrogging possibilities through lack of technology ^T	1		
Phone penetration	4			Penetration of mobile phones (due to bad landlines)	2	Mobile phone penetration	10
				Affordability of mobile phones	2		

	Incompatibility of system and phones	1	Compliance phone and interface	1			
Trust Safaricom	1 + 2		Client relations	1	Trust	7	
Trust mobile money	1		Trust in telecom companies	1			
Brand recognition	1		Building trust	1			
			Stable brand name	1			
Gap in banking system	1		Lack of banking services	1	Lack of banking services	4	
High amount of unbanked	1		Low banking penetration	1			
Literacy	1	Illiteracy	1	Literacy	1	Literacy	3
Post-election violence	1			Social unrest	1	Social unrest	2
		High perceived cost	1			Perceived Affordability	2
		High transaction cost	1				
Economic Growth	1					Economic Growth	1

The existence of common languages was brought forward thirdly (P. Singh, 2017). Singh was the only respondent to bring this factor forward, but saw this as a large problem in India. The use of 2 official languages in Kenya allowed for a cost reduction in development. During the development of the MPesa menu the team did struggle with the use of long Swahili words (Hughes & Lonie, 2007). However, not all Kenyans speak either Swahili or English (FMM4, 2017). The people who only speak a local language are therefore not able to use the system properly.

Lastly public funding was mentioned as a contributing factor. The DFID promised around a million pounds if certain targets would be met for the introduction of mobile money in Kenya (FMM4, 2017). This reduced the risk for Safaricom to recoup their investments. Recouping investment can take up to 3 years, whilst Vodafone's policy normally allows a 6 months trial period for new products (FMM3, 2017). Therefore, this was an important factor to allow experimentation with mobile money at a time when its potential was unknown.

Mobile money in Kenya is not necessarily cheaper than in other countries. Their cost fee has actually been criticised as unnecessarily high (FMM2, 2017). The advantage in this group is mainly due to the existing distribution network. Public funding was important to kick-start the project, it cannot be said whether this indeed resulted in a cost reduction. Regulations were helpful in cost reduction by allowing freedom to telecom operators, but they likely had a larger impact on market structure advantages. The factors mentioned in this group might have had a larger impact on the cost of mobile money in Kenya, but the lack of competition discussed in section 0 could have negated this effect. Then again the earlier mentioned established distribution network can be largely prescribed to Safaricom's dominant market position (FMM1, 2017; FMM4, 2017).

Table 23: Cost advantages from interviews

Cost							
Contributing factors	Count	Inhibitors	Count	Factors among groups	Count	Factor for framework	Total count
				Supporting regulations	2	Supporting Regulation	4
				Reducing barriers to open an account	1		
				Financial incentives to uptake mobile money	1		
Agent network	1			Leveraging existing stores for distribution	2	Leveraging existing networks	3
Common language	1	Language diversity	1			Common language	2
Public funding	1					Public funding	2
Relations Vodafone and DFID	1						

6.2.4 Export Advantages

Export advantages result in increased diffusion of the technology they consist of factors that ease the spread of the innovation or increase the will of other nations to adopt it.

Vodafone owned 40% of Safaricom at the time MPesa was introduced (Hughes & Lonie, 2007). The presence of Vodafone in other countries helped the spread of mobile money abroad. This resulted in successful introductions in for example Tanzania and Zimbabwe (Levin, 2013; WallStreet, 2017).

Secondly the reputation of Kenya resulted in a desire abroad to replicate its success (ResMM1, 2017; P. Singh, 2017). This arises not only from the success of MPesa, but also Kenya's economic position. Kenya is commonly seen as the most stable nation in East-Africa (Barkan, 2011). However, replicating mobile money takes caution as differences between nations were often ignored in the first few attempts to export mobile money (FMM1, 2017).

This shows the value of the third export advantage, similarity in regulation. Between the nations in East-Africa regulatory framework are similar, which eased the spread of mobile money (FMM1, 2017). West-African nations had a strong desire to develop their own systems due to national pride and vastly different regulatory schemes, making the Kenyan system unfit to be directly applied in these nations (FMM4, 2017).

A fourth factor contributing to export is the presence of an international institution that promotes the technology. GSMA, a research institution in telecom, collects data on mobile money and spreads best practices among nations (GSMA, 2016b; ResMM2, 2017).

The presence of similar needs and market conditions was only mentioned once (FMM4, 2017). However, this is still an important factor when considering how valued the presence of needs was within the demand advantages group. The latent need for mobile money was not specifically Kenyan (FMM1, 2017). If similar needs would not exist in other countries the large pull factor described in chapter 5 would not have been present.

Export advantages for mobile money seem to be mostly present in the presence of a multinational that can use its established reputation as a brand abroad. Export advantages could be seen as strongly related to demand advantages, because export is largely dependent on the presence of demand abroad. Along with reputation this causes a desire in other nation to adopt the innovation.

Export advantages further consist of factors that ease the spread of the innovation. What came forwards in mobile money is the similarity in regulations and needs as well as the presence of an international institution promoting mobile money.

It should be noted that the whole idea of exporting a system can be questioned as well. Export is related to products instead of services (ResMM1, 2017). In mobile money there is a diffusion of knowledge that has to be integrated in a new system. Differences between countries in infrastructure, regulation and markets might therefore be even more important than with products. It can be seen that many nations have chosen to build their own systems in mobile money inspired by the Kenyan model. The lead market of mobile money, might be exporting other things than mobile money itself. In Zimbabwe for example half of the MPesa staff was hired to help develop a mobile money system (FMM1, 2017). The earlier mentioned telecom-led model is being spread out towards other nations as it had been so important in Kenya (Suárez, 2016). This shows that export advantages might need to be rethought when considering systems.

Table 24: Export advantages from interviews

Export								
Contributing factors	Count	Inhibitors	Count	Factors among groups	Count	Factor for framework	for	Total count
				Relationship Safaricom and Vodafone	1	Multinational shareholder		5
				Vodafone's foreign relations	1			
				Vodafone's global presence	2			
				Brand recognition abroad	1			
				Newspaper coverage [abroad]	1	Reputation		3
				Large domestic success	1			
				Regionally strong economic position	1			
				Similar regulatory frameworks (in East-Africa)	2	Similar regulation		2
				GSMA spreading mobile money and best practices	1	International institution spreading technology		1
Similar needs abroad	1			Similar needs and market conditions	1	Similar needs and market conditions		1

6.2.5 Market Structure Advantages

Market structure advantages are those that arise through the actors that are active and how these interact.

Again regulation plays an important role and in this advantage group it is the most mentioned factor. Here regulations refer to creating a supportive environment that allows companies to experiment with an innovation and eases its introduction. What needs to be taken into account is that the government should balance its involvement (FMM4, 2017). A government should be interested, without being too controlling. Some interviewees were familiar with the telecom-led model and they agreed that banks should not lead the introduction of mobile money because they have no incentive to make it successful (FMM1, 2017; FMM2, 2017; RegE2, 2017; ResMM1, 2017; ResMM2, 2017).

The second factor is the presence of a committed large private player. Company commitment was already presented as key factor (FMM3, 2017). Interesting is that normally the lead market theory values competition (Beise, 2004; Tiwari & Herstatt, 2014). However, in the case of mobile it seems that competition inhibits the introduction of mobile money because it makes the systems highly complicated (FMM1, 2017; FMM4, 2017). The large private player ensures that the mobile money system is well-spread. This increases its value for its customers. In the literature it could already be seen that achieving critical mass is one of the main success factors in IT systems (Sun et al., 2016). Lack of a large domestic player was the main cause of failure to introduce mobile money in Ethiopia (FMM4, 2017, p. 4).

However, it does seem that for mobile money to grow further after it has been established that competition can have a positive effect. Therefore the third factor is that of a limited amount of equally large competitors. In Kenya competition is limited due to Safaricom's dominant position and this could halt further innovation (FMM1, 2017; Kenyan WallStreet, 2017b; ResMM1, 2017). However, too many companies overcomplicate the mobile money system and result in a fragmented market (FMM1, 2017; FMM4, 2017). Tanzania was considered an example of a stable competitive market with 4 equally large companies (ResMM1, 2017).

Fourth in Table 25 is Kenya's history in microfinance. This was already common in Kenya both formally and informally (Hope, 2014; ResMM1, 2017). It was an important part in the development of mobile money by forming a launchpad for MPesa (Hughes & Lonie, 2007; ResMM1, 2017). This factor shows a unique precedent that eased the development of mobile money in Kenya. It can be argued that the lack of this knowledge in micro financing in other countries is one of those subtle differences that are often overlooked.

The factor of partnerships between telecom operators and banks is only recently coming forward in mobile money (ResMM2, 2017; Saigal, 2015). In Kenya the first attempt of cooperation with MShwari failed (Muthiora, 2015). According to ResMM2 banks that were open to cooperation benefited from this in the long run. An example could be Kenya Commercial Bank, who cooperates with MPesa in granting loans. This trend is likely to continue and Equitel bank even launched its own mobile money system (ResMM1, 2017).

An important stimulus of competition could be the introduction of interoperability (RegE2, 2017; ResMM1, 2017). This means that a customer of one company can send money to a user of another company without an extra fee. This reduces barriers for consumers to switch companies. Through this companies cannot leverage their size to retain customers. This could help to introduce competition in Kenya as attempts to break Safaricom's monopoly have not yet been successful (ResMM1, 2017).

Market structure advantages have played a large role in the success of mobile money. As said in the previous paragraph, differences in infrastructure, regulation and markets result in vastly different markets and thus different success rates.

The main advantage in market structure in mobile money is regulation. The launch of mobile money can rest on a large domestic player, this helps to gain critical mass. However, despite ensuring a strong launch of mobile money it seems that in the long run the existence of a monopoly could halt further developments in mobile money. Increased competition is mentioned to tackle this problem. It is difficult to make a statement on the value of competition at this point. The Kenyan market still seems quite innovative. Competing companies might not be large and gain no government support (Heinrich, 2014; Omwansa, 2012). Competition should be balanced and can be further enhanced by interoperability. However, the monopolistic structure in Kenya might actually be one of the factors that make it innovative. Despite a comfortable position Safaricom keeps launching new products (ResMM2, 2017). Furthermore, the Chinese mobile money market consists of only 2 large players, AliPay and WeChat, and is also considered highly innovative (ResMM2, 2017; P. Singh, 2017). It seems that the role of market structure advantages is not yet fully understood in systems and might be different from earlier work on lead markets that considered products in developed nations only.

When looking specifically at Kenya there is a unique historical development regarding mobile phone penetration and micro-financing. Mobile money started trying to increase the value of this micro-financing and new developments indicate that micro-financing among other financial services will play an increased role in the further development of mobile money.

Table 25: Market structure advantages from interviews

Market structure								
Contributing factors	Count	Inhibitors	Count	Factors among groups	Count	Factor for framework	for	Total count
Regulatory support	2 + 6	Bank-led regulation	5	Regulation of the technical implementation	1	Supportive regulations		20
No regulation	1	Lack of government interest	1	Regulatory support	2			
No threat perception central bank	1	Too much government involvement	1					
Investment commitment	1	Lack of commitment	1	Presence of a dominant player	2	Committed large private player		13
Uptake by private operator	1	No private operator	1	High market share of Safaricom	1			
Monopoly	3	No	1	Dominant	1			

Safaricom	dominant operator		position of Safaricom ^c		
			1 large player at the start	1	
	Over-competition	1	Competition	1	Limited amount of equally large competitors 4
	No incentive for price reduction due to lacking competition	1	Diversity between competitors	1	
Lessons microfinance	1		History in microfinance ^d	2	History in microfinance 3
			Partnerships between banks and telecom operators	1	Bank-telecom cooperation 2
			Integration of banking and mobile wallets	1	
Interoperability	1		Interoperability ^c	1	Interoperability 2

6.2.6 Technological Advantages

This group represents the technological capabilities present in a nation. It encompassed factors that contribute to the continuous improvement and development within the sector of which the nation is a lead market.

Available manpower is mentioned first, mainly because leadership was mentioned as the most important factor twice. It includes manpower on different levels. Not only should there be manpower available to ensure new innovation, but also in management positions as these can provide the right leadership (FMM3, 2017). For the MPesa case it could be seen that there was a lot of manpower of Vodafone made available (FMM2, 2017; Hughes & Lonie, 2007). This shows that this manpower does not necessarily come from within the lead market's borders.

Regional base of knowledge is mentioned second. In Kenya's case there are a lot of investments made available to the country (GSMA, 2016a; ResMM2, 2017). Also many multinationals have placed their headquarters in Nairobi (ResMM1, 2017; ResMM2, 2017). This adds to the technological capabilities of the country. This factor is also connect to the export group as the reputation of Kenya in technology makes it more like that other countries

wish to adopt its innovations. This has however already been mentioned in the reputation factor.

Technological capabilities in ICT is the third factor shown in Table 26. Apart from the willingness to innovate there should be enough capacity as well. As can be seen interviewees relate this to ICT or app creation when considering mobile money (FMM4, 2017; RegE1, 2017; ResMM2, 2017). Interesting is to see that RegE1 mentioned the increased knowledge in app creation in Kenya. FMM4 already pointed out that mobile money companies themselves often have little technological knowledge and are in essence market firms that promote a relatively simple system. The technological capabilities of the nation are enhanced by the existence of the mobile money platform (FMM3, 2017). This is therefore also considered part of the factor technological capabilities in ICT.

The fourth factor is a culture of innovation. This is a rather fluid term, but often it has been mentioned that Kenya is considered an innovative country (FMM3, 2017; FMM4, 2017; ResMM1, 2017). There is an overall enabling climate that promotes innovation (RegE2, 2017). This is considered a reason for companies to prefer to focus on Kenya when attempting to do business in East-Africa (ResMM1, 2017). This factor can be seen as a cultural tendency or willingness to innovate and further relates to the factor acceptance of technology mentioned within the demand factors.

The knowledge of local needs was only mentioned once (FMM4, 2017). On the other hand ResMM1 told that the existence of customer sophistication in developing countries is often overlooked by multinationals, causing difficulties in penetrating these markets. Furthermore, the demand advantage groups showed the importance of needs very clearly. Therefore this factor might be more important than Table 26 suggests.

The technological advantage group encompasses factors that allow for the initial and continuous innovation within mobile money. Being a regional base of knowledge is what made Kenya highly suitable for the development of mobile money in comparison to neighbouring countries. Since then the country has been able to further develop its technological capabilities in ICT, largely by using mobile money as a basis (FMM3, 2017). This results in a continuous large amount of innovations in mobile money (ResMM2, 2017). This is fostered by a culture that is considered highly innovative. In turn this innovative culture aligns with the existence of customer sophistication in Kenya, which is represented by the demand advantages (ResMM1, 2017).

The interviews seem to question the idea of the technological advantage group that was presented in chapter 1.5. The theoretical model suggests that domestic technological capabilities are essential (Tiwari & Herstatt, 2014). However, it was often said that the technology was not the biggest issue to enable mobile money or that the technology was of foreign origin (FMM2, 2017; FMM3, 2017; FMM4, 2017). This could be related to the many examples where lead markets simply adopted and improved a foreign technology. The interviews with ResLM1 and ResLM2 also suggest that a lead market is rather a marketing than a technological concept.

Table 26: Technological factors from interview

Technological							
Contributing factors	Count	Inhibitors	Count	Factors among groups	Count	Factor for framework	Total count
Leadership	2 + 4	Lacking staff capacity	1	Foreign manpower	1	Available manpower	8
FDI	1			Regional hub of technology and innovation	2	Regional base of knowledge	8
				Home to headquarters of ICT multinationals	2		
				Fastest internet of Africa	1		
				Home to UN African headquarters	1		
				High amount of FDI	1		
		Lacking technical capabilities	1	Technological capabilities	1	Technological capabilities in ICT	7
				Knowledge in app creation	1		
				High educational level in ICT	1		
				Basic capacity for ICT and project management	1		
Using mobile money as a platform for innovation	1			Mobile money as a basis for other technology	1		
Entrepreneuria	1	No	1	Kenya's	1	Culture of	5

I spirit		willingnes s to upgrade	start-up ecosystem	innovation
Innovative attitude	1			
Continuous NPD and analysis	1			
			Knowledge 1 of local needs	Knowledge 1 of local needs

6.2.7 Lead Market Factors from Interviews

The interviews with experts lead to a third framework of factors that describe the lead market potential for developing countries.

Table 27 can be placed in between that of the theory and the case study. In this framework factors are constructed from many answers resulting in a more general framework compared to the framework based on the case study. However, because this framework is constructed from information on the mobile money sector it is rather specific compared to the framework constructed from the theory.

It can be seen that the framework is very extensive in the amount of factors mentioned. In this chapter the framework is meant to represent the thoughts of the interviewees. At times factors have been replaced, but information should not yet be removed to construct a more comprehensive framework. This will be done later when the 3 established frameworks will be compared. Factors that were mentioned 10 times are shown in bold in Table 27.

Table 21 showed earlier what interviewees considered the most important factors. Here regulations were most often mentioned and within market structure this was considered the most important factor as well. Needs was mentioned twice in Table 21 and is the most important demand factor. Leadership was also mentioned twice and was considered part of available manpower. This caused available manpower to move from the fourth position in the technological advantage group to the first position. Trust and distribution were both mentioned once, but did not influence the position of trust and telecom infrastructure respectively.

Table 27: Lead market framework based on interviews

Group	Factors from table
Demand advantage	Latent need for remittances
	Telecom infrastructure
	Acceptance of technology
	Mobile phone penetration
	Trust
	Lack of banking services
	Literacy
	Social unrest
	Perceived affordability
	Economic growth
Cost Advantage	Supporting regulation
	Leveraging existing networks
	Common language
	Public funding
Export advantage	Multinational shareholder
	Reputation
	Similar regulation
	International institution spreading technology
	Similar needs and market conditions
Market structure advantage	Supportive regulations
	Committed large private player
	Limited amount of equally large competitors
	History in microfinance
	Bank-telecom cooperation
	Interoperability
Technological advantage	Available manpower
	Regional base of knowledge
	Technological capabilities in ICT
	Culture of innovation
	Knowledge of local needs

6.3 Lead markets and Policy Making

The experts on lead market theory point out that lead markets bring focus towards the demand side of innovation theory (Quitow et al., 2014; ResLM1, 2017; ResLM2, 2017). The theory allows to understand innovation demand and its change (ResLM1, 2017), thereby showing the relationship between national and global dynamics (ResLM2, 2017).

The focus on the demand side might at the same time be seen as the largest weakness of lead market theory (ResLM2, 2017). The supply side of innovation is largely ignored by the theory. Lead market theory can be used to find the right market to fit a new technology, but does not provide any insight in how a country can become more innovative.

This marketing aspect of lead markets is often misunderstood (ResLM1, 2017). Lead markets should be seen as places where technology can grow in the market rather than be invented in a research lab. Policy makers often prefer to find new technologies that can be implemented within their borders, whilst lead market theory shows that it might sometimes be

better to further develop a new technology elsewhere. This means that policy makers need to accept that their domestic markets are not always suitable for technology that has been invented there.

The European Union could for example benefit from such a theory due to the diversity of markets within its sphere of influence. However, ResLM1 pointed out that this failed due to a desire to treat the EU as one single market, which from his research turned out to be highly impractical (2017).

This directs also towards another weakness of the lead market theory. It can only be applied to geographically bound markets (ResLM1, 2017). For international markets like for example the airplane industry it would therefore be unsuitable.

This information does make the lead market theory useful for developing countries. The relative lack of funds makes it difficult for developing countries to research entirely new technologies. However, there specific conditions can make them markets that are more suitable for market introduction and further development. The lead market theory can help to find where technology should be introduced to grow further in the market. Policy makers in developing countries should therefore determine to which technology their market provides the right condition and adjust their regulations accordingly. They should aim to attract multinationals to further develop technologies that are not suitable for developed markets.

6.4 Conclusions

Both from theory and practice interviewees consider it possible for a developing country to become a lead market. The mobile money sector after 10 years is still lead by Kenya and the markets where mobile money is most successful are developing countries. This is because it applies to a need that is mainly present in developing countries. The lead market position of Kenya is recognised by a high penetration and usage of mobile money as well as the large amount of innovation in the sector and the resulting reputation of Kenya.

The factors that led to the success of mobile money in Kenya are shown in Table 19. It can be concluded that demand and market structure advantages are the most important for mobile money. The most important factors are the existence of a latent needs, telecom infrastructure, acceptance of technology, mobile phone penetration, supportive regulations and a committed private player.

Demand advantages were the main driver of the mobile money market. Most importantly there was a need for not only remittance, but finance in general that established systems failed to fulfil. This can be turned into an advantage as in developed countries there is no incentive to rethink basic needs. In a more general sense policy makers in developing countries should focus research efforts towards the fulfilment of basic needs and problems specific to developing countries.

Cost advantages are from a theoretical perspective expected to be the crucial, but as theory on frugal innovation prescribes simply offering cheap innovation is not sufficient. For developing countries having cost advantages means that they should find ways to prevent cost from becoming a barrier rather than looking for advantages in pricing.

Export advantages seem to have had the least importance. This could be caused by the association with products being distributed. A mobile money system cannot be exported, but knowledge about it can be. Through this mobile money can diffuse globally. However, the system is used in developing countries is not likely to be able to diffuse to developed

countries. Advantages in export are mainly due to multinationals that support the local mobile money system and therefore of little interest to policy making.

Market structure advantages are however the main point of interest for policy making as they can be largely influenced. They also played an important role in the success of mobile money. Mobile money benefits mostly from regulations that follow innovation. Further regulation should allow the existence of a large domestic player. Competition does not necessarily stimulate innovation in mobile money. If there is too much competition it can actually have a negative effect as there is no large player to introduce a mobile money system. This will likely be similar for other systems. Interoperability can level the playing field, but whether this benefits innovation or the uptake of mobile money should be seen from countries that have implemented this.

Technological advantages have been largely introduced from abroad. The interviews also revealed the importance of people in innovation, more generally there should be dedication from top management. External investment can facilitate this as it reduces perceived risk for multinationals. Domestic technological capabilities become important after the mobile money market matured to ensure continuous innovation. Developing countries should focus on attracting foreign knowledge to start the development process. Hereafter focus should be on stimulating innovation in the sector in which the country is a lead market.

Lead market theory has only recently been connected to developing countries, but is highly promising. It shows that developing countries can become more innovative not just by inventing new technology, but by redefining existing technology. This could reduce the importance of large investments in research in development, which until now has been limiting innovation in developing countries. Rather than looking to find new technology developing countries should specialise in finding new ways to use existing technology.

Policy makers should aim to understand for which technology their domestic market is suitable and provide condition that attract multinationals to introduce such technology. In this way they can reduce the importance of a lack of domestic investments.

In developed countries there is little incentive to implement technology that relates to the fulfilment of basic needs. Developing countries provide the right conditions for such technologies to be developed further. If economic growth in developed countries would stagnate the needs that are now present in developing countries will become important there as well. In that case developing countries can become global sources of innovation, but they need to prepare for that now.

7 Framework for Lead Markets in Developing Countries

This chapter will combine the framework constructed in chapters 4, 5 and 6. The frameworks are shown in Table 28. From left to right the column show: the factors derived from the theory, factors derived from the case study, factors derived from the interviews and the generalised factors that were constructed by combining the previous three columns.

The factors from the 3 frameworks were compared to each other in Table 28. The interview factors were arranged according to their importance and therefore their arrangement was left intact. If the theoretical factors could be recognised in the case study or the interviews they were put into the final framework. At times it was found that the theoretical factors were not present in the other frameworks. The theoretical factors can be seen as hypotheses and therefore some of these were dropped if they could not be supported by the other two frameworks.

On the other hand some of the case study or interview factors were not predicted by the theoretical framework. However, their importance was of such significance that they were included in the final framework as well. At times factors of the interview framework were combined. This chapter aims at providing a general framework that is not only applicable to mobile money. Therefore some factors from the case study and interviews were rearranged and renamed.

In this chapter both the factors that were included and excluded are described. It is explained what lead to putting these factor into the final framework or rejecting them. For each advantage group its importance is shortly assessed based on the information that is available in this thesis.

Paragraphs 7.1, 7.2, 7.3, 7.4 and 7.5 describe the factors of the demand, cost, export, market structure and technological advantage groups respectively. The final framework is presented in paragraph 7.6.

7.1 Demand advantages

Demand advantages are the starting point to become a lead market. If demand for an innovation cannot be created it does not matter how well a country performs within the other advantage groups. In the case study and the interviews they have proven to be the starting point of becoming a lead market.

Anticipatory needs is the first factor of importance. In the case study this was represented by a need for remittances. Sending money home was already widely common in Kenya before mobile money was used to do so (Hughes & Lonie, 2007). Therefore there was already a large market available. This factor refers back to Beise's description of demand size. Tiwari and Herstatt changed this name towards demand size, but the case study showed the need for mobile money could be anticipated in Kenya through conditions unique in the country. This shows closer relation to Beise's interpretation of lead markets who considered them to pioneer certain fields of technology. Later these needs became relevant in other countries. The population size of Kenya is not much larger than many industrialised countries. This seems to limit the role of market size.

Infrastructure has proven to be highly important in mobile money, but this is likely valuable to other systems and services as well. For products this could be translated to a well-

established distribution network allowing products to reach their customers. In chapter 6 it had already been discussed that diffusion patterns are not well-understood in frugal innovation. Although in chapter 6 the focus was on diffusion between nations, which is part of export advantages, here the diffusion within a country through good infrastructure has proven important as well.

Acceptance of technology refers to a certain attitude towards technology. From the interviews it became apparent that there exists a positive attitude towards innovations in Kenya (FMM4, 2017; ResMM1, 2017; ResMM2, 2017). At the same time Kenyans showed openness to solutions that are not based on the newest technology. This can also be combined with the acceptance of frugal solutions. The acceptance of technology should therefore be seen as a certain attitude towards technology in a nation. For a developed country this points towards the customer sophistication as described by Beise (2004). However, already in this research it proved difficult to grasp this concept in a clear factor.

Anticipation of complementary goods. Complementary products had been present in the model of Beise (2004) as anticipatory availability of complementary goods. In the case study this played a large role. For a system such as mobile money the penetration of mobile phones is crucial. Without a mobile phone customers have no access to mobile money. This is likely to be relevant in other systems and services as well.

Lack of established systems is specific to developing countries and distinguishes them from developed nations. However, the example of Kenya showed how this weakness can be turned in to a strength. The lack of banking resulted in a need for an alternative system. This factor could be placed within the anticipation of needs. However, it is crucial that developing countries understand that the lack of existing systems could be used to their advantage is they wish to exploit their lead market potential. Therefore this factor is kept separate. This factor could be related back to Beise's growth of demand, because the lack of established systems allows for new systems to be introduced.

The following demand factors were not included in the final model.

Trust was mentioned many times in the interviews. However this factor did not appear in the theory or in the case study. In the interviews trust was mostly related to Safaricom. Therefore it is not considered a factor that works on a national level and left out of the final framework.

Literacy is a factor that was too specific to MPesa and even than was only mentioned a few times. There was even disagreement between interviewees whether this factor is even relevant.

Social unrest is considered an event that triggered the introduction of mobile money. It provided a boost to the penetration of MPesa, but it should not be considered a nationwide factor that increases a countries lead market potential.

Perceived affordability is again a factor that is specifically related to a certain good and not to a country.

Economic growth was hardly mentioned in the interviews. It seems that for MPesa growth was hardly seen as an important. It can also be considered why this factor is separated from demand size. By seeing these factors separately it might appear as if a saturated market should be able to grow even further. Using economic growth would also indicate that an innovation would be driven by economic rather than social factors. However, for economic factors a developing country would have little chance of competing with an industrialised nation unless it has as Tiwari and Herstatt indicated a large demand size. The Kenyan example showed how smart use of development aid can change the drivers of a

technology. Rather than being driven by economic growth, mobile money has become a driver of economic growth.

7.2 Cost Advantages

Cost advantages have always been considered crucial for lead market. However, the cost of systems and services relies mainly on the underlying infrastructure. After investments are made operational costs are left. However, systems do not have the high amount of input costs that are seen in products. Therefore they are less relevant when not considering products. Still financial impulses can stimulate the initial uptake of a system.

Financial regulatory incentives despite the decreased importance of cost a system needs a starting point. A system needs to attain critical mass to provide value to its users (Sun et al., 2016) Governments can aid in creating an initial user base of a system by providing financial aid or at least refrain from making it unnecessarily costly.

Cost of complementary factors was recognisable in the case study and interviews through the existence of Safaricom's agent network. The existing network provided a cost advantage as it was not necessary to construct a new distribution network. The lack of such a network in other countries made the introduction of mobile money more difficult. By referring to complementary factors this can be widened.

External funding could have been considered part of state incentives. However, the case of MPesa showed the importance of involving private parties and an external organisation that is willing to provide funding. Governments can provide financial aid, but in developing nations they might not have the funds available to invest in innovations. Furthermore, the often high corruption levels in government in developing countries provide an extra barrier to effective funding. Making effective use of an external party can divert this issue. It can further solve the problem that many private companies prefer to aim at developed markets as these are more likely to provide better results economically.

The existence of a common language was dropped from the final framework as will only provide a limited advantage in development and operational costs. Language has been an important factor in the status of India as a leader in frugal innovation (Tiwari & Herstatt, 2014). However, this was related to the use of English which has the status of lingua franca, which made it easier to spread scientific articles from India to readers worldwide. The language diversity in India was brought up as providing a limit to mobile money systems. However, many Indian languages are among the most spoken languages worldwide and therefore provide a large enough customer base individually (CIA, 2017).

Economies of scale provide a significant costs advantage in products, but its effect seemed limited when considering a system.

7.3 Export Advantages

For mobile money export needs some rethinking. In this case there is not a product that is constructed in the domestic market that is send to another country. Here there is a system than needs to be brought into another context. This requires many adaptations to an often different environment.

External orientation of private firms shows the importance of a private party that wishes to expand its business beyond the borders of the lead market. It has been an important factor in spreading MPesa specifically, but mobile money has also been developed in countries outside of Vodafone's reach. Moreover, not every market that Vodafone was interested in was receptive to mobile money.

Demonstration effects had a significant impact on the spread of mobile money and are likely to be important in other innovations as well. If the lead market shows the potential of an innovation there will likely be followers wishing to replicate its success.

Similar needs and market conditions did not appear most important from the interviews, but when taking information from the case study and theory into account might be the most important factors. It was already said that without a need for an innovation the innovation will not be developed. Likewise the need for the innovation needs to exist outside of the lead market's borders. Else there would be no interest in adopting the innovation of the lead market abroad. The lack of established systems factor, mentioned in demand advantages, helps to understand that the not only the introduction of mobile money occurred outside of the developed world, but also why its spread towards developed countries has not yet occurred on a large scale.

Embeddedness in international trade appears less relevant for systems. For mobile money it could only be recognised in the existence of GSMA that spreads the technology. However, this is not an export advantage of Kenya itself. It seems that the economic relations between Kenya and other nations had a limited effect on mobile money. However, international remittance was one of the developments that mobile money went through. This can be facilitated by governments. Compared to the first export advantage embeddedness in international trade refers to the role of government as opposed to private parties. More research could help clarify the exact importance of this factor in mobile money.

Price/quality was added to the theory in anticipation of the case study. However in neither the case study nor the interviews this factor was mentioned. More importantly in the interviews it was mentioned that MPesa is not necessarily cheap (FMM2, 2017; FMM4, 2017). Therefore this factor is considered not suitable for the final framework.

7.4 Market structure

Market structure has a strong influence on the emergence of system innovations. Advantages in market structure create an environment that supports innovations. This structure is determined by regulations the behaviour of private parties.

Regulatory support is the most important advantage in mobile money. It can even be said that rather than mobile money it was the regulatory approach that diffused from Kenya to other countries (ResMM1, 2017; Suárez, 2016). This means that policy makers are highly influential in the success of innovation. They do need to recognise that regulation is not the only factor that is of influence

Presence of strong domestic and global players is important as well. There needs to be a private party that understands the market to create a successful innovation. This is apparent from both the theory and in the case study.

Balanced competitive base. Competition was originally the only factor in market structure (Beise, 2004) This is still recognised as an important factor, but it needs to be noted that the competition should be in balance. From interviews it became clear that too much competition

can make a system to confusing, while too little competition can halt innovation. In the mobile money sector regulators can be highly influential in increasing the competitiveness through interoperability.

Historical development provides a unique background for systems to be built upon. In Kenya the history in micro-financing provided a platform to experiment with mobile money. The history of the Kenyan banking system allowed for a loose approach in regulation for example (Suárez, 2016). This shows that historical development can provide unique advantages that increase the lead market potential of a country.

Bank-telecom cooperation indicates an increased collaboration between overlapping sectors. However, this development is too recent to understand whether this results in an advantage. The advantage of a local industrial base could not be recognised in mobile money. Likely this is because the local base relates to the value-chain involved in products. This is less-apparent in system innovations. For system infrastructure and networks are importance, but these were already related to demand and cost advantages.

7.5 Technological Advantages

Technological advantages are considered a perquisite to ensure that a developing country can become a lead market. However, the case study and interviews on mobile money seem to give a lower importance to technological advantages. This group provides helpful advantages, but for mobile money in Kenya the technological knowledge was not a highly crucial factor. Only after mobile money was established these factor gained importance to ensure a constant stream of innovations. This could be related to the view of Tiwari and Herstatt (2014) on lead markets. They present lead market as an innovation hub in a sector rather than a point from which the diffusion of an innovation design starts.

Tiwari and Herstatt appear to consider these advantage to increase the chance of a country becoming a lead market. However, lead markets don't necessarily occur in the country were an innovation originally occurred. This group can better be considered to consist of factors that ensure continuous innovation in the sector and thereby result in a country to remain a lead market rather than becoming one.

Availability of skilled manpower was necessary to create a vast agent network in mobile money. Even though these agents were already connected to Safaricom, training was required to ensure high quality service for the MPesa system. The presence of people with capabilities was considered of high importance in all three frameworks.

Knowledge infrastructure came forward in the interviews through the regional base of knowledge factor. This mainly resulted in foreign direct investment in Kenya. This also drew Vodafone towards Kenya as there was a well-established knowledge base. This in turn is related to the relatively stable political climate in Kenya. Foreign investors are likely drawn to countries were they think they will be able to recoup their investments. Hence a stable country draws in the foreign investment required to build a strong technological base. The presence of many multinationals and thus investment ensures that innovation can continue to flourish in Kenya, therefore this is still considered an important lead market factor. Technological capabilities have been put into this factor as they are the result of a strong knowledge infrastructure.

Knowledge of customer needs was not considered important in the interviews, but was present in both the theoretical framework and in the case study. Therefore it is still considered an important factor to include.

A culture of innovation appeared as a factor specific to Kenya. It could not be recognised from the theory or the case study. Further it is a concept that is difficult to grasp in a scientific manner. Lastly traces of a positive attitude towards innovation can already be recognised in the acceptance of technology factor mentioned in demand factors. Therefore culture is not included in the final framework.

Table 28: Overview of Frameworks for Lead Markets

Group	Factors from Theory	Factors from Case Study	Factors from Interviews	Generalised Factors
Demand advantage	Market size	Latent need for remittances	Latent need for remittances	Anticipation of needs
	Infrastructure	Telecom infrastructure coverage	Telecom Infrastructure	Infrastructure
	Acceptance of frugal solutions		Acceptance of technology	Acceptance of technology
		High penetration of mobile phones	Mobile phone penetration	Anticipation of complementary goods
			Trust	
		Lack of financial services High unbanked population	Lack of banking services	Lack of established systems
		Instability of the established political system	Literacy Social unrest	
Cost Advantage	Growth potential		Perceived affordability Economic growth	
	State incentives		Supporting regulation	Financial regulatory incentives
	Costs of input, complementary and supporting factors	Leveraging of [Safaricom's] telecom network Leveraging of [Safaricom's] agent network	Leveraging existing networks	Cost of complementary factors.
			Common language	
		Public funding	Public funding	External funding
Export advantage	Economies of scale			
	External orientation		Multinational shareholder	External orientation of private firms
	Demonstration effects	Media coverage	Reputation	Demonstration effects
	Similarity of demand	Similar needs in nearby	Similar needs and market	Similar needs and market

	countries		conditions	conditions
Market structure advantage	Embededness in international trade		Similar regulation International institution spreading technology	Embededness in international trade
	Price/quality ratio			
	Regulatory support	Supporting regulatory environment and relationship between the private and public sector	Supportive regulations	Regulatory support
	Presence of strong domestic and global players	A large domestic player (Safaricom)	Committed large private player	Presence of strong domestic and global players
	Internal competition		Limited amount of equally large competitors Interoperability	Balanced competitive base
	Historical development of the market structure		History in microfinance	Historical development
			Bank-telecom cooperation	
Technological advantage	Local industrial base			
	Availability of skilled manpower	Large amount of agents Agent training	Available manpower	Availability of skilled manpower
	Knowledge infrastructure		Regional base of knowledge Technological capabilities in ICT	Knowledge infrastructure
	First-hand knowledge of customer needs	Understanding of the local market	Culture of innovation Knowledge of local needs	Knowledge of customer needs

7.6 Final Lead Market Framework

The final framework is presented in Table 29. It has been constructed to fit developing countries with an emphasis on systems. The framework of Tiwari and Herstatt (2014) has been the basis of this framework. Some traces of this framework can be recognised, but large differences can be found. Table 29 is meant to be a generally applicable framework for lead markets in developing countries.

For systems it appears that demand and market structure advantages are the most important. These groups form the basis of building a successful system that can result in a leading position in a certain field of innovation.

For systems there appears to be less importance of cost and technological advantages. This contradicts earlier theoretical assumptions. Beise and Tiwari and Herstatt emphasised the importance of cost advantage as they make an innovation attractive. This research is not meant to imply that costs advantages lost their value. These are still important to allow access to an innovation. However they are not the most crucial. This can be related to the notion mentioned in chapter 3 that innovations for the poor should be cheap, but still provide sufficient quality.

Technological advantages help to sustain the achieved lead market position, but seem to have little effect in reaching this position. Foreign knowledge can provide helpful in becoming a lead market, which decreases the importance of having technological capabilities within the lead market itself. Furthermore, lead market theory aims to understand how innovations develop and can fit in a market rather than how they appear (ResLM1, 2017; ResLM2, 2017).

Table 29: Final Framework for Lead Market in Developing Countries

Group	Generalised Factors
Demand advantage	Anticipation of needs
	Infrastructure
	Acceptance of technology
	Anticipation of complementary goods
Cost Advantage	Lack of established systems
	Financial regulatory incentives
	Cost of complementary factors
	External funding
Export advantage	External orientation of private firms
	Demonstration effects
	Similar needs and market conditions
	Embeddedness in international trade
Market structure advantage	Regulatory support
	Presence of strong domestic and global players
	Balanced competitive base
	Historical development
Technological advantage	Availability of skilled manpower
	Knowledge infrastructure
	Knowledge of customer needs

7.7 Implications of the Final Framework

The factors in Table 29 should not be seen as separate entities making the lead market framework a tick the box exercise. It is important to realise how these factors interact. This has an implication for the usage of this framework. The factors adhere to different actors thereby revealing the need for cooperation in the pursuit of becoming a lead market.

The anticipation of needs is a reoccurring factor and forms the basis for the emergence of a lead market. This should be considered the most important factor. If no need is present the innovation is bound to fail.

The lack of established systems can actually stimulate this need. Therefore policy makers should try to provide support to companies who try to find new ways to fulfil the need that such a system fulfils in other countries. Support can be granted by ensuring that the existing infrastructure form a solid basis for new innovations. Furthermore, policy makers should be aware of existing complementary services. These services should be provided by the industry, but monitoring their penetration can help to determine further innovation possibilities for governments. Governments should further be aware whether there is a market acceptance for certain types of technology on which they wish to focus.

Regulatory support should provide a climate that benefits innovation. The Kenyan approach serves as an example. It might even be said that Kenya is a lead market in the test-and-learn approach for regulators as it has proven its value in other markets as well.

Financial incentives can also stimulate innovation, but care should be taken not to make a sector depend on subsidies. This tools should be used carefully and focus on development and not on distribution of innovation. Financial aid can be attracted from abroad lightening the burden on governments and domestic firms in developing countries. Funds from developed governments are the most likely candidate as they are aimed at supporting social innovation. Such support is difficult to find in multinationals that focus on reducing risk and maximising profit. However, links between domestic companies and multinationals can be helpful to attract knowledge and for technology diffusion.

Governments are further important in ensuring a balanced competitive base. There is a tendency in innovation theory to see more competition as better by default. Although the role of competition is not fully understood in system innovations in developing countries, more competition might be harmful in the emergence of lead markets. A monopoly of a large domestic player can actually be helpful in establishing a system.

Skilled manpower and knowledge infrastructure are important factors to maintain a lead market position and ensuring continuous innovation. Investing in education, setting up knowledge centres and attracting foreign talent are important tools to realise this. These become important when the lead market is established so government should anticipate to early signs of lead markets. For these they are referred to reputational factors discussed in paragraphs 5.8 and 6.1. Lastly thorough knowledge of customer needs is important, which can be found in domestic players.

Lastly the historical development can only be assessed afterwards, but it does mean that a nation will show trends towards need fulfilment. This can likely be traced back to the informal sector. Companies are advised to closely monitor the informal sector to find business opportunities.

8 Conclusions

The goal of this study was to answer the following research question:

How can lead market theory enable policy makers in developing countries to make innovation efforts in their domestic markets more effective?

Lead markets are a complex phenomenon consisting of many characteristics. They are the markets in which an innovation within a certain sector has the most chance to develop to become a commercial success and spread globally. This also means that the innovation in question can be further developed in the lead market and that new innovations in the associated sector are most likely to originate from the lead market. They stimulate other markets to adopt and innovate in the sector, in other words they provide the main innovation impetus for a particular product, service or system.

Lead markets can therefore be seen as innovation hubs. For developing countries it is challenging to stimulate innovations. Traditionally developed countries have been the main suppliers of innovations, because they can invest more money in research and development. New technologies are therefore more likely to occur from these markets.

The lead market theory is not concerned with invention, but the introduction of an invention to a market. Many new technologies fail. This does not need to be because of this technology, but can be related to them being introduced to the wrong market. The lead market theory can help policy makers to understand the strengths of their nation. This will allow them to understand in which sector they should focus their efforts in innovation and which sectors to ignore.

Frugal innovation can contribute to this as a frugal innovation is not necessarily an entirely new innovation, but can be a new application of existing technology. This can reduce the cost barrier that is often hindering innovation in developing countries.

The development of the mobile money sector shows how a developing country was able to rethink the need for financial services. Kenya is currently leading the world in mobile money. This means that new innovations in mobile money are likely to occur in Kenya before they spread to other countries. Mobile money has not been an entirely new technology, but rather a different application of the already existing technology of SMS.

If a lead market is established more innovation can follow, which provides a stimulus to the national economy. By switching from invention towards market introduction developing countries can deal with the traditional lack of funds as it reduces the role of money.

The example of mobile money showed clearly how an existing technology could be developed because of conditions specific to developing countries. It also revealed that a lack of fulfilment of basic needs can be a stimulus for the adoption of innovation. This contrasts with developed nation where there can be a restraint to change existing systems that are perceived to work properly.

This open attitude towards innovation should be seen as a strength that can allow developing countries to follow different paths of innovation than developed countries. It can result in technology that is unable to penetrate developed market to be successfully introduced to developing countries. In time the value of the innovation will increase with its further development which could result in developing countries wishing to adopt the innovation as well. The lead market will then become the market where multinationals will test

innovations and the market with the most knowledge about the sector. This will help the nation to establish a basis for services next to agriculture and industry.

However this is a very futuristic scenario. In the near future it is better to look at how developing countries can become regional lead markets rather than global lead markets. Lead markets emerge, because they anticipate the needs of other markets. Redefining basic needs is a strategy that likely works in developing countries, but only in exceptional cases in developed countries due to different demands and standards of customers.

There could even be a danger for a developing lead market in spreading its technology towards a developed country. The developed country could come up with a better innovation design and take over the lead market position. This has happened earlier in lead market literature. However, this would also mean that the needs of the developing country should be experienced in the developed country as well.

The need that has driven mobile money is however changing from a need to fulfil remittances to a need to build a cashless economy. Mobile money rather than a sector is likely to become a one of the design in the battle for a dominant design in the cashless economy. If other designs become better at fulfilling the needs that have driven mobile money this could decrease the popularity of mobile money. It is therefore important for a lead market to continue innovating. Understanding the drivers of competing designs will help to understand how the lead market position can be retained. However this has not been the focus of this research.

It is important the once a new system has been established that innovation continues and that the market keeps an open attitude towards new developments. Elsewise the developing lead market will suffer the same weakness found in developed countries, not being open to innovation due to satisfaction of the current fulfilment of needs.

This research has resulted in a set of factors that enable a developing country to become a lead market. The factors that occurred from this research have been collected in Table 29.

It should be noted that it is difficult to find general factors that apply to all cases of lead markets so care should be taken in using this framework. Lead markets are connected to a specific product, service or system. Therefore the importance of factors might differ when applying this framework.

This shows that in constructing a framework for leads markets factors should be general enough to be applied largely, but specific enough to be applied to the sector that is being studied. This balance became clear in the structure of this thesis presented a general, specific and balanced framework to be combined in one final framework.

Demand advantages appear the most important. These create demand and therefore a *raison d'être* or right of existence for an innovation. Innovation in developing countries is driven by unfulfilled needs. This increases the acceptance of technology. Existing infrastructure and complementary goods are advantages that should be leveraged as they ease adoption.

Cost advantages are mainly required to reduce the influence of cost-related barriers. Systems have a different build-up of costs than product innovations. This changes the importance of cost advantages and the factors within this group. Initial investments remain important, but can be diverted by external funding. Multinationals might not be prepared to prioritise an innovation driven by social needs so there lays an important role here for development aid organisations.

Export advantages do not appear to matter than much for a system. Systems need to be constructed from scratch in every new market. Whereas for a product its physical movement can be facilitated for a system this is more complex and local companies might find better ways to introduce the technology than the companies operating in the lead market.

Markets structure advantages are highly important in a system. The strongest advantage comes from tight collaboration between governments and private parties.

Technological advantages do not appear as important in systems as they are for products. It also seems that this advantage group should be seen as advantage to remain a lead market rather than becoming one. A lead market does not need to be the country from which the innovation it leads originated.

This research has provided a framework that can be used to understand the lead market potential of a developing country (Table 29). This has been mainly build upon the earlier work of Tiwari and Herstatt, who in turn used the framework of Beise as a basis.

The main contribution has been the focus on systems instead of products. This adds a different perspective on frugal innovation, lead markets and the combination of both. This framework has highlighted the importance of infrastructure and regulation. In this way the framework incorporates challenges of frugal innovation into the lead market theory.

The framework shows the importance of market structure advantages. It counter argues Beise's assumption that competition is the only important factor in this group. It was even found that this factor was one of the least important factors. The framework shows the importance of both a supporting regulator and a committed private player. This in turn adds the importance of actors and their interaction to lead market theory. This is further supported by the presence of the factor external funding referring to an external money provider like a charity, NGO or dedicated governmental body.

The framework shows also that researcher should be careful not to focus too much on demand size, access to technological capabilities and embeddedness in the global economy. The case study showed developing markets do not require an enormous population to become lead markets. They also can gain access to technology through multinationals. The role of the last factor was found to be limited as export advantages mainly play a passive role in system innovations in developing countries.

This study also shows that the trigger event introduced by Tiwari and Herstatt plays an important role in the timing of introduction of an innovation. This adds a temporal dimension to the lead market theory. This trigger event helps to explain the difference between in rates of success of similar markets. The trigger event can make the need more visible and therefore increase the speed of market penetration of the innovation.

In summary the lead market theory can enable policy makers to link their domestic market to new technological developments. As these are already invented the barrier of cost becomes less pressing. Lead market theory does this by providing an overview of factors to which the market can be held for a certain innovation. If these factors are strongly represented in the domestic market there is a high potential for it to become a lead market.

Frugal innovation can be a strategy to adapt the technology to the market of the developing country. Lead market theory can point out which existing products, services, systems and structures can be leveraged, but frugal innovation provides a means to adapt existing technology to fit these.

9 Recommendations

The factors in the lead market framework can be influenced by different actors. Interaction between these actors can be highly beneficial in harnessing a nation's lead market potential. In this chapter recommendations are given for policy makers, domestic companies in developing countries, multinationals and development aid organisation in paragraph 9.1, 9.2, 9.3 and 9.4 respectively.

9.1 Recommendations to Policy Makers

In Table 29 the factors that can be influenced by policy makers have been made bold. This shows there is a large role for regulators in the lead market potential of a country. However all factors are important in the framework. Therefore factors that cannot be directly influenced should be taken into account as well.

The factors are arranged according to importance and the demand and market structure advantage were found to be the most important. However all factors are connected in this framework. Therefore prioritisation does not mean that other factors can be ignored.

Priority should be given to demand advantages: anticipation of needs, infrastructure, acceptance of technology, anticipation of complementary goods; and the market structure advantages: regulation and the presence of strong domestic and global players. However it should be noted that this order is based on knowledge gathered from interviews regarding the mobile money sector. Therefore more research is required to verify this order.

Regulators have played an important role in mobile money, but they could play an even larger role in the anticipation of other lead markets.

Their main role is to provide ensure that innovation does not get obstructed by regulation. They are advised to adopt the Kenyan test-and-learn approach meaning that they should monitor technological development and adapt regulation accordingly.

They can use the lead market framework to understand the strengths of their nation and should monitor what needs are not yet fulfilled and how companies are trying to fulfil those. Companies that attempt to fulfil these should be given freedom to do so and government should support them in their innovation efforts.

Governments should focus on the strengthening their existing ICT infrastructure and allow room for companies to use it as a basis for innovation.

Technological capabilities can be influenced by governments and should anticipate requirements for the sector it attempt to become a lead market in. Therefore it is important that government closely collaborate with industries.

Governments can further facilitate the interaction between important actors that enhance lead market potential. They should facilitate multinationals to enter their markets and ensure that development aid focussed on innovation arrives without difficulty to where it is required. This can help to offset the lack of funds that generally hampers innovation in developing countries.

Another contribution can be made by ensuring a balanced competitive climate. The effects of not enabling competition are not yet known for mobile money as the dominant position of Safaricom has not yet decreased the leading position of Kenya in mobile money, but Tanzania might gain a stronger position through its more competitive base. This development should be monitored closely.

Policy makers should invest in a strong technological environment to sustain a lead market position. Innovation is a continuous process and should therefore be stimulated.

Being a lead market shows that a country provides the best conditions for a technology to be developed. This should be embraced as it can result in a further increase of innovation and economic benefits in the long run.

9.2 Recommendations to Domestic Companies in Developing Countries

Domestic players should focus on leveraging existing technology and adopt a frugal mind-set in their innovation efforts. It is important that they maintain close relations with the government to earn support. Being backed up by a multinational, for example as a shareholder, provides them access to technological developments and to global networks.

Domestic players should provide knowledge about local markets and find latent needs so that innovation efforts can be focussed. They should not attempt to invent new technology, but find ways to redefine the fulfilments of basic needs by finding new applications of existing technology.

9.3 Recommendations to Multinationals

For multinationals the lead market factor can provide insight as to where they should focus their investments. The lead market is the best place to introduce new innovations within a certain technological field. Certain innovations that might not appear useful in development markets due to a lack of need might see a successful introduction in developing markets. To ensure this close cooperation with local companies is required.

Cooperation with organisations that provide funds can decrease what is often considered a financial barrier by multinationals. These funds are driven by social motivation. However, multinationals can provide the required knowledge and manpower as they employ many people who are willing to contribute to development goals.

Multinationals should also realise that developing countries are home to a large innovative capacity that has hardly been explored. These markets can provide insight in how to use resource more effectively. Multinationals can learn how to adopt a frugal mind-set in their process and thereby reducing costs.

Moreover developing countries are young markets and have more growth potentials than mature markets. Tapping into such markets early prepares multinationals for future developments in which developing countries are likely to play an increasingly important role. This study has shown that they can provide examples to redefine basic needs using new technology resulting in disruptive innovation.

9.4 Recommendations to Development Aid Organisations

The DFID has seen a highly effective use of development aid. In mobile money, development aid was used to create business. This resulted in a sustainable self-supporting system that benefits a large amount of people at the bottom of the pyramid, not only in Kenya but also beyond.

The story of MPesa might only show the beginning of the possibilities that both ICT and financial systems in development aid. This research has not focussed on these roles, but it can provide an interesting starting point to look into more possibilities.

This research indicates that stimulating financial innovations that facilitate and create business provides an effective tool to reduce poverty. However, further research is needed to confirm such a statement.

10 Limitations and Further Research

This study has contributed to the lead market theory by further investigating the lead market potential of developing countries. However the study had to be conducted in a limited amount of time. Therefore the study was bound to several limitations. These limitations might provide an input for further research.

First of all the research put a heavy emphasis on the model of Tiwari and Herstatt. The contributions of Beise could have been more integrated into the model. The assumption was that the framework of Tiwari and Herstatt would be more suitable for this research as it focussed on lead markets. This model has been critically assessed, but the model of Beise might have been allowed more influence to the theoretical model.

At the same time the model that Beise created is older than a decade. The factors that are important to assess the lead market potential of developed countries might have changed in the meantime as well. Therefore the model of Tiwari and Herstatt or the model created here might be applicable outside of developing countries as well despite not being intended for it. Further research might answer this question.

Secondly this study is based on a single case study. The case study focussed mainly on Safaricom and their mobile money system MPesa. The interviews were intended to find factors for the mobile money sector as a whole, but interviews often focussed on MPesa as well. Adding more case studies would provide more validity to the research.

Thirdly related to the case study, this research ignored mobile money developments in developed countries. Due to time constraints the assumption was made that lead market models for developed markets should be treated separately. As mentioned the model of Beise might be out-dated making it difficult to check whether this is a valid assumption to make. Also this results in a limited picture of the global mobile money market. It might be discovered that in a later stage developed countries might take over the lead market position in mobile money. This could counter argue the statement made here that developing countries can become lead markets or it could mean that developing countries require a larger demand size following the thoughts of Tiwari and Herstatt.

Fourthly several challenges of frugal innovation have been introduced in the literature review of this study. However, it has not been investigated what could be done about these. These challenges might inspire researchers interested in frugal innovation to conduct further studies.

Fifth the challenge of culture can be given more emphasis. Frugal innovation literature often talks about a frugal mind-set appearing in developing countries, indicated that innovators in these countries are better at using available resources more effectively. Culture appeared to have a role in the story of MPesa as well, but this could not yet be confirmed.

11 Reflection

To finalise this thesis I will here provide my thoughts on a few topics that were outside of the scope of this thesis.

In paragraph 11.1 I will reflect on lead markets, whether they were the correct theory and how I interpreted them. In paragraph 11.2 I will do so for frugal innovation also. I will discuss the future of Kenya's position in mobile money in paragraph 11.3 and finalise with a discussion on globally dominant designs for mobile money 11.4.

11.1 Lead markets

This study has been researching lead markets in developing countries. It can be reflected upon whether this has been the appropriate theory and whether it has been used in the correct manner in this study.

The lead market theory in contrast to other innovation theories does not focus on invention, but on the emergence of technology in a market (Quitow et al., 2014). The argument has been put forward that this can help developing countries as they can focus on the implementation of existing technology rather than inventing new technology.

However, this might also be seen as an argument that developing countries still have no innovation potential. This is further supported by the large role given to multinationals in bringing in technological knowledge.

It should be noted that this study does not wish to imply such thoughts. Rather innovation should be seen in a different way for developing countries and should be tailored to their specific conditions.

Being able to redefine and simplify existing technology can become an important contribution of developing countries in the creation of a more sustainable economy. Frugal innovation is a promising philosophy to innovate more effectively and efficiently. Developed countries are hindered in this as for them there is little need to be sparing with resources. However, possible shortages in the future of oil, precious metals and other resource might result in a need to rethink current innovation and design processes.

By redefining and simplifying existing technology developing countries might lead the way into an era where the conditions that developing countries are so used to will become important globally.

Lead market theory is important to identify what nations can best deal with future issues and what the world can learn from those. Whether or not lead markets result in global design has been considered the most important feature of lead markets, but viewing lead markets as breeding grounds for innovation might be more useful.

Whether or not the design that emerges there spreads out is in my opinion a secondary feature of such markets. More important is that they provide new possibilities, room for experimentation and lessons for other countries to learn from.

11.2 Frugal Innovation

The importance of frugal innovation can be linked to the importance of resource scarcity. As long as there is abundance there is little incentive to be sparse with resources. However interest is emerging.

In this study frugal innovation has not been the main topic of research, but it does play a significant role in the lead market potential of developing countries. Its philosophy of doing more with less applies to how daily life is often experienced in developing countries.

It could be questioned whether enough attention has been given to this subject and the possibilities it has for lead markets. Frugal innovation has merely served as an input to the literature framework, but its implications for Western nations have been ignored mostly.

Frugal innovation might for example be linked to other developments such as that of the circular economy. In the circular economy the goal is to eliminate waste by using discarded products as resources for new products. Such concepts have not yet been linked, but using waste as an input material could fit the ideas of frugal innovation. However, this is more recognisable in Jugaad as waste is a mixture of many elements. This also means that up-scaling is likely to be the main issue of a circular economy.

Still increased research in frugal innovation might result in new ways to facilitate up-scaling. This could be a significant input to Western ideas to make use of what is now regarded as waste material.

Frugal innovation is a topic that deserves more attention as it shows how assumed weaknesses of developing countries can be turned into advantages.

11.3 The future of Mobile Money

MPesa is praised for its success, but at the same time it is considered an old system that might soon lag behind to other developments (FMM2, 2017; FMM4, 2017; ResMM2, 2017). This does not necessarily mean that Kenya will lose its lead market position, but it could be. This begs the question whether Kenya will be able to keep up with current developments and keep leading mobile money. Discussing the future of MPesa and mobile money in general was beyond the scope of this thesis, but this section provides room to reflect on the thought of Kenya as a lead market.

11.3.1 Trends

Firstly it seems likely that there will be an increased use of smartphones in mobile money (FMM1, 2017; RegE1, 2017; P. Singh, 2017). Smartphones could become a facilitator in spreading mobile money as well (FMM3, 2017; P. Singh, 2017). The use of these devices is becoming a habit for many people. MPesa is being further developed to comply with Android (RegE1, 2017). However, in a recent interview MPesa CEO Bob Collymore (2017) stated that most of MPesa's innovations will still lie on their text-based system as this complies with the phones of most of their customers. This seems to indicate that the presence of an established system might be an innovation inhibitor, but now for Kenya. Whereas industrialised nations are hampered in the development of mobile money through their well-established banking systems, Kenya might be heading the same direction because of the success of MPesa.

On the other hand RegE1 notices that app creation is gaining more popularity in Kenya (2017). Furthermore, a recent study showed that 60% of Kenyans own a smartphone (Omulu, 2017). So although the focus is not on smartphones yet in Kenya, smartphones might become of increased importance. This development has already resulted in the creation of super-apps in China, where mobile payment is integrated in a larger system (ResMM2, 2017).

Secondly mobile money is might become part of a larger range of services (FMM3, 2017; ResMM2, 2017; Sun et al., 2016). A possible development is that e-commerce, which is based on desktops will shift to m-commerce, based on mobile phones (ResMM2, 2017). This could threaten the current balance in mobile money in Kenya. MPesa is a well-spread system, but only allows transfers of limited size (RegE1, 2017). However, Singh considers that upgrading mobile money systems to better fit retailers is one of the key priorities in mobile money (2017). This could expose a limit of MPesa that still needs solving.

A third trend is one that might allow Kenya to remain the leader of mobile money. In chapter 5 a description was given on the competition in Kenya. It could be seen that competitors have not yet been able to break through the monopoly of Safaricom, but they keep trying. Not only other telecom companies wish to gain market share in mobile money, but banks are increasingly getting involved as well. It seems that in Kenya the border between banks and telecom companies is disappearing (ResMM1, 2017). This development might increase competition in Kenya as well. If this trend continuous it might redefine both banking and telecom operations.

At seen in chapter 5, regulators are not willing to change their policy to increase competition in the Kenyan market. Interoperability seems unlikely at this point. By entering the telecom sector banks are showing that Kenya can still be a competitive market despite having to follow channels that are unknown abroad. Maybe this will be another model that will be followed later in other countries, showing that Kenya is still a lead market in the mobile money sector.

Fourth is the introduction of digital currency. The appearance of BitCoin and other digital currencies could overhaul the whole concept of currency (FMM2, 2017; RegE2, 2017). This technology is coming from America, but is more likely to spread in a country that lacks a stable currency itself (FMM2, 2017). FMM2 considers this a global phenomenon and therefore not bound to a national market that could lead the diffusion of the technology. This follows the thoughts of ResLM1 (2017) who considers the lead market theory insufficient to describe global markets.

A fifth trend is the increase of interoperability (RegE2, 2017). Interoperability decreases the necessity for customers to subscribe to a single operator. In Kenya this is withheld by Safaricom (Kenyan WallStreet, 2017b). However, Tanzania has pioneered this approach and thereby strengthened mobile money within its borders (Raithatha, 2017).

11.3.2 Implications for Kenya's Lead Market Position

What can further be seen is that in different parts of the world different models for mobile money are coming up (Schilling, 2017). Mobile money seems to be one of the options for nations to become cashless economies. Although Kenya has been the first country to achieve this and had other markets following its footsteps, there are different developments in other parts of the world. The largest growth of the last few years has been seen in Asia, although Africa is still home to the largest amount of users of mobile money (GSMA, 2017).

China is developing cashless payment in line with the first and second trend mentioned above (FMM1, 2017; ResMM2, 2017; P. Singh, 2017). Here smartphones are common in large parts of society and super-apps have integrated mobile payment into their larger systems (ResMM2, 2017). These might form the basis for the integrated systems that Singh calls for.

India is home to a strong technological base and is experimenting with payment systems that are based on banks (P. Singh, 2017). Identification is done through social security number and biometrics.

These countries have been the main inspiration for Tiwari and Herstatt (2014) to consider the lead market potential of developing countries. It can be recognised in the emphasis on technological capabilities and market size as described earlier in chapter 4. ResLM2 (2017) considers India an exceptional developing country as it is able to show technological capabilities that are generally lacking in developing countries.

Interesting is that these countries are developing mobile money in a different way than Kenya does. Until now many countries have tried to adopt the Kenyan model, but India and China are following different paths in cashless payment that might turn mobile money into an optional technology in cashless payment technologies.

If the focus is on mobile money itself Kenya should also keep innovating. Other countries have lagged behind for long, but mobile money is becoming more integrated there as well. Kenya is showing innovation as it is pioneering mobile credit, insurance and savings (Raithatha, 2017).

The question is to how long other countries will keep following Kenya. It is hard to predict the future and to predict what more innovations will be introduced based on mobile money. What can be said is that the gap between Kenya and other nations is getting smaller each year. Outside of the developing world industrialised nations have also started to experiment with mobile money.

In Western nations mobile money is yet to take off (McParlane, 2016; Perelmuter, 2015). It is developing mainly through banks and in combination with smartphones. However trust in mobile money is still in issue as banks are well established in Western countries (McParlane, 2016).

Kenya is seen as a leader of mobile money, but this does not necessarily imply it will stay in this position for an extended period. The literature has shown that large domestic success do not always guarantee a lead market position (Beise, 2004). The Kenyan model for mobile money might not be the most suitable for the future. Safaricom's current CEO announced that MPesa will still focus on text based services (Collymore, 2017). GSMA is however promoting a shift to digital signals in telecom worldwide, including Kenya (GSMA, 2017).

The interviewees were asked what country they think will lead the mobile money market in the future. This resulted in various answers. Often the interviewees did not wish to point out one specific market, but rather would provide their thoughts on trends that they could see developing.

11.4 Dominant Design for Mobile Money: Global or Regional

This also shows the value of lead markets. Kenyans are used to the concept of mobile money. This makes it easier to introduce new innovations there and to understand what might be valuable to other nations. By gaining a better understanding of what is happening in a lead market both companies and policy makers gain insight in the future of other nations that follow the developments of the lead market.

A lead market will appear in the place where the needs of the population are the drivers of the innovation (ResLM1, 2017). In a developed nation, novelty and differentiation are strong drivers. However, in developing countries the lack of basic needs and social value can be drivers.

Both the lack of basic needs and social values have driven Kenya for a long time in the further development and spread of mobile money. This can be seen in the lack of banking services and the development aid provided by DFID. However, these needs are not present everywhere. One of the factors contributing to Kenya's lead market potential was the lack of banking services.

The lack of these needs have been present longer, but it's the new developments that have made it possible to attend to them (ResLM2, 2017). When Beise constructed his framework in 2004 the technological possibilities of today were not yet imaginable.

New developments will result in new drivers of mobile money. New drivers might arise from governments who wish to move towards a cashless economy. In this larger playing field the model that Kenya presented to the world becomes one of multiple possibilities.

Outside of Africa different designs are being build (Schilling, 2017). The Kenyan mobile money market seems to have been a model for many other countries, but it does not seem like the needs felt there will be experienced in industrialised nations. In for example South-Africa MPesa did not gain popularity, mainly because the banking sector was already fulfilling local needs (FMM1, 2017).

As Beise described, the design of a lead market has a higher chance of being adopted in other nations than any other design. However, the need for mobile money that was present in Kenya cannot yet be seen in many developed countries. This does not mean that this need might never appear. In Kenya MPesa started from the bottom of the pyramid and worked its way up in society (FMM3, 2017). This might mean that the Kenyan design for mobile money might become used in developed countries as well at some point, but for this is it likely that mobile money requires further development.

Kenya seems therefore mainly a regional lead market. It has been seen as a global market, because in many nations mobile money has not been present. However, the lag markets of Kenya have been other developing countries.

From this perspective it seems that the dominant design as described by Beise (2004) is not yet present. It appears that mobile money is still at its infancy and that Kenya opened up the battle for a dominant design in mobile payment through the introduction of mobile money with MPesa.

On the other hand it the idea of dominant designs does assume that there is a design that will take over all other designs. This implies that this design will suit the needs of all markets. However, the difference in success of mobile money in developed and developing nations can be largely subscribed to the need for it.

The increased integration between banks and telecom might disrupt this. In Western countries the well-established banking system has been an inhibitor for the introduction of mobile money for a long time. If these banks would see increased value in mobile money this might lead to a large scale introduction of mobile money globally.

If Kenya chooses the right path of development it might lead this development as well. Whether Kenya is able to keep its position as a lead market depends on how it responds to future developments. What these will be is uncertain, but it is clear that the mobile money market is changing.

Appendix A: Lead Market Theory Origins

The theory on lead markets itself builds on other work as well. By following its development the reader will gain a better understanding of the elements that make up the theory. The starting points of lead markets comes from the idea of that certain markets have advantages over others. In this way one of the competing designs can become dominant over time.

A.1 Competitive Advantage

It can be observed that in a competitive environment particular demand conditions of a country may provide a nation with certain advantages in specific sectors compared to other nations (Porter, 1998). This so called national competitive advantage is described in a model called Porter's diamond. Porter's Diamond already describes the importance of a competitive advantage, which are factors that allow a country to produce goods or services at a lower price or with a higher desirability (Porter, 1998). These factors were described by Porter as shown below (1998, p. 166):

- Factor Conditions: The nation's position in factors of production such as skilled labour or infrastructure, necessary to compete in a given industry
- Demand Conditions: The nature of home-market demand for the industry's product or service
- Related and Supporting Industries: The presence or absence in the nation of supplier industry and other related industries that are internationally competitive
- Firm strategy, Structure and Rivalry. The conditions in the nation governing how companies are created organised and managed as well as the nature of domestic rivalry.

It is generally accepted that Porter's diamond provides *the roots on which the lead market grows* (Quitow et al., 2014; Tiwari & Herstatt, 2012). This is to say that the factors of national competitive advantage provide the necessary conditions for the dominant design to emerge. From this starting point the lead market theory provides an understanding on how this dominant design is able to become the preferred design in other markets as well.

Porter's model only tries to explain why certain nations dominate certain markets, but does not go deeper into the diffusion of the innovations. This is an essential part of lead markets as they are followed by lag markets, that take over the dominant design in a later stage (Beise, 2004).

A.2 Innovation Diffusion

This brings up the second step in the development of a theory on lead markets: innovation diffusion. The factors that give a nation a competitive advantage can become important in other countries as well, resulting in the innovation spreading to other regions (Bartlett & Ghoshal, 1988). Bartlett and Ghoshal (1988) characterised lead markets as geographical markets that induce global innovations by local demand preferences and local environmental conditions. They further name them: "the markets that provide the stimuli for most global products and processes of a multinational company" (Bartlett & Ghoshal, 1988, p. 243). With this Bartlett and Ghoshal linked the thoughts of Porter to the early lead market terminology, but still kept emphasis on the country where the innovation takes place and on the consumers living in that country.

In the early literature, following Bartlett and Ghoshal, a lead market was understood as “the country in which an innovation was invented” (Yip, 1995). Kalish Mahajan & Muller added the diffusion of innovation to the definition by stating lead markets are “the countries in which the diffusion process of an innovation first takes off” (Kalish, Mahajan, & Muller, 1995). Taking off is to denote that there is a certain starting point from which the innovation becomes widely used over a larger international region or even at a global level.

A.3 Critique by Beise

Beise (2004) noted that the understanding of lead markets at that time did not seem fit. He provided two propositions that criticized the thoughts on lead markets as summarised by Bartlett and Ghoshal.

First of all a lead market is not necessarily the country of origin of the innovation. Beise (2004) observed that often innovations occur in different countries than those where they are first widely accepted. This means that the country of invention is not necessarily the lead market of an innovation, although this used to be assumed in the literature (Yip, 1995). Examples are: the personal computer that was invented in France instead of the US where it became first widely used; cellular mobile telephony was invented in the US, but emerged from Scandinavia; also the fax machine was invented in the US, in technological terms it was mostly developed in Germany, but only became widely adopted in Japan at first (Beise, 2004, p. 998). In these cases the lead markets would be: the US, Scandinavia and Japan.

Secondly, lead markets are not predominantly characterised by users who are more willing to adopt innovations. Before the emergence of a lead market, the design to become dominant is still competing with alternative designs. These alternative designs might be innovative and successful in other markets. It cannot be assumed that consumers in the nations in which these alternative designs emerge are less willing to adopt innovations. On the contrary adopting an alternative design, which will later have to make room for the dominant design, shows that costumers outside of the lead market are not necessarily less willing to adopt innovations. Here an example could be the success of the teletypewriter in western nations before the fax machine from Japan was adopted into western markets and became the preferred technology of use.

These two propositions show that lead markets are not merely interesting for domestic companies. Foreign companies can benefit from lead markets by applying new technologies in those markets rather than their domestic markets, because the conditions in the lead market might be favourable for the new technologies (Beise, 2004). Beise mentions that most firms become internationally successfully because they just happened to be located in a lead market (Beise, 2004, p. 455).

Following these critiques Beise constructed a framework providing a platform for the application of the lead market theory (Beise, 2004). Within this framework he used the following definition, based on several case studies on international diffusion patterns:

Innovations that have been successful with local users in lead markets have a higher potential of becoming adopted world-wide than any other design preferred in other countries. (Beise, 2004, p. 1012)

As said before, this does not mean that consumers in other countries wait for an innovation to cross borders into their nations. The lag market might have had preferred another design before and switch to the dominant design later. Figure 11 provides a general pattern of diffusion for the dominant design from the lead market into a lag market. It also

shows the pattern for the design of the lag market. This lag market design is successful at first only to be pushed away by the dominant design.

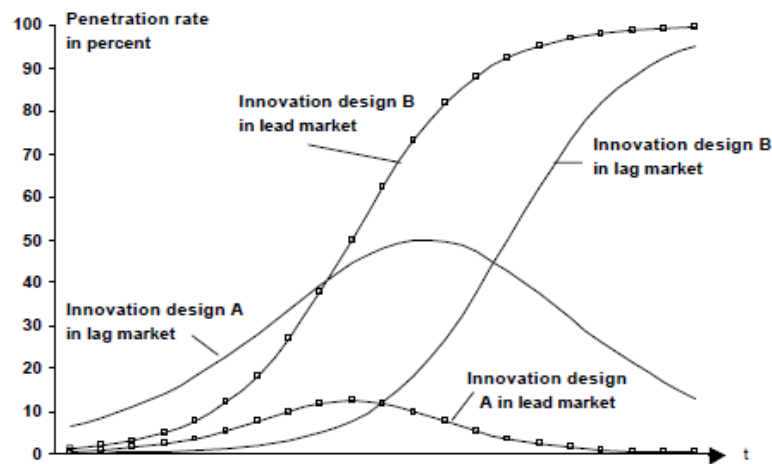


Figure 11: A generalised pattern of the international diffusion of innovation with competing design (Beise, 2004)

Appendix B: Resource Constrained Innovation

Frugal innovation as a term has developed itself in recent years from a bottom up type of quick-fix solutions towards a commercially viable innovation aimed at being more inclusive towards customers at the bottom of the pyramid. Also its increased success in developing countries has not been unnoticed in developed countries and these developed markets have started to show a growing interest in what frugal innovation can bring (Weyrauch & Herstatt, 2016). Because this change in views is quite recent frugal innovation still get easily confused with other related terms (Agarwal et al., 2017). To clarify this problem, this paragraph provides an overview of comparable terms.

To provide the reader with a basic understanding of these concepts, which are not to be called frugal innovations, they are listed below. Their difference from frugal innovation will be explained in the remainder of this sub-chapter.

- Grassroots innovations: bottom-up innovations in response to local situations, interests and values (Hossain et al., 2016).
- Jugaad: Low-resource quick-fix solutions (R. Singh et al., 2012). The term is often used in public literature as the Indian word for frugal innovation.
- Gandian Engineering: Rebuilding a complex product in the most economical way (Basu et al., 2013). It has its roots in India.
- Gambiarra: The Brazilian version of resource-constrained innovation. The focus lies on adapting standard products with readily available material (Moreira Soares, Ferranini, Martins Fontes, & Angel Borrás, 2014).
- Shanzai: This refers to the counterfeit consumer goods in China. Despite its controversy it does show how the Chinese are able to make Western products for far less cost without having the means of the large companies they counterfeit available to them (Schmidle, 2010).

- Zizhu Chuangxin: This also originates from change and can be translated as indigenous innovation, referring to China's own rising capabilities in technological development (Chen, 1994).
- Jua Kali: The Get Er Done mentality in Kenya to keep broken products going by means of improvised repairs (Wiens, 2011). The term is further used to refer to unregistered economic activity or the informal economy (Hope, 2014).

Table 30: Search hits on innovation concepts using ScienceDirect

	2008	2009	2010	2011	2012	2013	2014	2015	2016
Frugal Innovation	24	17	21	29	42	50	55	63	88
Grassroots Innovation		139	146	140	183	233	215	293	332
Jugaad				4	5	11	5	13	12
Ghandian Engineering			1			1		1	
Gambiarra	1			3	1	1			
Shanzai				1					1
Zizhu Chuangxin							2		4
Jua Kali	1	1	1	2	2	3	3	3	1
"Reverse Innovation"	1	1	1	3	10	18	26	26	38

Table 31: Search hits on innovation concepts using Google

	Hits on Google
Frugal Innovation	379 000
Grassroots Innovation	1 0700 000
Jugaad	1 660 000
Ghandian Engineering	447 000
Gambiarra	1 740 000
Shanzai	30 900
Zizhu Chuangxin	3 460
Jua Kali	388 000
"Reverse Innovation"	136 000

Why is it important to understand these types of innovation one might ask? As can be seen from Table 30 there is little academic interest in most of the concepts it seems. Not many papers are specifically devoted to one of the resource-constrained innovation types. However, when going through the literature it can be found that these terms are often mentioned within the papers with various understandings of their meaning. Moreover, when searching on Google, many of the concepts provide more hits than frugal innovation itself. It seems that the term frugal innovation is still relatively unknown. The mixing of concepts mentioned earlier results in erroneous views on frugal innovation itself. Below I will mention what differs frugal innovation from the aforementioned other resource-constrained innovation concepts.

Quality

This list shows concepts that are sometimes referred to as separate fields, parts of frugal innovation or synonyms to it. The common denominator for these concepts is the affordability

of the innovation (Basu et al., 2013). The general explanation is that the relatively recent entrance of frugal innovation in academic literature is the cause of the flux in definitions (Simula et al., 2015). In early years the term frugal innovation started to arise in the light of solutions invented by and for people at the bottom of the pyramid it can be observed that it is often seen as a synonym to local, quick-fix solutions such as Jugaad (Kaur, 2016; R. Singh et al., 2012). Care has to be taken in not confusing the overlapping terms with one another. Frugal innovation is a way of dealing with resource scarcity other than bricolage or improvisation (Levänen et al., 2015). This clearly distinguishes it from concepts such as chuangxin or jua kali, even though they all fit into the category of low-cost resource-constrained innovation (Ibragimova & van Boeijen, 2014).

Recently the term frugal innovation has moved away from the term Jugaad (Aulbur, 2015). This can also be observed in the Indian government in recent plans on their innovation policy, the term frugal innovation is now favoured over Jugaad (Kaur, 2016). This because of Jugaad’s association with poor-quality. The term of Jugaad and similar terms are now more labelled as providing a basis for frugal thinking. More on this will be explained in 3.3.3.

Scalability

A common issue that further distinguishes these type of innovations from frugal innovation is that of scalability (Kroll et al., 2016). Also Bound & Thornton (2012) mentioned that frugal innovations can be made available at a large scale. This implies a precondition which is often not met by the aforementioned resource-constrained innovations. Kroll et al stated three issues in the scalability of frugal innovations (Kroll et al., 2016). Firstly, local ecosystems have very specific issues that might be addressed by a resource-constrained innovation, but do not necessarily apply to larger markets. This as the larger the market gets the larger the distance between producer and user gets. Secondly, local producers are often not aware of nor interested in the possibility to sell to larger markets, which requires skills different from their intuitive knowledge of the local market. Lastly, increasing the scale of a product requires some form of standardisation. This will hamper with the specific attributes chosen for the initial markets that the bottom-up innovation was intended for.

Appendix C: Definition of Frugal Innovation

This appendix summarized 15 views on frugal innovation as found in the literature. The goal was to use definitions, but whenever these were not available a description was constructed from the used source. Table 32 summarizes the characteristics found in the articles. Hereafter the definitions are given as found in the literature. Lastly, the frequency of the elements used in 3 is mentioned for each element.

Table 32: Summary of elements for defining frugal innovation

	Quality	Constraints	Customer	Level	Notes
Agarwal et al. 2017	Good-Enough	Affordability	Resource-Constrained	Products	
Aulbur 2015	Customer value	Price point		Process	
Basu et al. 2013	Appropriate quality	Affordable, adaptable,	Citizens in the	Process products &	

		accessible	developing World (aim)	services	
Bhatti 2012		Complexity and cost		Process	
Bhaduri 2016	Suitable (for Global South)		Marginal groups	Concept, a way of thinking	
Bound & Thornton 2012	Outperforming alternatives	Financial, material and institutional		Development, production and delivery of products and services	
Hossain et al. 2016			Local (problems)	Mixtures of available knowledge and technology	
Hyvärinen, Keskinen & Varis 2016	Good-enough	Affordability No Frills	Resource-constrained customers	Products	
Kamp, Orrt & Harahap 2015		Adapted often low cost	BoP households	Products	
Kroll et al. 2016				Multi-dimensional phenomenon	Context-specific
Levänen 2015		Resource-constraints	Emerging markets (driver)	Solution	
Simula et al. 2015	Value aimed	Costs	Low-purchasing power		
Sun et al. 2016		Minimal resources		Systems	
Tiwari 2016	Fulfilling or exceeding prescribed quality standards	Aimed at core functionality		Value Chain	
Tiwari, Fischer, & Kalogerakis, 2017	High quality standards	Core needs		Products	
Weyrauch & Herstatt 2016	Core functionalities & Optimised performance	Cost reduction			

(Agarwal et al., 2017)

“Good-enough,” affordable products that suffice the needs of resource-constrained consumers

(Aulbur, 2015)

Frugal innovation: a structured process that focuses on delivering customer value at pre-determined price points. (This article strongly connects it to disruptive innovation that meets basic requirements and sees it as a key success factor.)

(Basu et al., 2013)

Frugal innovation is a design innovation process in which the needs and context of citizens in the developing world are put first in order to develop appropriate, adaptable, affordable and accessible services and products for emerging markets.

(Bhaduri, 2016)

Frugal innovation is more like a concept, a way of thinking. Frugal innovations focus on marginal groups [in contrast to regular innovations]. Small solutions from the informal sector made by and for people in the Global South, suitable for the circumstances and problems in their own region.

(Bhatti, 2012)

Frugal innovation is the process of reducing the complexity, cost of a good and its production to make products more accessible in developing countries

(Bound & Thornton, 2012)

Frugal innovation responds to limitations in resources, whether financial, material or institutional, and turn these constraints into an advantage. Through minimising the use of resources in development, production and delivery, or by leveraging them in new ways, frugal innovation results in dramatically lower-cost products and services. Successful frugal innovations are not only lower in cost, but outperform the alternative, and can be made available at large scale. Often, but not always, frugal innovations have an explicitly social mission.

Features of frugal innovation are:

- Making things better, not just cheaper
- It applies to services and products
- It is about remodelling not just de-featuring
- Low cost does not mean low-tech

(Hossain et al., 2016)

Frugal innovation comprises innovative mixtures of available knowledge and technologies to solve urgent local problems. Reverse innovation are those frugal innovations that migrate to wealthier markets.

(Hyvärinen et al., 2016)

Frugal innovations have been proposed as a potential approach for serving resource-constrained consumers in emerging and developing markets as well as in the low-growth

struck Western markets due to their notion of affordability, good (enough) quality, and no-frills structure.

(Linda Manon Kamp et al., 2015)

Adapted and often low cost products that can fulfil some of the basic needs and thereby improve the daily lives of people in BoP households.

(Kroll et al., 2016)

Frugal innovation is a multi-dimensional phenomenon that combines aspects of product, process and environment in different, context-specific ways. Consequently, no single threshold for frugality can be defined with a view to one particular criterion. Moreover, the very nature of the abovementioned criteria, such as 'context-specific utility' underlines that successful frugal innovation cannot be 'measured' in generic terms, but only be identified qualitatively in a specific framework.

(Levänen et al., 2015)

Frugal innovation is a recently emerging concept. It refers to solutions created under the circumstances of resource constraints. It is driven by demand limitation and low-cost competition in emerging markets. It addresses problems in various sectors by involving the private sector.

(H. Simula et al., 2015)

When an innovation meets the needs of customers with low purchasing power, typically located in emerging markets or developing countries, it is considered a frugal innovation. Simula et al add that: "There are multiple paths to frugality: lowering costs and elimination non-value adding functions"

(Sun et al., 2016)

Innovative (information systems) that are developed and deployed with minimal resources to meet the needs of their users.

The design and development of products/services with price rather than features as the starting point, but also focusing on the utility and value offered rather than high-end sophistication

(Tiwari, 2016)

Frugal innovations seek to create attractive value propositions for their targeted customer groups by focusing on core functionalities and thus minimizing the use of material and financial resources in the complete value chain. They substantially reduce the cost of usage and/or ownership while fulfilling or even exceeding prescribed quality standards

(Tiwari et al., 2017)

Frugal products should focus on customer's core needs and reduce unnecessary complexity while adhering to high quality standards

(Weyrauch & Herstatt, 2016)

We propose that innovations are frugal if they simultaneously meet the criteria *substantial cost reduction, concentration on core functionalities, and optimised performance level*

Sufficient quality

The aspect of quality is what distinguishes frugal innovation from many other resource constrained types of innovation (Aulbur, 2015). 10 of the 16 sources mention an aspect of quality in defining frugal innovation. There are some different views on this quality aspect, but mainly the key of frugal innovation is to provide sufficient quality to its customers. This is stated in various ways by 9 out of the 10 sources who included a quality aspect. Terms used to refer to this are: suitable, value-aimed, good-enough and appropriate. Two of the sources even mentioned that frugal innovations could or should outperform alternatives. However, this seems to be too much to include in a definition.

Resource constraints

The very basis of frugal innovation seems to lie in the constraints it puts on the designing process and the outcomes of this process. 13 sources have included constraints in their definitions, 9 of them mentioning costs, price or affordability. Sometimes complexity is mentioned or leaving out extra's or "frills". 2 definitions broaden the idea of constraints by mentioning it as resources in general.

Bottom of the pyramid

As seen before frugal innovation arose from providing to customers at the Bottom of the Pyramid in developing countries. What also became clear is that since then frugal innovation developed itself in a type of innovation that can also serve people outside of this segment. With 8 sources mentioning a certain type of customer it is still worth determining what people frugal innovations are intended for. 4 of these 8 sources mentioned emerging markets, BoP costumers or locals. The other 4 sources speak of resource-constrained customers or similar terms. However, a lot of sources do not mention a specific type of customer, which seems to make a definition more in favour of a wider group.

Management philosophy

What is also not directly clear is whether a frugal innovation should be seen as a product, service, process, system or even a management philosophy. 5 definitions mention the word product. Another 4 sources use process in their description. However, broader ideas on frugal innovation are also possible. Bhaduri (2016) calls it a concept and Kroll et al. (2016) describe it as a phenomenon. Kroll et al. further state that what is a frugal innovation depends on the context of its usage, for instance using an iPhone for satellite control. Bound & Thornton (2012) apply the concept to development, production and delivery of products and services. This does show that frugal innovation can be applied throughout the development process. Looking at frugal innovation like this widens the potential impact of frugal innovation. By looking at it in this manner it becomes a management philosophy that can be applied to design, production and distribution of products and services.

Appendix D: Hofstede Dimensions

Power Distance Index is a measure of 'the extent to which the less powerful members of institutions and organizations within a country expect and accept that power is distributed unequally' (G. H. Hofstede et al., 2010, p. 61).

Individualism 'pertains to societies in which the ties between individuals are loose: everyone is expected to look after him- or herself and his or her immediate family. Collectivism as its opposite pertains to societies in which people from birth onward are integrated into strong,

cohesive in-groups, which throughout people's lifetime continue to protect them in exchange for unquestioning loyalty.' (G. H. Hofstede et al., 2010, p. 92).

Masculinity, where '[a] society is called masculine when emotional gender roles are clearly distinct: men are supposed to be assertive, tough, and focused on material success, whereas women are supposed to be more modest, tender, and concerned with the quality of life. A society is called feminine when emotional gender roles overlap: both men and women are supposed to be modest, tender, and concerned with the quality of life.' (G. H. Hofstede et al., 2010, p. 140).

Uncertainty Avoidance is a measure of 'the extent to which the members of a culture feel threatened by ambiguous or unknown situations' (G. H. Hofstede et al., 2010, p. 191).

Long-Term Orientation, standing 'for the fostering of virtues oriented toward future rewards – in particular, perseverance and thrift. Its opposite pole, short-term orientation, stands for the fostering of virtues related to the past and present – in particular, respect for tradition, preservation of "face", and fulfilling social obligations.' (G. H. Hofstede et al., 2010, p. 239).

Indulgence versus Restraint, where indulgence 'stands for a tendency to allow relatively free gratification of basic and natural human desires related to enjoying life and having fun. Its opposite pole, restraint, reflects a conviction that such gratification needs to be curbed and regulated by strict social norms.' (G. H. Hofstede et al., 2010, p. 281).

Appendix E: Construction of the assessment table

The following descriptions were used to connect Table 7 to Table 8.

E.1 Demand advantages

Demand advantages are concerned with domestic demand. The cells in this column provide information on what factors need to be considered to understand whether the regional market has a need for the innovation.

Quality: The first frugal innovation element is quality. Frugal innovations aim at realising a significant cost reduction by slightly reducing quality to a level that is considered sufficient enough to complete the intended purpose. The question is whether the intended market has a large enough customer segment that could be interested in such innovations.

Resource constraints can lead to the population being used to solutions that are not based on the latest technology. This can result in more acceptance and higher demand of frugal innovations.

Bottom of the pyramid: A large amount of people who live at the bottom of the pyramid will increase the demand for frugal innovations as they are restricted to this type of innovations, because of their buying power. Frugal innovations can provide quality solutions to people belonging to this category.

Government, as we have seen in the theory, can help in shaping demand through education and policies on stimulating and promoting of frugal innovation. These might in turn result in increased demand.

Diffusion patterns might seem unlikely to result in further demand advantages. However, it has been seen in the literature that issues remain in frugal innovations reaching their intended customers. So the main factor at hand here is to ensure that supply of frugal innovations can ensure to meet demanded innovations.

Culture: National culture might result in higher demand. As we have seen earlier Tiwari (2016) connected the dimensions of Hofstede (2010) with the concept of frugality.

Non-technical innovations: There might further be a national demand for the non-technical innovations that are related to frugal innovation, such as new business models. This demand can be the reason that the nation has gained experience in social and organisational innovations to meet the country specific demands.

E.2 Cost advantages

Cost advantages are those that keep costs of innovations low compared to other nations.

Quality: Developing economies are better capable of providing low-cost products due to low labour costs. Compared to developed economies this allows them to provide the same or a slightly lower quality level at a large reduction of costs.

Resource constraints: The familiarity of dealing with few resources can provide advantages as companies in the national market are using to using whatever resources they have available to their full extend. The socio-economic conditions of the nation can be turned into a costs advantage compared to developed nations in which prices are higher. Cost reduction can also be done through leveraging of existing infrastructure.

Bottom of the pyramid: Providing innovations for the poor requires companies find creative ways to reduce cost of ownership so that the poor are able to benefit from the innovation. However a large amount of people at the bottom of the pyramid can ensure economies of scale large enough to offset for thin margins.

Government: Government incentives can aid in providing cost advantages. However, it has to be taken into account that these need to be sustainable. For instance stimulation research towards cost-effectiveness would be preferred over subsidising.

Diffusion patterns: On a national level diffusion patterns are still not fully understood. Many innovations do not reach their customers as they do not diffuse outside of their local environment. If costs of up-scaling and spreading of innovations can be reduced this might allow more innovations to reach a larger customer base. Also existing infrastructure can be leveraged to stimulate diffusion whilst keeping costs low.

Culture: Culture in itself is not considered to be related to costs. If there is a connection this would be too indirect to be considered here as it is one of many factors contributing to socio-economic conditions.

Non-technical innovations: An important consideration is to not only keep the costs of the innovation itself low, but also through non-technical features such as the distribution and payment. Institutions of a nation might aid in this to provide a costs advantage.

E.3 Export advantages

These result from a similarity of needs in other countries and help to spread the innovation across a nation's borders.

Quality: A superior price/quality position makes it interesting for other nations to adopt the innovation therefore providing an export advantage to the lead market.

Resource constraints: The resource constraints faced by the nation can be similar elsewhere. This creates similar demands outside of the nation's borders.

Bottom of the pyramid: Again this results in a similarity of demand as multiple nations have a significant part of their population belonging to the bottom of the pyramid.

Government: Supporting policies can grant export advantages as they make it easier to move the innovation across borders. It remains important to ensure fair trade policies especially between developing and developed nations.

Diffusion patterns: Strengthening diffusion patterns can be helpful in increasing export advantages. Diffusion is a challenge for frugal innovation and should be actively supported as it is a relatively rare phenomenon. This might be especially relevant when trying to export frugal innovations to developed nations.

Culture: This can relate to earlier notions from Beise that Tiwari and Herstatt adopted, being the reputational advantage. For frugal innovation this applied mainly to other developing countries through local success. Furthermore, similar cultures are likely to have similar tastes.

Non-technical innovations: Export advantages revolve for a large part around the similarity of demand. However, non-technical characteristics that might be taken for granted in the home country might be lacking in the intended lag markets. For example exporting to a country with similar socio-economic conditions makes export easier, but different institutions and policies could hamper diffusion. Lacking non-technical factors, that granted success in the lead market but are not present in the lag market should be identified and dealt with by diverting around them or introducing them.

E.4 Market structure advantages

Market structure advantages come forth mainly out of a competitive climate that helps to stimulate innovation.

Quality: The value for money proposition can be benchmarked against competitors to understand what quality level is still acceptable or sufficient. Also a large base of competition in frugal innovations can provide a source of learning.

Resource constraints: The tight constraints on resource availability are likely to enhance competition and in turn a stimulator for creativity in new market solutions.

Bottom of the pyramid: the bottom of the pyramid provides a new market opportunity as it has not been fully discovered as an opportunity for innovation by many companies yet, especially from developed countries.

Government: Government incentives can be used to stimulate competition. However, some incentives might also slow it down. It is important to find a right optimum in providing opportunities without making companies dependent on government support.

Diffusion patterns: Internal competition might provide an incentive to look for new markets outside of the home country. Furthermore, large domestic players have the ability to open up new markets abroad by introducing the innovation elsewhere.

Culture: Some cultures have a more competitive attitude than other. Hofstede (2010) pointed this out mainly in masculinity, but other researchers found a high score on masculinity to have a negative effect on innovation in general. The exact effect is therefore hard to distinguish based on this information, even though it is likely that competition is linked to culture.

Non-technical innovations: Non-technical innovations might provide advantages over other nations as they are often hard to copy. These can be organisational or marketing innovations. Further innovation could be enhancing by means of how actors within the market interact.

E.5 Technological advantages

Technology advantages arise from the technological capabilities within a nation. They are mainly based on a large base of skilled manpower and their familiarity with local market conditions.

Quality: To ensure that quality is at a sufficient level there needs to be enough knowledge available. In this way commercial innovation processes can be ensured to provide “good-enough” solutions that go beyond the low quality that is often seen in bottom-up innovations that do not make it to the market.

Resource constraints: It is important that the nation is able to find a way to work around the resource constraints. It can as well be an advantage. Due to familiarity with a resource constraint environment engineers are more focussed on what features are necessary instead of what is possible and might be nice to add.

Bottom of the pyramid: The local conditions at the bottom of the pyramid are in the literature often mentioned as the source of innovativeness for developing countries. There is a need to do “more with less” forming the basis of an entrepreneurial spirit (Kaur, 2016). This can further result in a large base of people who are experienced with creative problem solving.

Government: Government incentives especially in education are important to build a strong technological base. It is important that at the same time government try to avoid compromising environmental health and social welfare.

Diffusion patterns: Diffusion poses a challenge to frugal innovation. However, new technological advancements such as IT provide new possibilities in overcoming this challenge. For developing countries leapfrogging technologies might even provide a possibility to catch up or decreasing the distance in technological advancement with developed countries.

Culture: As seen in paragraph 3.3.3 culture is connected to innovative capabilities. Furthermore, it might be that cultural factors influence the technological capabilities as there is a higher incentive to strive for engineering degrees resulting in more technologically educated workers.

Non-technical innovations: It was described earlier that technology can benefit from the support of non-technical innovations as well. It might seem strange to add this question to technological advantages, but existing infrastructure might help to enable technological capabilities. It further relates to the environment surrounding the innovation. Within the technological advantage group this can be related to the knowledge of this environment.

Appendix F: MPesa: Usage

To create an account customers register themselves with only their identification card at an authorized MPesa outlet (Eijkman et al., 2010). They are then assigned to an e-wallet, which is an individual money account, linked to their phone number. This account can be accessed through an application on the SIM-card. Authentication is done threefold by: mobile phone number, identification PIN and national ID card.

Once an account has been opened it can be used for depositing sending and withdrawing money (Hughes & Lonie, 2007). An overview of the system is provided in Figure 7, which describes how money is sent from customer C to customer D. As can be seen the system consists of interaction between customer and agent accounts. To be able to send money it first has to be converted into e-money. For this purpose customer C needs to deposit cash into his account. To do so he will request and MPesa agent to convert cash into

e-float to be stored on his customer MPesa account (2). Both customer C and agent A receive a conformation message to see whether the transaction succeeded. The agent is linked to the main MPesa bank account on which he can deposit or withdraw cash to rebalance his e-money or cash stock (1). In this case he will however only accept the cash of customer C and send e-money to customer C. Customer C has now received an increase of e-money on his MPesa account which he can send to for example customer D (3). To do so the sender, customer C will enter: the phone number of the receiver, customer D, the amount to be sent and customer C's PIN code as a security measure (Sadoulet & Furdelle, 2014). Another agent at another place can exchange his surplus of e-float for cash to be distributed in another region (5) (Hughes & Lonie, 2007). In this other region another customer D can than withdrawal cash by transferring the received e-money to the agent (4).

F.1 Fee Structure

MPesa charges fees for withdrawing and sending money through a stepwise increasing fee (Jack & Suri, 2011). For higher amounts a higher fee is charged (Figure 12). However, percentagewise this fee decreases with the transfer or withdrawal of higher amounts of money. The advantage for Safaricom is that it creates an incentive for users to transfer large amounts of money, however it has been a point of critique as it puts a higher burden on lower-income groups using MPesa (Carey, 2016).

An interesting development is that MPesa has evolved from a remittance system, as intended by Vodafone with its nationwide launch, towards a system that is used to make payments directly (Jack & Suri, 2011). This is so common currently that many Kenyans at times forget to take cash with them under the assumption that they can pay everywhere with MPesa (Stepcic & Salah, 2016).

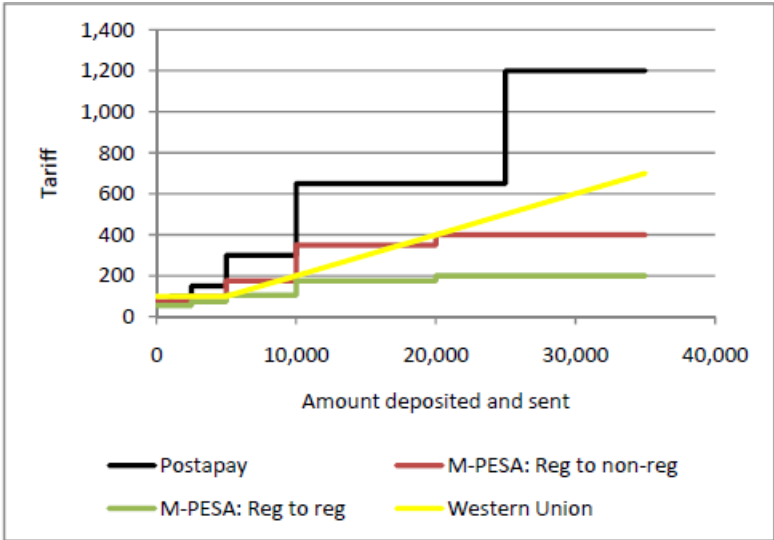


Figure 12: Rates for money transfer and withdrawal for MPesa and competing systems (Jack & Suri, 2011, p. 8)

F.2 Agents in MPesa

Agent interconnection happens according to three models (Jack & Suri, 2011). The first model is that of the head-office. Here one agent acts as a broker between sub-agents who work for him and MPesa. In the second model, the aggregator model, there is again one agent who forms the link between a set of agents and MPesa. However, in this case the sub-agents are independent from the aggregator. In the third model there is a so-called super

agent. This agent only interacts with agents and has no direct connection to either customers or MPesa. This super-agent ensures sufficient cash and e-money for the agents connected to his office.

F.3 Balancing Cash and E-money

Balancing cash and e-money is an important part of the MPesa system as lacking of either e-money or cash is one of its main reoccurring issues (Eijkman et al., 2010; Jack & Suri, 2011; Stepcic & Salah, 2016). To be more precise in a 2008 survey by Jack and Surrey it was found that 70 % of delays in money withdrawal where due to agents lacking money (2011). Although the situation improved in 2011 this was still the reason for 30 % of delays. Stepcic and Salah related the lack of money issues to the disconnection between MPesa and banks (2016).

Running out of e-float due to large cash deposits can also be an issue for agents (Eijkman et al., 2010; Hughes & Lonie, 2007; Stepcic & Salah, 2016). This was solved by allowing e-float to be transferred between agents. Eijkman at all pointed out in their study the difficulties of rebalancing e-money and cash as a complex and time consuming task for agents (2010). The rise of agent-models might have been a result of these issues, but as recent studies show rebalancing is still an issue these models have not been able to solve the balancing of real and electronic money for agents.

The up-scaling of the system further resulted in technological and administrative issues, because of the large flow of data, requiring improvements in the administrative system. The servers that were originally in Germany, because of the reliable connections, were moved to Kenya to increase capacity and connectivity of MPesa. (“Safaricom finishes moving M-Pesa servers to Kenya,” 2015).

Appendix G: Development of Kenya’s Legal Framework for Mobile Money

MPesa has seen a large amount of freedom regarding regulations. In the literature the legal framework is often pointed out as a crucial element of Kenya’s leading position in mobile money. Here the development of the legal framework of mobile money is presented.

After the 2007 no-objection letter the legislation of mobile moneys systems has been developed alongside the development of MPesa (Muthiora, 2015). The large success of MPesa after its introduction resulted in a desire for more regulation, but it took time before a framework was completed and enacted (Muthiora, 2015). Safaricom showed an open attitude towards collaboration, which might explain the lenient treatment that the company got (Jack & Suri, 2011). In 2007 Safaricom voluntarily adopted an Anti-money Laundering framework, which was at that time non-existent for mobile money as legislation for anti-money laundering was extended to mobile money only in 2009.

In 2010 the non-objection letter was replaced by a draft regulation on mobile money, which was the predecessor to the National Payment System Act (NPSA) that got passed in 2011 (Muthiora, 2015). Although this meant there was now a legal framework to regulate mobile money the NPSA was only officially commenced three years later in 2014.

With the increased success of MPesa, regulators were fearing for the increased influence of MPesa on their economy (Masinde, 2016). It was thought that a system this

influential might be able to disrupt the Kenyan economy in case it would fail as it was used to transfer an equivalent to 44 % of the country's global domestic product. However, within the Kenyan National Payment System, which sums up all transactions in the nation, it was found that mobile money only accounts for 6.6 % of total transactions in the country. The more heavily regulated Kenya Electronic Payment and Settlement System is used for 78.6 % of the total transaction value which is the vast majority of transactions.

The NPSA permits both banks and non-banks to provide mobile money services (Muthiora, 2015). Firstly, it states that e-money should be separated from cash and is not allowed to be lent or invested. Secondly the act states that companies who wish to engage in mobile money should establish arrangements with the government. This follows in line with the way the NPSA was developed in the first place. A third point is that companies are not allowed to transfer funds that they convert to e-money to itself or mingle with other trust funds. It has to be pointed out here that Safaricom has distributed its funds among two more commercial banks instead of only the CBA (Jack & Suri, 2011). Safaricom had full access to this new account so the NPSA might have been a reaction to reduce the risk involved in this unlimited access to a large amount of funds. Fourth the NPSA states that contracts with agents should be non-exclusive (Muthiora, 2015). In practice it can be seen that despite their freedom to choose an operator most agents prefer MPesa, as it is the strongest established brand and moreover both agents and costumers are unaware of other options (Stepcic & Salah, 2016). Fifth, the act does allow for interoperability between providers and attempts to stimulate it, but does not regulate this to allow companies to do it themselves. However, in practice this is rather limited as transferring money from MPesa to other companies is charged at a rate double of transfers between MPesa users (Omar, 2015). Lastly the NPSA regulates customer protection and anti-money laundering practices (Muthiora, 2015). Safaricom is seen as one of Kenya's most trustworthy brands, but this could be the result of brand building rather than regulations (Bessant, 2014; Muthiora, 2015).

It can be seen that Safaricom aimed to anticipate to coming regulations. It had enjoyed and made use of the freedom that was given during the earlier development of MPesa. It proved helpful to keep a good relationship with regulators and show good will to engage in regulations. It allowed Safaricom to remain involved in the development of the NPSA. Further it strengthened the good reputation of Safaricom, but it might have also been that Safaricom's reputation was what facilitated its regulation with the CBK in the first place.

Appendix H: Overview of Mobile Money in Developing Countries

In this section an overview is given on the status of mobile money in various developing countries according to the criteria set in paragraph 5.6.

Tanzania has been the second country to reach over 40% of active users of mobile money (GSMA, 2017). This is a measurement by the GSMA to describe the success of mobile money in a country. The largest players are MPesa and Airtel Money, with a 54% and 13% market share respectively (CGAP, 2015). Even though Tanzania is closely following Kenya in terms of money transactions, USD17.7 to USD21.9, and has even surpassed to total amount of users, 38 million to 28 million, it is lagging behind in active users, with 8.9 to 14.2 million. However, the power of Tanzania seems to lie in its competitive base, with 3 largest players. Also more than half the agents serve multiple providers, which is very rare to

happen in Kenya. Added to that Tanzania is one of the first countries with an interoperable system, which means that providers can use each other's networks (GSMA, 2016b). Tanzania has a larger market and a more competitive one than Kenya, but as it is following Kenya in regulations and has its market operated by Kenyan companies its lead market potential might be limited. It also seems Tanzania is a follower in terms of usage as the mobile money market mainly serves remittances and only few payments (Economides & Jeziorski, 2016; Intermedia, 2013)

EcoCash **Zimbabwe**, is another success story. Merely 18 months after its introduction it was used by 31% of Zimbabwe's adult population (Levin, 2013). EcoCash started as a simple product so that it could send a clear message to its intended customers. The company seeks to move the mobile money industry forward by incorporating mobile money in customers' daily routine, creating interoperability with the banking sector and integrate electronic payment in retail. The success of EcoCash opened up the market and in 2017 45% of adults in Zimbabwe were registered with mobile money platforms (Gwanyanya, 2017). Zimbabwe shows a high mobile money penetration as well as a supporting regulatory environment. The initial desire for interoperability with the banking sector has resulted in innovative banking solution as a result of cooperation. These innovations include a move towards digitalisation of payment systems.

Uganda like Tanzania is a neighbouring country of Kenya. Mobile money has spread here in 2009 (Evans & Pirchio, 2015). It is one of the countries with an over 40% adult user base (GSMA, 2017). In 2015 there were 21.1 million registered customers (Ssettimba, 2016). An issue mentioned in the Ugandan context was illiteracy as this resulted in the first users of mobile money in Uganda being higher educated and richer than the national average (Ndiwalana et al., 2010). Opposing the goal of financial inclusion of the countries' poorest. Also in Uganda there is a high demand due to a wish to support family members. The regulatory environment has been supportive and through increase easy and efficiency of tax collection it has a clear incentive to support mobile money (Ssettimba, 2016).

Bangladesh is one of the most populous countries worldwide with a population of 160 million (Mitha, 2013). A banking penetration of only 14% in combination with a 60% penetration of mobile phones seems to have spurred a high success of mobile money. The need is said to arise from an agro based economy which lacks financial services, a large amount of domestic and international remittances and a high need for easy-access micro-finances services. bKash arose from a joint venture between America financial inclusion investment company, Money in motion LLC and BRAC Bank (International Finance Corporation, 2016). The platform is used by 23 million people, which is 75% of the mobile money market in the country.

Pakistan EasyPaisa, was the result of a cooperation between mobile network operator Telenor and Tameer Microfinance Bank (Sibghatullah, 2016). It is the leading mobile money system in Pakistan with 7.4 million users (Runde, 2015). Although this is an impressive amount of users, interest in case studies seems to have worn off after 2013. There were expectations that Pakistan and also Bangladesh would be leading the mobile money market in 2013, but Kenya did not gave away it's number one position in the percentage of users (Jones, 2014). Furthermore, this market is not mentioned as having reached over 40% of adults with mobile money. So although EasyPaisa is a successful

company in terms of its user base it does not seem likely that Pakistan will become a lead market in mobile money.

Tigo Money in **Paraguay**, appears to be Latin Americas most successful market as it is to only market outside of Africa to have reached the GSMA threshold of 40% of adults being frequent users of mobile money (GSMA, 2017). The country shows a high penetration of mobile phones, a low amount of banking branches and a large amount of financially excluded (Tellez & McCarthy, 2012). Like in Kenya Paraguay has a positive regulatory environment. “Regulators saw mobile financial services as a key pillar in their long term strategy for financial inclusion” (Tellez & McCarthy, 2012, p. 4). Tigo Money, the leading mobile money provider in Paraguay, showed an open approach to the product and adapted it several times to fit customer needs. The company was further careful in selecting agents and incentivising them to keep the quality of their services high. On the customer side it spent much time and effort to create awareness and understanding. Tigo lastly partner with a bank with a large network and high willingness to cooperate in setting up a micro-financing service next to their platform. Tellez and McCarthy state that regulation is a critical issue in Latin America for the further development of mobile money.

The **Philippines** is home to SMART, the first successful mobile money service that existed already years before MPesa (Runde, 2015). In the year of MPesa’s launch there were already 5.5 million Filipinos registered to the platform. However, there are few active mobile money users in the Philippines and is not among the countries that passed the threshold of >40% of the population being active users of mobile money (Buenaventura, 2014; GSMA, 2017). This seems odd given its head-start. Further the country followed a telecom led approach and has demand conditions similar to that of Kenya and a 3 times larger population (Hasnain et al., 2016).

Nigeria is 3th in the amount of mobile money technology hubs (GSMA, 2017). It is further home to 19 mobile money companies, which is the highest amount in one country (GSMA, 2016b). Nigeria is also considered one of Africa’s technological hubs (GSMA, 2016a). However, despite also being the largest economy in West-Africa and having a large amount of unbanked as well as a high mobile phone penetration, Nigeria’s mobile money sector is far behind that of Kenya (Llewellyn-Jones, 2016). That has mainly been prescribed to the bank-led approach followed by the Nigerian Central Bank.

Appendix I: Anticipation of Lead Markets

Apart from criticising lead market literature on its focus on developed countries, Tiwari and Herstatt further considered the current theory to focus too much on ex-post analysis (2014). They suggest a model to anticipate the emergence of lead markets, shown in Figure 13. The figure shows four phases. In this paragraph I will summarise the model (Tiwari & Herstatt, 2014, pp. 192–196).

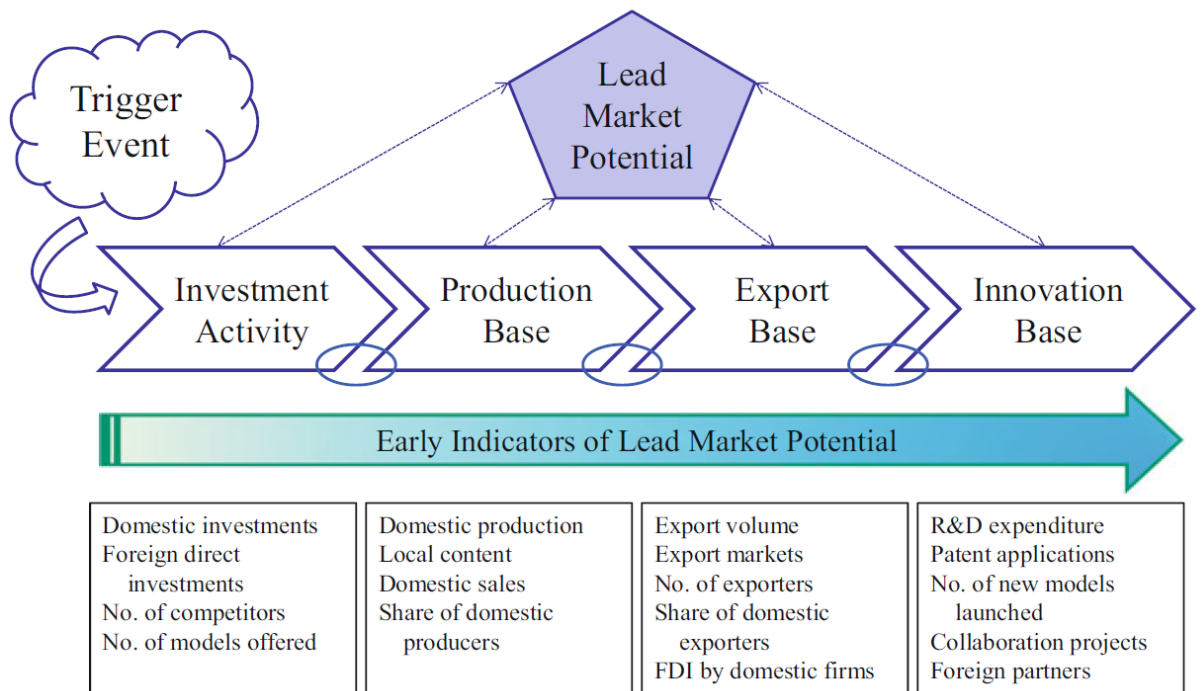


Figure 13: Generalized process of emergence of lead markets (Tiwari & Herstatt, 2014, p. 193)

The emergence of a lead market starts at first with a trigger event, which is an abrupt external shock. (i) This event initiates the first phase of the model, investment activity. These investments can be both domestic and external and increases both the number of competitors as well as the number of models offered. (ii) Hereafter the second phase starts, the emergence or strengthening of a sustainable production base. Domestic production goes up in this phase and becomes able to meet local demand, with local content or locally produced goods. This results in an increase in domestic sales and the overall share of domestic producers. These producers might be foreign-owned firms based in the lead market, because they also contribute to strengthening the local production base. (iii) As a result of a successful and competitive production base export opportunities will emerge, which will likely result in an increase of export volume and an increase in the amount of export markets and number of exporters. For this to hold true the exports should not be effectively restricted to one or two firms, but should be linked to the home base for the nation to hold a competitive advantage instead of only these firms. Still, the presence of some strong domestic players is desirable as they are likely to create and augment R&D capabilities. The share of domestic exporters is therefore important in determining whether the strong export base is truly linked to the nation. Another likely observation that can be made is the increase of foreign direct investment (FDI) by domestic firms. (iv) The last phase of the model is that of the emergence of an attractive innovation base. Here an increase in R&D expenditure as well as patent application is likely to be observed. More important is the number of innovations that are launched as this is perceived as a more reliable indicator. The high amount of globalization currently makes it important to further consider collaboration projects and foreign partners.

A notion to be made here is that the model is aimed at products. However, the focus of this thesis will lie on systems. This means that some adaptations need to be made to make the

model fit the needs of this research. Instead of looking at production it would be better to focus on the amount of users of the service and the amount of usage. For a system like MPesa this could be the number of transactions and the amount of money transferred using the service. The same holds for exports, which for a service cannot be measured in volume. Here again the amount of users and the amount of usage are good indicators.

Appendix J: MPesa: Success Factors

It has been made clear at this point that MPesa had a significant contribution to the Kenyan economy and the lives of many of the country's residents, notably the poor. However, the question remains as to what caused this success. Chapter 5 shows some important factors. To create an overview below factors have been summarised as they were stated in case studies on MPesa.

According to Bessant, professor of Innovation and Entrepreneurship at the university of Exeter, MPesa's success was thanks to the following (2014).

- Agents providing word of mouth resulted in reaching network effects early
- A high penetration of mobile phones in the country with 83 % of the population over 15 owning a mobile phone in 2008.
- Supportive regulatory environment
- Brand building over a long period
- Incentives for retailers to incorporate MPesa into their business
- Low pricing compared to competition, like banks
- Visibility, for example signs at retailers
- Retailer recruitment and training

Mas and Ng'weno, summarised the success of MPesa into 3 factors (2012)

- Branding
- Channel Management
- Pricing

GSMA, an organisation that represents the interests of mobile operators stated in a blog post on competition on mobile money in Kenya, the following factors of success for MPesa (Omwansa, 2012).

- Trust in the system
- Social influence
- Perceived trust
- Performance expectancy

According to Stepcic and Salah the following factor contributed to MPesa's success (2016)

- Inconvenience of the banking system, which lacked interconnection, speed and ease of use. The latter because payment systems of banks usually involved queues.
- Internet access is, although widely available, slow and unreliable

They further distinguished between three categories for success factors: technological, organisational and environmental factors.

Technological factors

- Costs are perceived as fair
- Security
- Convenience of payment

Organisational factors

- Affiliation towards MPesa as it is the most known form of payment
- Lack of knowledge of other forms of payment for both consumers and retailers
- Compatibility with existing business

Environmental factors

- Consumer affiliation
- Acceptance of MPesa by government institutions as a form of payment
- Network reliability
- Common usage by small and mid-sized enterprises

Carey took a broad approach on finding success factors and came up with the following (2016).

- Send money home campaign
- Political atmosphere

Another way to look at the is by taking three perspectives (Mas & Radcliffe, 2010):

- Country factors
 - Strong latent demand for remittances
 - Poor quality of alternatives
 - Supportive banking regulator
 - Dominant mobile operator and low airtime commissions
 - A reasonable base of banking infrastructure
- MPesa service design
 - A simple message targeting a big pain point
 - A simple user interface
 - Removing adoption barriers: free to register, free to deposit, no minimum balances
 - Being able to send money to anyone
 - Building trust in the retail network
 - Simple and transparent pricing
 - Liquidity of last resort at bank branches and ATMs
- Getting to critical mass quickly
 - Aggressive up-front investment in promoting the MPesa brand
 - A scalable distribution channel
 - Developing multiple store liquidity management methods

Appendix K: Interviews

This appendix is to present the data gathered from the interviews. Firstly an explanation is given on how the interviews were approached as well as an overview on their field of expertise. Hereafter the interview protocols are presented. Hereafter each elaborated interview is shown. The interviews with ResLM1 and ResLM2 focussed on lead market theory. In the other interviews mobile money was discussed within the context of lead markets.

K.1 Approach and Overview of Interviewees

Table 33 provides an overview of the interviewees. 38 requests had been sent out. Experts have been found. The researcher has asked within his own network if people could help him to find contacts that are knowledgeable in mobile money. This resulted in several starting points and an introduction to Lukas FMM4 and Piyush Singh. Also a general request was sent out through Facebook and LinkedIn. This unfortunately did not give any results.

Experts on Lead market theory were found through the literature used for the framework. The writers of these works were approached for an interview. Of the 7 people approached through email, 2 were willing to be interviewed.

Emails have also been sent to several companies and institutions. The first firm was Safaricom as the company owns MPesa. Secondly a request was sent to the Central Bank of Kenya, which regulates mobile money. GSMA an institution that researches telecom and mobile money worldwide was approached thirdly. Fourthly ZEW, a German research company that is home to many papers on lead market theory has been sent an interview request as well. Lastly a request has been sent to iHub, a Kenyan company that connects local and global technological companies. Unfortunately none of these requests to companies resulted in an interview.

The most successful approach of interviewees was directly contacting them through LinkedIn. Experts had been found by searching through company employees for people whose work was related to mobile money. These people were sent a contact request. One of the respondents requested to remain anonymous and is referred to as RegE2, which is the name of the research institution the respondent works at.

Lead Market Expert (ResLM), Field Expert Mobile Money (FieldMM), Researcher Mobile Money (ResMM), Regulatory Expert (RegE)

Table 33: Interviewee overview

Name	Country of origin	Background
Lead market experts		
ResLM1	Germany	Did lead market analysis on several sectors commissioned by the EU and the German government. Worked with Marian Beise on the theory of lead markets.
ResLM2	Germany	Did research on the lead market theory framework and wrote several papers on the topic mainly focussed on environmental innovations.
Mobile money experts		
FMM1	England	Lived in Kenya during the launch of MPesa and was involved in starting up Musoni. Started a software company with Musoni that integrated software in mobile money systems EcoCash (Zimbabwe), Airtel MTM (Uganda), Tigo (Ghana) and MPesa (Kenya).
FMM2	England	Wrote the newsletter on Mobile Money for the Financial Times Virtual Finance Report. Co-founder of Musoni.
FMM3	South-Africa,	Founding CEO of Safaricom. CEO at the

	Kenya	introduction of MPesa.
FMM4	Netherlands	Co-founder of Musoni, the first micro-financing company in Kenya fully operating through MPesa.
FMM5 Singh, Piyush	India	Fintech and Payment expert with working experience in financial services such as mobile money India and Kenya.
RegE1	Kenya	Works at CBK as an ICT specialist. Before he worked at Safaricom as a customer relations manager and billing engineer. Has 10 years of experience in mobile money
RegE2	USA, Kenya	Worked for BRAC, a mobile money software company, following global mobile money trends. Currently researcher at ODI. Has experience from the side of the regulator regarding mobile money.
ResMM1	Kenya	Has done field work on mobile money in Kenya in 2014 and 2015 using an institutional approach. Further has a background in researching frugal innovation.
ResMM2	Kenya	Currently a researcher on mobile money at GSMA. Worked 7 years in the mobile money sector. Was involved in the strategy and product development department in MPesa.

K.2 Interview Protocols

In this section the questions that were asked during the interviews are presented.

The first set is focussed on the theoretical part of lead markets and whether the success of MPesa shows that developing nations have the potential to become lead markets. The goal was to gain a deeper insight in the theoretical value of lead markets. The gathered information was used to write section 6.1.

The second set of questions template is aimed at experts on mobile money. The gathered information was used to construct the framework presented in chapter 6.

Introduction

Good morning and thank your time for this interview. How are you? I have sent you a document up front regarding my research. As you might have read my research is on the lead market potential of developing countries. A lead market is the country that is seen as the main innovation hub of a certain technology. Within this theoretical field I focus on mobile money. Are there any questions from your side regarding this information?

Questions regarding Lead Market Theory

Q 1 What is your experience with Lead Market theory?

Q 2 Would you consider it possible for a developing nation to become a lead market? Why or why not?

Q 3 What factors would you consider important for a developing country to become a lead market in the mobile payment sector?

- Q 4 What factors would you consider inhibiting the lead market potential of a country?
- Q 5 What would you consider the most important factor?
- Q 6 what would you consider the added value of the lead market theory for policy analysis
- Q 7 What are the advantages of the Lead Market theory compared to other innovation theories?
- Q 8 What are the disadvantages of the Lead Market theory compared to other innovation theories?

Questions regarding Mobile Money

- Q 1 What is your experience with mobile money systems?
- Q 2 Which country would you currently consider to be leading in providing mobile money solutions and why?
- Q 3 What other factors do you consider important for success of a mobile money system?
- Q 4 What factors do you think would inhibit a mobile money system to become successful?
- Q 5 What would you consider the most important factors?
- Q 6 The lead market theory uses 5 advantage groups, demand, cost, export, market structure and technology advantages. I will explain these to you one by one to see whether there are more factors that come to mind within these advantage groups. With this in mind is there anything you would like to add to your previous answers?
- Q 6.1 Demand advantages, create a relatively large domestic demand
- Q 6.2 Cost advantages, allow offering the innovation relatively cheap
- Q 6.3 Export advantages, result in a desire in foreign nations to adopt the innovation and facilitate spreading the innovation abroad
- Q 6.4 Market structure advantages, arise from how involved actors in the market interact
- Q 6.5 Technological advantages, are those that increase the country's technological capabilities in the sector
- Q 7 Which (other) mobile payment systems do you expect to be the most important in the near future?

Closing the interview

Thank you for your time. It was an interesting and insightful conversation.

K.3 Interview Lead Market Theory – ResLM1 28-09-2017

1 *What is your experience with Lead Market theory?*

I am working at ZEW now for 17 years. [ZEW is a German research institute] Marian Beise (now Rian Beise-Zee) established the key literature on the lead market theory. I worked with him on the theory and did some analyses. I did analyses on literature and in several sectors such as textiles. I focussed on industrialised countries and mainly the automotive sector. For example, I worked together with Daimler on trucks to find the best market to introduce new products or where there was most to be learned from customers. The Netherlands came out as the lead market of this sector.

The intention was to look for developing countries, but the infrastructure was too bad and so a country aimed at logistics like the Netherlands was better in terms of demand and quality.

2 *Would you consider it possible for a developing nation to become a lead market? Why or why not?*

Yes this could be possible.

The basic hypothesis is that the theory can anticipate a new user need. The Lead Market is the best at foreseeing a new development.

It would mean that the conditions that apply in a developing country will become relevant in other places later. However, these conditions are only relevant in specific situations and normally a developed country is therefore leading and developed countries try to catch up.

3 *What factors would you consider important for a country to become a lead market in the mobile money sector?*

This depends on the market and its key drivers.

You need to understand its development towards the future. The question is what is key for mobile money: maybe security, speed, price, ease of use or network type for example.

The market seems to be currently driven by the most simple technology. This makes it understandable that a developing market could lead. The rough conditions there could help and developing countries also simplify more. The question remains how this changes in the future. If more sophistication becomes more important than developed countries would be better suited as lead markets.

Frequently developing countries lose to better markets so the lead market position is mostly not in the country of innovation. An example is Hong Kong where mobile phone were invented, this technology did however lift off in Scandinavia. Or the energy-drink market. This was developed in South Asia, but became popular in Europe because the market was better fit for it.

An important element of Lead Markets is that of competing designs. In mobile payment the cards that are commonly used in Scandinavia and the Netherlands are also mobile payments. It is about an innovation to get rid of the use of cash, so there will be different designs of the same innovation. The design that is best prepared for the future will eventually prevail.

The basic advantage of a developing country is:

- Simple technology is required, due to for example failing electricity and lack of centralised systems it has to be fail proof.
- They can focus on cheap innovations

If this drives the market a developing country can become a lead market. Still, a forecast on what characteristics drive the market is needed. Maybe in mobile money low cost and simplicity are important, but in developed countries it is likely security is more valued. In Kenya security is perceived as good enough. If this would be accepted in Europe than Kenya becomes a lead market of which the technology is adopted and adapted to fit specific needs elsewhere.

4 *What factors would you consider inhibiting the lead market potential of a country?*

A global innovation hinder is generally a low income level. Innovations are usually made to be sold at a high price. In developing countries it is about social innovation. In that case willingness to pay is less important.

All case studies that I have seen where based on having extra money left. The basic needs were already satisfied. So only if extra money was available innovation was possible.

5 *What would you consider the most important factor?*

This again depends on the market. Often cutting unit cost is important. This is usually achieved through up-scaling as it results in economies of scale.

The path of global diffusion usually follows two steps:

- Fitting the innovation to user requirements
- Making it cheap

Sometimes this does not apply, like in the car sector. Germany leads this sector by innovation new components all the time, but costs are perceived as relevant because of the value they add.

In developing countries being cheap is important.

6 *What would you consider the added value of the lead market theory for policy analysis?*

The lead market theory in the policy making community is often misunderstood. It is about marketing and not developing technology. Policy makers are more interested in becoming a leader through development. However in the lead market theory the technology is already there and the question is where it should be developed to diffuse globally.

Policy makers do not want to support a shift of technology. Like in my earlier example in the textile market in Germany we found the USA, Japan or China would be more suited and we advised the German government to send their companies there.

A government should generally define a policy that leverages the lead market potential. If there is no success it is likely that too much change is required. Policy makers should not define a wish for a certain technology, but be open to any technology options. The European Commission did not take this serious and prefers the old system of pre-defining a technology and developing this rather than being flexible.

Why isn't the EU interested, with so much distinctive markets one of them could be chosen as a lead market when a technology is developed?

That is because there is no prioritisation of individual markets. The idea is that the EU should be treated as one market, but this is impractical.

This could for instance be seen in the design of an airport security system that had to work everywhere, but the systems where it had to be implemented are too different. Too much compromise had to be made so the outcome fits nowhere.

7 *What are the advantages of the Lead Market theory, compared to other innovation theories?*

It is the best theory to understand demand and demand change. Others are usually supply oriented and only focus on technology. The lead market theory focuses more on marketing than technology.

8 *What are the disadvantages of the Lead Market theory?*

That it is geographically bound to regional markets. Some products should be segregated among customer groups. The lead market theory assumes the region delineates the market. In global markets like for example the aircraft industry it is not so useful.

Could a digital currency like BitCoin be seen as such a global market?

This is difficult to see as I am not an expert.

K.4 Interview Lead Market Theory –ResLM2 20-09-2017

1 *What is your experience with lead market theory?*

I did some research using the Lead Market Theory framework. The concept started with Porter and was developed further by Beise.

In your paper you also used the regulatory advantage group, did you add this?

No, the regulatory advantage group was added by Rennings and Beise.

In what sectors did you apply the lead market theory?

Only in the ecological environment.

2 *Would you consider it possible for a developing nation to become a lead market? Why or why not?*

First of all yes, but it would be challenging. Kenya is for example a lead market in [mobile payment] technology. Isn't this included in lead markets?

This [the lead market potential of developing countries] arose from critique of Tiwari and Herstatt on the traditional framework of Beise. His thoughts indirectly excluded developing countries.

Yes, through frugal innovation it could be possible

Why do you think Beise did not take developing countries into account?

The world has changed since Beise published his work, earlier it wasn't possible, India for example has changed a lot. Its R&D capacity has increased. There is more sophistication in RD but it remains a poor country. It has the capacities of a lead market, but it also has features of a developing country.

Capacity for innovation and tech development should be high.

In general in developing countries the demand may be there (which is one of the defining concepts of LM), but capacities might be limited.

So who meets the demand is the main question, maybe multinationals can meet the demand and make the country a lead market. This does mean that there should be interest

from multinationals. It further depends on the classification of a developing country. For example Israel is a lead market for water technology, but in some ways a developing country.

3 *What factors would you consider important for a developing country to become a lead market of a system (for example mobile payment system)?*

R: let me know what advantage groups you use and I will tell my thoughts on them.

K: *I use the framework of Tiwari and Herstatt. It is similar to Beise, but combines export and transfer advantages. It further adds a technology advantage*

R: It makes sense to put export and transfer together.

Demand: advantages that create domestic demand

Without demand there is no lead market, most important. A developing country has its own specific demands. Purchasing power is the main issue but frugal innovation might help to overcome this.

Cost: advantages to due cost reduction possibilities

Cost advantage could be helpful.

Export: advantages regarding spreading the innovation abroad

Export is very strongly linked to how a developing country is classified [on income level]. For example China is a big exporter. This could be a big advantage, but for a country like Chad it would not be valuable. Matching demand in other countries is important too. There is a large group of developing countries it does not apply to.

Market structure: advantages due to how the market is structured and how involved actors interact.

Competition is not limited to industrialised countries, but in developed countries it is not always present. Competitiveness is more present in industrialised countries. India is an exception as there are some competitive sectors.

Tiwari and Herstatt also add factors like the industrial base, regulations and strong domestic players.

They seem to have added the supply side, which seems understandable. Still, less developed countries are disadvantageous in their market structure.

Technological: advantages regarding the countries technological capabilities in the sector

Technology: less developed countries have no technological advantages they need foreign direct investment for that. Maybe India, China, Brazil, Taiwan and other emerging economies have it. India is a special case as it is so big and an emerging economy. But there it depends also on the states because they are very diverse: some are rich and some are poor.

(after asking question 4 some loose factors were mentioned)

Size of the market and scaling is very important. A country with a big home market would have a large advantage. For example chad has no scale and cost advantage.

Further the demand is important: Somalia could by that logic become a lead market in security services.

4 *What factors would you consider inhibiting the lead market potential of a developing country for a system (for example mobile payment system)?*

No industrial base, no strong R&D, no specialisation of technologies.

Despite demand advantage they might lack the capacity.

Offers that would be only interesting to a local but not outside of that context.

5 *Which of these would you consider the most important factors?*

Demand and cost advantages.

6 *What would you consider the added value of the lead market theory for policy analysis?*

Brings to focus the importance of demand and not just supply in developing innovation on a global scale. This was the early advantage.

7 *What are the advantages of the Lead Market theory compared to other innovation theories?*

It shows the relationship between national and global dynamics.

8 *What are the disadvantages of the Lead Market theory compared to other innovation theories?*

It was blind sighted with respect to the supply side. Tiwari and Herstatt seemed to have added this back into the lead market theory.

K.5 Interview Mobile Money – FMM1 28-09-2017

1 *What is your experience with mobile money systems?*

It started for me through Lukas Wellen who joined in founding of Musoni in 2008. In 2013 I started a software company with the software team of Musoni. At some point we processed 10-15 000 transaction per day. We also integrated software for Ecocash in Zimbabwe, Airtel MTM in Uganda, Tigo in Ghana and MPesa. What I saw is that all systems tried to copy MPesa and learn from it

Further I lived in Kenya at the launch of MPesa. So I gained experience as a customer and in micro-financing. I also trained people in MPesa.

2 *Which country would you currently consider to be leading in providing mobile payment solutions and why?*

Still Kenya. 2nd for me is Uganda with MTM-money, MPala (the Ugandan version of Mshwari). Tanzania is ticking along also, but in Tanzania there is no dominant operator. The market there is roughly divided 4. Having 4 mobile money accounts makes it more complex than Kenya.

Kenya also has a larger volume, more transactions and agents, and MPesa works anywhere. In Ghana mobile money is sometimes accepted, but sometimes not in stores. It is not present at the same level as in Kenya.

Further lots of innovations are built on MPesa, maybe 100s. This is not seen in other countries. All of them still look at Kenya. In West-Africa people think they can't reach Kenyas level.

Tanzania and Zimbabwe have similar cultures to Kenya so broadly seen the same technology can work there. There is also little rivalry between these countries. West-Africa wants its own technological path. You can see a lot of patriotism in West-Africa. They would want to adopt domestic tech.

3 *What other factors do you consider important for success of a mobile payment system?*

The operator should fully buy in. It is a long expensive journey

The agent network is also important. The underlying technology is secondary.

Commitment over a multi-year period. At the start this was not always realised and a lot of attempts at mobile money failed, because of that.

Environment should be enabling: this can be achieved through a large mobile phone ownership base, literacy and trust in operator.

Also Safaricom has 85% of the telecom market, a dominant position in the market allows it to convince people to use their system.

In Zimbabwe, half of the MPesa team was recruited and Zimbabwean people were open and understanding towards mobile money. In Uganda and Tanzania it took more time. They were also early. There are lots of people in towns in Zimbabwe. Everything is structured around 2 big cities, causing a need for remittance.

4 What factors do you think would inhibit a mobile payment system to become successful?

Too many and a too strong position of alternatives. In South Africa mobile money failed many times. There was no need for it. The banking system is good there: using cards works and sending money through bank works. There is a high banked population and high amounts of ATMs.

Inhibiting regulatory systems. All in East and south-Africa was mobile [/telecom] led instead of by banks. In West-Africa and India it was bank driving. Partnership doesn't work. Banks are not good at processing small amounts and high volumes of transactions. Ghana changed to sort of mobile led over time. Ghana is still slow but grows. The most successful operator here, Paga, is a digital systems instead of an USSD system. Nigeria is a chaos with 40 services that are all independent and bank driven. There are lots of small businesses that show quick collapsing in Nigeria.

What would you think would be the right amount of operators for competition?

1 or 2 would be good, but 40 is too much. They need interoperable, but this brings high costs.

5 What would you consider the most important factors?

Lots of things came together at the right time in Kenya. The need for sending money, super advertising and the alternative was bad. Safaricom was willing to put money in the system.

The number one factor was probably that almost 90% of the market was owned by Safaricom and that the company was highly trusted.

6 The lead market theory uses 5 advantage groups, demand, cost, export, market structure and technology advantages. With this in mind is there anything you would like to add to your previous answers?

Demand

Workers living in urban areas and their families in rural.

Bad alternatives

But these are not really Kenya specific

Cost

Dominant market position of Safaricom. Because of this the company had no competition to worry about.

Regulatory framework, do first ask question later

Export

Safaricom being part of Vodafone. Vodafone owned market share in other countries too, where learning happened.

East-Africa regulatory frameworks are similar between Kenya, Uganda and Tanzania, if something is permitted in Kenya it is highly likely to be permitted in the others as well.

Up until 2011 export didn't work. Lack of commitment, thinking too easy, no budget, no demand in target countries. Too much copying instead of developing variations. They seem similar but are different

Market structure

A dominant and trusted player owning 90% of the telecom market and 98% of the mobile money market, they had the budget and reach to spread mobile money nationwide. They sponsor all major events in Kenya.

Technological

Kenya is seen as innovative, but this is mainly due to MPesa. Prior to MPesa it was seen as rapidly developing and better economy than others. Silicon Savannah for example is happening, because of MPesa

7 Which (other) mobile payment systems do you expect to be the most important in the near future?

My focus is very Africa dependent, but I think what is happening in China will have the most impact in the near future.

What is going to happen to systems like USSD?

SDK (Software Development Kit) was used in Kenya and in Tanzania it was USSD (Unstructured Supplementary Service Data). Ecocash in Zimbabwe is also built on SDK. These are software protocols. A combination of both works better. The future is presumably going to be apps. This opens up more options.

SDK is great as it opens up mobile money by serving as a basic building block, but it blocks access for further development.

K.6 Interview mobile money – FMM2 25-09-2017

1 What is your experience with mobile money systems?

My journey started in 1994 with Kevin Elliot when talking about a Fintech company. I joined a financial cryptography association session in 1996. Hereafter, I wrote the Newsletter on Mobile Money for the Financial Times Virtual Finance Report until 2004.

During the years I saw a lot of failures with companies trying mobile money. I first got in touch with MPesa through a subsidiary that designed Mpesa's security and investing in a Tanzania startup

Micro financing was still very inefficient so it was a no-brainer to use it with MPesa. I was part of a company providing tech support to MFIs using MPesa, but it was hard to change external Organisations. After 1 year Lukas Wellen came in, but it did not help

Hereafter Musoni was designed to be fully cashless. From our experience we saw that in MFI showing up on time is an issue, also you have to count all cash you get back. People further need to deposit the money at a bank and show a receipt as proof. This is all very time consuming and you spend a lot of time waiting for a bank receipt. MPesa speeds this up. Also you don't need all the security measures a cash-based system requires, which saves a lot of costs.

2 Which country would you currently consider to be leading in providing mobile money solutions and why?

Kenya, it has been hard to replicate success and penetration rate of mobile money.

The idea of MPesa came from Vodafone. Who secured the DFID grant and took it to Safaricom

This was after a decade of other mobile money schemes had failed.

So the lead market got taken to Kenya by England. Nobody there saw it coming as it was not seen as a threat by the CBK and banks. They just provided a no-objection letter. The following pilot of mobile micro-financing with Faulu was a failure, but other usage appeared. It was through a woman who had to send money to her husband whose cash got stolen that this alternative usage became apparent.

3 What other factors do you consider important for success of a mobile payment system?

The most important for MPesa was Pauline Vaughan, her attention to detail was very helpful to the success of MPesa. She was aware of customers. She helped building the network. Culture etc. was not the point, it was the people involved who made it successful.

Marketing program also, it was aimed at the people without money (to the rural). It promoted phone use also as there was a need. But sending money was first very much of a hassle and was done by bus. However, post-election violence in Kenya closed bus routes so money could not be send. MPesa provided a much needed alternative.

When it became more successful Banks started to see it as threat, CBK had resisted interfering so far. In other countries banks could resist upfront as they could see it as a threat already and they are generally not willing to cooperate.

Are there any other more general factors you might consider relevant that made mobile money successful in Kenya and not anywhere else?

The 85% market share helped Safaricom. There was further a network effect as Safaricom had already established a large network of shops. Also the coverage country wide is better than for instance the US.

Tanzania is also an important market of MPesa and earlier with introducing interoperability; but mobile money took off a bit slower there.

Other important factors were a

High willingness to try by customers

Trust, lot of testing, it was use as a safe deposit. People would store money and go pick it up somewhere else 2 hours later.

Good customer support helped also to gain more trust. Safaricom could always be contacted and people there actually picked up the phone.

This remains of high importance as bank runs still happen if an upgrade takes too long or if there is a crash, public announcements

4 What factors do you think would inhibit a mobile payment system to become successful?

In Uganda lack of coverage is an issues.

Countries should keep mobile money away from banks as people don't want bank accounts. This resembles in M-Shwari success.

5 What would you consider the most important factors?

The people.

6 The lead market theory uses 5 advantage groups, demand, cost, export, market structure and technology advantages. With this in mind is there anything you would like to add to your previous answers?

Demand:

Pauline Vaughan, and Safaricom's key infrastructure. Michael Joseph made this so successful. Safaricom happened because of Michael Joseph. Everything there is named after him, wings and halls. There is a reliable connection everywhere now.

Cost:

Pricing structure MPesa, was way too high. It is expensive, but cheaper than cash remittance. It discouraged small payment. This is an issue. There is no reason to charge 20% of fees. This discourages small savings as well. It got better in Kenya due to more competition, but other countries are no better also.

Export:

Safaricom is still connected to Vodafone. So it is not Kenyan technology Vodafone exported more advanced versions of MPesa abroad. MPesa Kenya barely changed.

Will this be an issue soon? No, there will be an upgrade to integrate smartphones. But it is going very slow.

To be more frank there is a lot of frustration at Vodafone that Safaricom doesn't upgrade. Successor of Michael Joseph is less capable.

Market structure:

No, there are not advantages because of Kenya's market, it goes back to the people who proposed the idea, mobile and money guys who were passionate and never gave up. They got rejected by Vodafone, but at some point DFID came in so they could pull it off.

Technological:

Once mobile money is present there is a basis for innovation, this helps Kenya's reputation. All relies on mobile money. The innovations are just simple making use of a simple system that is already in place.

Is this dangerous, that it all relies on one system? Yes, there is a systemic risk, one has to trust it is 100% safe. It is still just based on a no objection letter from the bank. Risk is assessed through audits.

M-Shwari, unlike MPesa, has no limit on savings. If it collapses it would be catastrophic

7 Which (other) mobile payment systems do you expect to be the most important in the near future?

I am involved in Bitpesa at the moment, this connects Bitcoin to mobile money. The only thing that is managed is the float. It exploded since its conception. Africa's payment corridors are very inefficient and slow. Through Bitcoin instant payment are possible. You can see it's usage true Coin.dance, which shows country by country transactions using Bitcoin. In Kenya this is exploding. All over Africa bitcoin are being used. Safaricom even tried to close Bitpesa. They don't see it as opportunity, but as threat. So digital transaction with no fees might beat MPesa eventually. The transition to digital money is a global phenomenon.

But isn't there a leading country that develops it like for example the USA?

In the USA, people just talk, but no one uses new systems. Here even checkbooks are still commonly used. The need for a new system is not felt and those in existence are made too complex. Apple pay requires its users to take a new credit card, provide their fingerprint and use signature when paying. Especially the last is completely unnecessary. While Europe

uses chip and PIN on bankcards the USA still uses the magnetic stripe. Silicon Valley still even has parking meters in which you have to throw coins.

How is this connected to mobile money?

There are account and non-account in mobile money. MPesa falls in the first category, the money itself is not on the phone, but at Safaricom. Bitcoin is actually on the phone, that makes the transactions direct as there is no 3rd party. Non-account transactions can't be reversed and governments can't close it. For example account based cards in the USA can't be used to donate to Wikileaks.

Is there not a specific region where this will originate from?

It is a global community. Lots of innovation happens in Silicon Valley, as there is interest in digital money by the researchers.

I like to see it as how the telegraph evolved to the phone in a 100 years. We are going [from cash] to a world of competing private currencies. Speculations are there might be 1 private currency or a government run digital currency. I personally think there will be multiple competing currencies.

In Africa there is a real need as there are a lot of people without bank accounts. Where banks are present there is an alternative. People don't see the point of it in countries with a functioning banking system.

But this seems to mean there should be a market that will be the starting point of [mobile] digital currency?

Digital coins are a global phenomenon. But fastest growth is in countries where the current systems are insufficient or trust in the national currency is low like in Venezuela, Argentina and Nigeria, basically anywhere where banking does not work.

K.7 Interview mobile money – FMM3 6-11-2017

1 *What is your experience with mobile money systems?*

I was the founding CEO of Safaricom and MPesa in 2007. I further was involved in expanding MPesa to other countries such as Tanzania, Mozambique, Lesoto, Ghana and India.

2 *Which country would you currently consider to be leading in providing mobile payment solutions and why?*

Are we talking about mobile money or mobile banking?

When talking about mobile money it would be Kenya. This is because of the amount of subscribers and the transaction amount. I think at this moment MPesa has 25 million subscribers.

Mobile banking is where people use their mobile phones for their banking services

Mobile money works on a mobile phone without having a bank account this is mainly aimed at the BOP

3 *What other factors do you consider important for success of a mobile money system?*

Scalability

Leadership: you have to believe in the product and its value for changing lives

Distribution: it has to be everywhere

Trusted brand: including a back office that is always available to answer questions

IT system mobile money platform integrity: it has to work, always

4 *What factors do you think would inhibit a mobile payment system to become successful?*

The lack of the ones I mentioned before, but mainly leadership. After 6 months without success normally a product is dumped. In mobile money it can easily take 3 years until it becomes widespread and investments can be recouped. So patience is important. Also the fee structure low, but investment is high so few money is made out of it.

5 *What would you consider the most important factors?*

Leadership

Why was mobile money specifically tried in Kenya by Vodafone?

I believe it was due to my innovation ethos. The guys of Vodafone also went by other people with their plan and I immediately said yes when I was asked if I wanted to join. It is important to hold a belief in launching life changing product

Did MPesa live up to its promise of serving the bottom of the pyramid?

Fully

But how about illiterate people, they cannot use MPesa.

Literacy doesn't matter, people still learn to use it.

It went up from below

6 *The lead market theory uses 5 advantage groups, demand, cost, export, market structure and technology advantages. With this in mind is there anything you would like to add to your previous answers?*

Demand

The bottom of the pyramid structure in the country, due to the spread of families in rural and urban areas. In Tanzania this isn't seen so much, but there are other needs that help to spread mobile money.

High literacy

Entrepreneurial people [viewed as technological advantage]

Cost

As an example: in India there is a leadership problem and also rural areas are very different. There is no economic activity there so also there are no shops. Cash can only be gotten in towns and they have banks as well.

Export

The foreign subsidiaries of the Vodaphone group

People tend to stay with their known networks, people want to be with a life-changing company

Market structure

It needs to be driven a lot. You need to sell it like an insurance, it does not sell itself at the start.

Establish network and encourage buying until critical mass is achieved.

We sell the convenience of mobile money like not traveling, having the possibility of saving money.

Technological

Coverage 2G is enough for SMS [viewed as demand advantage]

Platform robust

7 *Which (other) mobile payment systems do you expect to be the most important in the near future?*

It depends on what market you are looking at. For Kenya, mobile money will grow and evolve. Payment will become bigger. New developments will expand mobile payment to include retail payment, micro-insurance and other financial products like savings and loans.

What about other payment systems?

Other systems might take over unless there is a strong presence of mobile money.

How about digital currencies like BitCoin?

I think it is more likely that BitCoin will come to mobile devices and that stuff based on BitCoin could develop itself in the mobile money platform.

And the developments in China?

Those systems, like AliPay, will influence the structure of mobile money.

The Chinese system is based on smartphones and MPesa seems to head that direction as well. Would the rise of smartphones not make it more difficult to reach the BOP?

In 10 years everybody will have a smartphone. Lots of systems exist because of MPesa. It will help other systems like Paypal and Apple-Pay find their way down in the economic pyramid when Smartphones become more integrated.

Could this also happen the other way around, that MPesa reaches the top of the pyramid?

In Kenya this already happened as it became useful to them as well. I also used the systems in Safaricom to pay salaries for example.

MPesa goes up the pyramid and might find its way further towards more developed countries, especially in retail.

What are the developments that other markets could learn from MPesa?

How to apply leadership in the introduction of mobile money.

Understanding the regulatory challenges of banks, there needs to be protection against money laundering, anti-terror funding and such. The MPesa regulatory model is a prime example to deal with challenges like these.

K.8 Interview mobile money – FMM4 14-09-2017

Language: Dutch

1 *What is your relationship with mobile payment systems?
Wat is uw achtergrond in mobiele betaalssystemen?*

Ik heb [mede] een micro bank in Kenya opgericht, genaamd Musoni. Dit was de eerste micro financiering die mobiel betalen volledig integreerd. Het werkte enkel via Mpesa en was anderhalf jaar na Mpesa, eind 2008, geïntroduceerd.

2 *Which country would you currently consider to be leading the mobile payment sector and why?*

Welk land is volgens u momenteel leidend in de sector mobiel betalen en waarom?

Zeker in het begin was dat Kenya. Sindsdien veel andere die dat geprobeerd hebben over te nemen. Maar enkel in Kenya is dat overal aanwezig en is er veel additionele activiteit. In Tanzania India en Bangladesh is dit allemaal wat minder ver ontwikkeld.

Om een vergelijking te maken: in het begin was Kenya Ajax en de rest VVV. De rest van de landen is nu meer Feyenoord. Met andere woorden, Kenya is nog steeds leidend, maar andere landen komen erg dichtbij.

2.2 *Waarom juist kenya*

Ik zal het uitleggen met een voorbeeld. In Rwanda was de overheid sterk aanwezig. De regering wilde de leidende rol [van mobile payment] op zich nemen en heeft dit geprobeerd met veel overheidsbemoeienis en reguleren.

De kracht van Kenya was : nul regelgeving in het begin. Banken hebben geprotesteerd en de staat heeft (mogelijk door slechte organisatie) Mpesa zijn gang laten gaan. Een Laissez-faire zogeheten.

Safaricom was al heel dominant in Kenya. Het had een monopoly, maar was marge per klant aan het verliezen was wilde iets extras.

Daarnaast had het DFID 1 miljoen pond in Mpesas ontwikkeling gestopt. Er was een externe partij die hielp met financiering

3 *What other factors do you consider important for success of a mobile payment system?*

Welke andere factoren ziet u als belangrijk voor succes in mobiele betaalsystemen?

Weer een voorbeeld: Kifiya in Ethiopie. Dit systeem werd heel erg gepromoot door de staat, onder andere via salarisdistributie van de staat, en het distribueren van beloningen voor straten schoonhouden etc. Dit was dan enkele euros per maand. Kantoren die dit vroeger deden waren corrupt dus er was een wens voor een mobiel betaalsysteem. Het gemis van een commerciële partij die hier een markt in zag was de grootste factor dat het niet lukte. Verder hadden Ethiopiërs geen kennis van mobiele technologie.

De timing in Kenya was beter, mensen kenden de technologie en er was een grote speler [Vodafone] die met een grote pot geld gelokt was om daar op in te gaan. Zonder geld had dit mogelijk niet gelukt.

De staat hielp Mpesa, terwijl banken hard tegenwerkten. Safaricom had geld genoeg om Mpesa te promoten. Elk kwartaal moest Mpesa winst en groei laten zien, maar deze was er nog niet in het begin en Safaricom had de mogelijkheid dit op te vangen. Het miljoen pond zou sowieso pas beschikbaar komen bij een bepaald doel en dit zorgde dat men het idee had dat de investering geen groot verlies zou zijn.

De goede contacten in Engeland hielpen om het geld van het DFID bij elkaar te krijgen.

Andere factoren die bijdraagden waren:

+ veel kenyanen naar Nairobi, dus een noodzaak. Via de bus chauffeur was onbetrouwbaar - moedertjes thuis moeten wachten tot deze aan zou komen - en western union is erg duur.

Men kon hier Mpesa aan linken. Dit werkte zoals de auto die werd gepresenteerd als een wagen zonder paard.

+ Kenyanen zijn bereid om te proberen in andere markten is men meer afwachtend

→ *Heeft dit Vodafone naar Kenya geleid?* DIFD wilde naar Afrika, Kenya (en Ghana) zijn makkelijke markten dus vandaar.

Zou zoiets in Ghana kunnen werken? Musino was geprobeerd in Ghana, maar er was geen dominante speler. Er waren teveel partijen om rekening mee te houden. Dit zorgt voor teveel verschillende systemen. Zelfs in Mpesa veranderde het systeem wel eens. De monopolie in Kenya hielp om het eenvoudig te houden.

Om het systeem te starten was dit een voordeel, maar tegenwoordig is dit [Mpesa] een wat verouderd systeem aan het worden. Er werken 2 systemen naast elkaar die nauwelijks communiceren. Banken en Mpesa werken daardoor naast elkaar. Mpesa stuurt berichten naar het banksysteem en is niet geïntegreerd

→ *Vormt dit een gevaar?* Ja, want Mpesa kan niet verder groeien. Verder wordt de onderkant van de markt niet bereikt door Mpesa en Mpesa intreseert zich daar ook niet voor (men moet kunnen lezen en schrijven). CGAP heeft dit gevonden. Spelfouten zorgden voor verkeerde transacties 1 op de 10 kwam fout aan. Hiervoor kon je iemand bellen of naar een kantoor gaan (bij de markten – middenklasse) dit was enkel in het engels of swahili. Als je deze talen niet kende had je een probleem.

4 *What factors do you think would inhibit a mobile payment system to become successful?*

Welke factoren zouden volgens u het succes van een mobiel betaalsysteem tegen kunnen gaan?

Geen interesse van de overheid, of juist teveel bemoeienis

Gebrek aan een dominante speler, wat het systeem te ingewikkeld maakt

Slechte infrastructuur

5 *What would you consider the most important factors?*

Welke factoren ziet u als meest belangrijk?

Steun van de overheid

Een dominante speler

6 *The lead market theory uses 5 advantage groups: demand, cost, export, market structure and technological advantages. With this in mind is there anything you would like to add to your previous answers?*

The lead market theory is onderverdeeld in 5 advantage groups: demand, cost, export, market structure and technological advantages. Zou u aan de hand van deze nog iets aan uw eerdere antwoorden toe willen voegen?

Demand advantages

Slechte infrastructuur aanwezig voor vaste telefonie, maar behoefte aan communicatie (dit kan een cultureel aspect) er zijn handelsstammen die willen weten waar ze kunnen handelen

Cultureel belang om voor ouders te zorgen

Mpesa gaf een goedkoop alternatief

Negatief aspect: men betaald liever met cash. Dit moest overwonnen worden. In het begin zetten mensen hun geld er een dag op en haalden het er weer af, vervolgens werd dit een

week en daarna steeds langere perioden. Men wilde weten of het geld veilig was, vertrouwen is belangrijk.

Concurrenten van MPesa zijn banken, deze zijn erg conservatief neergezet en bedoeld voor de bovenlaag van de bevolking (zoiets als volksbank bestaat niet). Ze zijn verder zwaar gereguleerd en erg duur opgezet (met dure kantoren en mensen) dus kan het zich niet goed uitspreiden. In NL geen behoefte aan mobiel betalen omdat de bestaande infrastructuur toereikend is.

Cost advantages

Mpesa had al overal kiosken in het land. Er was al een infrastructuur. Mensen die al belminuten, melk en snoep verkochten konden hier simpelweg Mpesa aan toevoegen. In ethiopia is dit niet zo. Kifiya moest eerst nog een infrastructuur bouwen en dit heeft ze mogelijk de nek omgedraaid. (tech, infra en operaties).

Net als bij facebook heeft men een omslagpunt (critical mass) anders is het niet interessant om te gebruiken. Pas bij een bepaald percentage is het interessant omdat het risico dan minder is (een monopolist helpt hierbij).

Export advantages

Aandachtpunten zijn: Krijg je voldoende mensen mee? Werkt het goed? Zijn er voldoende financiële prikkels?

Als Mpesa niet was begonnen was het ergens anders ontwikkeld, maar het grote succes zorgde voor volgers.

Senegal en Ghana wilden MPesa zo [als concept] overnemen, maar als land heb je het niet in de hand om het zo te laten lopen. De aanwezigheid van een monopolist miste daar. Met moest ook de banken sussen, in franstalig West-Africa is er een centrale bank die voor 7 landen verantwoordelijk is]) banken zijn weinig behulpzaam. Mensen moeten bereid zijn om te betalen, in Zimbabwe wil men geen geld uitgeven [aan een mobiel betalingssysteem].

De meeste landen zijn dusdanig slecht georganiseerd dat er nauwelijks een overheid aanwezig is. Er wordt niet bewust gezegd: "we voeren iets in vanuit de overheid". Dit komt vanuit ondernemers (m.u.v. overheid Ethiopie of Rwanda) die vele valkuilen moeten overbruggen.

Er moeten voldoende mensen zijn om het system over te willen nemen. Je moet op dag 1 al groot zijn. De mobile operators zijn vooral marketing firma die technologisch vrij weinig kunnen en Mpesa vraagt wel een extra technologische stap. Het systeem moet voor elke telefoon toegankelijk zijn (Iphone en chinese troep waren moeilijk, want deze konden het menuutje voor Mpesa niet downloaden, dit moet per telefoon worden aangepast)

Market Structure advantages

1 dominante speler is belangrijk deze wil weten wie er gebruikt maakt van haar platformen.

De samenwerking met Equity Bank mislukte, want Mpesa wilde zelf crediet geven en daarom konden ze niet samenwerken. Er wordt sowieso weinig samengewerkt in de mobiele betalingssector.

Technological advantages

Basiskennis voor IT en projectmanagement capaciteiten.

De juiste stappen uitvoeren, Kenya heeft voldoende capabele mensen (net als Uganda en Senegal)

Technologie is niet moeilijk maar het leveren van de service, mensen helpen om het systeem te snappen. Een ander systeem was goedoper maar functioneerde minder en mensen vertrouwden het niet. Ze kregen ook geen terugkoppeling dat het werkte, via een bevestigings-SMSje).

Infrastructuur: toegang tot telefonie in combinatie met een slechte financiële infrastructuur is een voordeel (bv in Somalieland. Hier is niks aan financiën, maar het eerste wat er kan is met mobiele telefoons [betalen]). Het is zelfs het enige dat daar werkt.

7 Which (other) mobile payment systems do you expect to be the most important in the near future?

→ welke markten moet MPesa voor oppassen. Het credit scoring system MyBucks uit Zuid-Afrika in samenwerking met een Luxemburgs bedrijf. Dit bedrijf bepaald je credit score en op basis daarvan krijg je een lening. Mpesa heeft een vergelijkbaar systeem genaamd Mshwari, maar dit systeem is beperkt. Je leent geld voor een maandje met hoge kosten. Om een tientje lenen moet je 15 euro terugbetalen.

Mpesa weet weinig over haar klanten omdat dit een vrij dom systeem is. De klanten waren in slechts vier groepen onderverdeeld in Kenya, dit wordt nu veranderd.

Safaricom is simpelweg een marketingfirma die een technisch systeem heeft. De kracht is overal mensen neer te zetten en hier overal reclame te maken. Er is echter een vrij hoge default rate, percentage mensen dat niet terug kan betalen, en men weet te weinig van de klant.

Ik zie MPesa niet als een frugal innovation omdat het zich niet op de onderkant van de markt richt.

Kenya gaat mogelijk haar positie verliezen. Er wordt gewerkt aan een algemeen platform, maar Mpesa houdt dit tegen.

Ik zou nog steeds zeggen dat Kenya een belangrijke partij is maar het is moeilijk om te zeggen dat ze dit jaar nog leidend zullen zijn. Tot 2 jaar geleden was Mpesa nog steeds het voorbeeld.

K.9 Interview mobile money – FMM 5 Piyus Singh 15-09-2017

Due to connectivity issues the interview had to be stopped after 10 minutes, after question 4. Mr. Singh agreed to answer the other questions later and send them via email. This section shows the document that was returned by Mr Singh.

Dear Mr Singh,

Here is the full questionnaire, in our call we went through the first 4 questions already. I added my notes so that you can check whether I understood you in the correct way. If there is anything you like to add to the answers you provided, please feel free to do so. Furthermore, please answer questions as you feel correct. For me it is most important and interesting to understand your views on this topic.

I have tried to provide clear questions, however it remains difficult to communicate complicated matters like these through a questionnaire. If anything is not clear to you or I

might have written something in a too difficult way please feel free to contact me and I will do my best to make it clearer.

Here you will find the definitions I used during our phone call

Lead market: the country that is considered the driving force of innovation in a certain sector (provides the main impetus)

Mobile payments: a payment transaction processing in the course of which the payer employs mobile communication techniques in conjunction with mobile devices for initiation, authorisation or realisation of payment

More simply: "using a mobile phone to make payment transactions."

I hope that with this I have provided you enough information to be able to fill out the questions. Again thank you very much for your time and your help regarding my thesis.

Kind Regards,

Kay Potters

1 What is your experience with mobile payment systems?

I am a FinTech and payment expert from India. I worked as a manager in sales and operations on mobile money and other services. Hereafter, I worked as a consultant on financial services, including mobile money. When working at mRUPEE I focussed completely on mobile payment.

2 Which countries would you currently consider to be leading in providing mobile payment solutions and why?

India: the government is focusing on demonetisation. The government is investing in cashless payment systems like Mastercard and the integration of these systems. There are also systems being promoted that are based on social security number, where people only have to remember that number and their bank name. Another new payment system uses biometrics to verify a person's identity.

China: due to their technological advancement and acceptance [of technology] only very few investments are needed. Further mobile phones are very common there.

Kenya: Everybody is trying to be like Kenya to create a cashless economy, but why mobile payment was successful there is a separate topic. In 2 years' time it was used by 80% of households. This was further stimulated by social unrest, which the concept grew proportionately.

3 What other factors do you consider important for success of a mobile payment system? [What are the right conditions to allow a mobile payment system to become integrated in society?]

Infrastructure

Mobile devices that can do multiple things (ex. Advanced Bluetooth) and are low cost
Telecom network (in India this is not stable enough and doesn't work for transactions even in big cities)

The common languages in Kenya (English and Swahili) helped with the introduction of MPesa. In India one would require a dozen of languages to be available in the system due to the large diversity in India. Even within Hindi, which has a variety of dialects, various versions would be needed.

4 *What factors do you think would inhibit a mobile payment system to become successful? [What factors prevent mobile payments systems to become largely used in society?]*

Lacking of:

Literacy (which is sometimes only measured as being able to write your name)

Network quality

Language

Infrastructure (coverage)

The phone interview stopped here, the following answers were sent by Mr Singh through email.

5 *What would you consider the most important factors?*

Network

Infrastructure

High literacy

Common language

6 *The lead market theory uses 5 advantage groups, demand, cost, export, market structure and technology advantages. This means that the lead market country has conditions within these advantage groups that make it easier for a mobile payment system to become successful compared to other countries.*

With this in mind is there anything you would like to add to your previous answers? [please fill in your answer per advantage group below each description, according to your own understanding of these groups]

Demand advantages: these are conditions that create a large domestic demand

New use cases from daily life of people (integration of mobile money into daily lives)

Attractive incentives, like Cashbacks for initial push

Higher number of merchants accepting the mode of payment

Cost advantages: these allow providing the service at a relatively low cost compared to other countries

Cost of smart phones should be less

Internet connectivity [pricing] should be lower

Export advantages: these are factors that make other countries want to follow the lead market and help the lead market to spread its innovation outside of its borders

Market structure advantages: due to how the market is structured and how involved actors interact

Technological advantages: these are factors that help to create strong technological capabilities in the lead market

7 *Which mobile payment systems do you expect to be the most important in the near future [in 5 years time]?*

Mobile payment systems will grow in future and have a great potential as this is linked to the smartest personal device [smartphones]. Using it has become a habit for most of the people, so payments will be the next use and convenience for these people.

Payment systems will become more integrated in retail. They will consist of payment plus CRM (customer relationship management) and other additional services. This will provide merchants with an all in one solution. Payment that is part of a larger solution rather than a standalone feature will become most important. It is important that these systems are easy to use and understand for their intended customer segment.

K.10 Interview mobile money – RegE1 03-10-2017

Due to a bad connectivity the interview was only 20 minutes and answers were short.

1 *What is your experience with mobile money systems?*

I have 10 years of experience in working with mobile money. I worked as a customer relations manager for Safaricom and as an engineer on a billing system. Now I work at the central bank of Kenya as an ICT specialist.

2 *Which country would you currently consider to be leading in providing mobile money solutions and why?*

Kenya, because of mobile money's high usage and customer penetration. It is part of life and filled a gap that the banking system could not fill.

3 *What other factors do you consider important for success of a mobile money system?*

The unavailability of an established banking system resulted in a lot of unbanked people. The acceptance of the system by the Kenyan population: this was related to the fact that the restriction that were present in banking were not there in mobile payment.

4 *What factors do you think would inhibit a mobile payment system to become successful?*

High costs of transferring money

5 *What would you consider the most important factors?*

The lack of services by banks.

6 *The lead market theory uses 5 advantage groups, demand, cost, export, market structure and technology advantages. With this in mind is there anything you would like to add to your previous answers?*

Demand: advantages that create domestic demand

The good client relations

The regulation of the technical implementation

Cost: advantages to due cost reduction possibilities

The cost in other countries are comparable so I would not say there were advantages here in Kenya.

Initially costs were high, but these decrease quickly.

Export: advantages regarding spreading the innovation abroad

The success of MPesa in Kenya, it has been covered a lot in newspapers

Market structure: advantages due to how the market is structured and how involved actors interact

There were initially 3 to 5 competing systems. Now there are 3 that are important there number of users are 24, 10 and 3 million.

The choice of the system depends on the type of customer. The competition systems differ through the services they offer next to payments.

I personally use MPesa next to payments for insurance in health for example.

Technological: advantages regarding the countries technological capabilities in the sector

The capabilities are growing and more advanced tools are being used for mobile payment. Currently NFC is increasingly used and adapting MPesa to be used on android. This technology is more imported instead of being developed. Kenya is more focussed on the creation of applications.

7 *Which (other) mobile money systems do you expect to be the most important in the near future?*

Other systems could become important because the current mobile money systems are limited in their fee structure to 2400 shilling. Newly developed systems have a limit of a million shilling.

K.11 Interview mobile money – RegE2 26-10-2017

1 *What is your experience with mobile money systems?*

With my family I lived in Kenya so I use the system myself. Also I have worked here as a mobile payment consultant. For 2 years I followed the trends of mobile money globally. I worked for BRAC a company that makes software for mobile money companies. I have been working on enabling policies for mobile money as well. This is to broaden the field of mobile money from just payments towards loans and other financial services to promote financial inclusion.

2 *Which country would you currently consider to be leading in providing mobile money solutions and why?*

Kenya, because of its rapid growth in such a short time.
Further, because of the infrastructure and regulation.

Are there any other markets you consider interesting at the moment?

The Philipines started although Zambia also claims this.

Jordan, Peru and Tanzania have very interesting and working frameworks regarding interoperability. In Tanzania this was helpful to promote mobile money as the market was highly fragmented before this was introduced. Yomoko might be and interesting system to look at.

Bangladesh with bKash is very successful, although the telecom coverage and infrastructure is less than in Kenya. It is a verb on its own, people say: "I am going to bKash you".

3 *What other factors do you consider important for success of a mobile money system?*

I will speak from my experience with MPesa.

First there was a clear use case that was fulfilled by a simple offering. There was a need for remittances to transfer money from urban to rural areas. Thus MPesa tapped an existing

demand through the “send money home” campaign. This was tailored to low income groups. Also new products that are launched tap into consumers’ lives.

Second the technological infrastructure and network. Mobile phones have a 90% penetration currently. Payment could just be added to a technology people were already familiar with. This is further amplified by country wide connectivity and the leveraging of an existing agent network.

Thirdly, there was a high awareness of the Safaricom brand. Their green colour is visible throughout the country. The familiarity results in a high trust in the brand.

Fourth are policy regulations. The regulator did screening of the new technology and after the risk was found acceptable the regulator issues a no-objection letter and afterwards monitored mobile money by gathering data. This “wait-and-see” approach removed what is otherwise the main barrier for mobile money. Now mobile money falls under the National Payments Act.

4 What factors do you think would inhibit a mobile money system to become successful?

Regulation, this differs a lot between countries. It makes sense that some governments are trying to mitigate risks, but this stuns the uptake of mobile money.

Cost perception. Despite being cheap and convenient mobile money can be considered to be expensive because of transaction fees. Especially in regions where cash is common.

Little incentive for price reduction in the long run due to lack of competition. Interoperability can mitigate this, but this is held back by Safaricom in Kenya. In Kenya, banks are also launching their own interlinked system.

Connectivity: Long system downtime, for instance due to power outages, will decrease trust.

Do you think the involvement in the election scandals will affect Safaricom’s customer base?

I am sceptical about this. The system going down for 24 hours earlier this year seems to do more damage. I use MPesa 10 times per day so imagine the impact on the many people here who use it more often. This might be the downside of having 1 major provider. It creates a high dependence, which leads to the questions whether the current system is reliable and secure enough.

There have also been reports of fraud: low income women get messages requesting payments from them that turn out to be fake.

5 What would you consider the most important factors?

Value proposition. Even in a strong mobile money environment like Kenya there are people who don’t use it often. The uptake is not the same as the regular usage. So the offer should always tailor some need of the customer.

6 The lead market theory uses 5 advantage groups, demand, cost, export, market structure and technology advantages. With this in mind is there anything you would like to add to your previous answers?

Demand

The offered product should meet a specific need, like remittances

There should be a compliance between the interface and the used phones. In Kenya the system was based on USSD instead of apps.

Cost

Competition would to reduce costs → this is a barrier currently in Kenya. There are talks about interoperability in the sense that it should become possible to send and receive money from different operators.

Interoperability is connected to this

Reduction of other barriers like opening accounts and make that more widely available could indirectly reduce costs.

Export

This would only be applicable regionally

It would require brand recognition in other countries, which would result in sufficient trust abroad. For example the competitor which is now named Airtel caused a lot of confusion through its many name changes while Safaricom remained stable.

The presence of Safaricom and Vodafone abroad helps in building trust. For example introducing bKash in Kenya would not work.

Market Structure

Competition

Having 1 large player, this is a double edged sword. It helps growth of the technology and up-scaling, but it hinders competition.

A fragmented market might therefore be an advantage in the long run

Regulation

Technological

Existing penetration of mobile phones

Connectivity

The start-up ecosystem of Kenya

7 *Which (other) mobile money systems do you expect to be the most important in the near future?*

In the future I think there will be less emphasis on a specific provider, but a cohesive payment system in which the provider itself becomes irrelevant. Mobile money will be more aimed at low costs, convenience and economic advantages for the country. Governments would like to aim for the broader benefit, this already worked outside of Kenya. The financial sector might bring together the current players to benefit the customer.

For mobile money Kenya is likely to stay ahead, but other systems like block chain might take over. In the US cards are very integrated and mobile money is not needed there.

K.12 Interview mobile money – ResMM1 12-10-2017

1 *What is your experience with mobile payment systems?*

I have been using MPesa since its deployment. Further I did research on mobile money during my PHD. It took an institutional approach focussed on the social factors involved in deployment and development of mobile money. It questioned how has the financial service industry developed and why it developed in that way? I looked into the market, policy and culture in Kenya.

2 *Which country would you currently consider to be leading in providing mobile payment solutions and why?*

Kenya.

Everybody accepts it, it is a common statement.

It is further supported by many statistics, the main one being financial inclusion, because addressing the unbanked was the original starting point of mobile money. Therefore success is based on this measurement. Data has been collected by World Bank, ITU (mostly phone penetration), Brooklyn's Institute (did a comparative analysis) and the CBK.

It is also shown in innovations both in technology and business models and their scope of development. Mobile money is relatively advanced in Kenya, and the border between commercial and mobile banking is dissolving there. All bank services are in mobile money services, for example: payments and insurance. The system is also linked with Visa. Next to the high impact of technology and business models is the social impact is high too in the Kenya.

3 What other factors do you consider important for success of a mobile payment system?

I will use Kenya as an example

Creating bottlenecks in other places, it shows what made it more successful than for example Tanzania.

1 Regulation was open minded.

The regulator took risks and put social needs above financial security. In hindsight it is fascinating they were willing to do this, even though they might have added some mechanisms that prevented financial meltdown. Vodafone and Safaricom were given latitude and were shielded from pushback from commercial banks. The CBK took a relaxed role in the legal framework to allow development. Even when the design was stable they [Safaricom] were protected, because of the financial inclusion goals. Which financial banks ignored.

2 Vodafone and Safaricom had a brilliant idea.

Prior solutions were not feasible so it has social relevance to introduce MPesa. MPesa built on Kenya's specific local culture of frequent remittances. The majority of families live in rural areas and one son lives in city. This person supports his family on a monthly basis. So the slogan to "send money home" touched Kenyans. The old mechanisms for sending money home were not sufficient. Using the bus was difficult and banks were non-existent in rural areas. It created a value proposition that connected with every Kenyan. It would be interesting to see if this applies to other countries as well. A product has to address a need. This wasn't there in South Africa for example and mobile money failed there.

3. The entrepreneurial culture of Kenya.

This became important later in mobile money. Foreign businessmen usually also prefer to do business in Kenya for this reason. There is room for innovation. Consumers are willing to take risk and experiment. Vodafone and Safaricom worried about the idea of putting money where you cannot see it. This is difficult if e-money is new for you. But people were willing to try. This [positively] influenced diffusion. Blogs I read said that in other markets this is lacking. People are too risk averse. Also there the technology is perceived to come from elsewhere [Kenya] and people prefer old banks.

There exists a certain amount of consumer sophistication for Kenyans regarding mobile money and mobile technology in general. Mobile money created a nice market. There are mobile apps for health, farming education etc. Mobile money has become a channel to introduce new technology. In Kenya people are more familiar with this than in for example

Uganda. They are also more literate. There is higher mobile and internet penetration. Countryside people use Facebook in Kenya, which you don't find in Uganda.

In the theory I researched it is assumed lead markets don't appear in developing countries due to a lack in customer sophistication. How would you respond to this?

This is a common mistake made by companies entering developing markets. Here too consumers look for value and value differs between consumers. If you make a dollar you will spend it differently and your perceived utility is different. You will look for the best available for what you can afford. If an innovation is high tech and I have the money people will try it maybe. But for success in emerging markets you have to look at both taste and preference, and cost and need. I usually take food as an example. It is available through multiple channels but you will look at highest value for money. Literature assumes that poor only take what is available, but they actually have options. In the food example they can go to the market, grow it themselves, or get it from their neighbours. There are options available and sophistication arises from the decision making process. Success of companies in literature suggest that multinational should realise poor people have tastes and preferences. The product should live up to their expectations.

4 What factors do you think would inhibit a mobile payment system to become successful?

The absence of the aforementioned factors, for example GSMA wrote an article on Nigeria where conditions are similar but mobile money didn't work. This was linked to the legal framework. The Central Bank there was hesitant. It is an example of the telecom-led versus the bank-led model. In Nigeria telecom companies cannot develop mobile money themselves. A financial institution has to be partner and the bank is the one offering the service.

This has been a challenge in South Africa and India as well. Central Banks want banks and not telecom operator to lead mobile money, but mobile money runs on telecom networks and not on financial networks.

Is the approach of the Kenyan banks a result of Kenya's culture of experimenting that you mentioned?

It is because of the CEO of the central bank at that time. He made the final decision. Had there been another person things might have turned out very different.

5 What would you consider the most important factors?

Regulation

6 The lead market theory uses 5 advantage groups, demand, cost, export, market structure and technology advantages. With this in mind is there anything you would like to add to your previous answers?

Demand: factors that create domestic demand

Low penetration of commercial banks

Send money home campaign

The success of microfinance in Kenya. Initially MPesa was based on a microfinance model. This is still most commonly done via group lending: people lend as a group to create credibility through shared responsibility. Managing repayment was a challenge. Weekly repayment is difficult if the entrepreneur is 50km. This makes repayment very expensive for entrepreneurs so this influences loan obligation commitment. Initial attempts at solving this

problem lead to the development of MPesa. Microfinance was already very successful in Kenya. So this created a Launchpad.

This also refers to the historical development of Kenya towards mobile money. There was an existing infrastructure that people were familiar with through microfinance. It provided ideas to customise mobile money to the local environment. So there is no organic evolution. The technology was continuously adapted. In other countries this development of a technology that evolved to suit changing needs is not there. It makes transferring the technology difficult, because this history doesn't apply there.

Cost: advantages to due cost reduction possibilities

The liberalisation of the telecom sector in Kenya a few years before MPesa. So the cost of owning a mobile phone dropped dramatically in 1994 after adapting this policy framework. Mobile money development started in 2003. This allowed viability of mobile money in Kenya. People need a phone to allow a phone service. MPesa is a feature added to an already owned product. 70% access to phones created a market that was large enough.

Cost advantage is a difficult concept to apply to a service. A service has its own cost advantage as no factory or lots of worker and materials are needed. So there are less capital costs.

A service does still need distribution. You need to create access, like a bank needs a branch which is a cost. This was too much for the banks if revenue could not be guaranteed, which explains the lack of rural bank branches. MPesa had this challenge too. People needed places to deposit and draw money. So how to create a cheap outlet was a challenge. This was done through existing kiosks that could become agents. This reduced costs a lot.

Export: advantages regarding spreading the innovation abroad

That is a question for Vodafone. Their worldwide network is helping

Policy and infrastructure would normally apply but here a product cannot be exported. This would only be relevant where there is already a mobile phone network. Export is also product related so diffusion would fit better. Vodafone relations and existing infrastructure could be helping diffusion. Furthermore, mobile money is an add-on to what is already there (cell phones). If you can't sell data and voice than mobile money is also not possible.

Market structure: advantages due to how the market is structured and how involved actors interact

In a product this would be related to the value chain or how does the market support a product ecosystem. However, this is a service that is offered without collaboration with other companies. There is no need for a supply chain. Only CBK and central communications authority were relevant next to Safaricom and Vodafone, they also supplied to existing consumers.

Safaricom had highest market share in telecom. Political cloud (being the biggest taxpayer) and first mover advantage helped strengthen their position in mobile money. It allowed flexibility to attain deeper penetration levels in mobile money.

Would you consider the Kenyan mobile money market to be competitive?

All operators offer mobile money now. Initially it was very competitive with Zain (or airtel, it changed a lot in name), orange also entered. But they couldn't beat the 70% market dominance of Safaricom.

New developments, political push and interoperability (which Safaricom doesn't want) might change the playing field. There was a lot of talk about levelling the playing ground, for example sharing agents between operators. Mobile money operators now do use same agents in Kenya.

Competition evolves on what happens. Currently Safaricom has been involved in the election fiasco. So now there is a huge exit out of MPesa into other operators. Safaricom's reputation seems to be harmed.

Technological: advantages regarding the countries technological capabilities in the sector

The educational level is high in Kenya

The telecom infrastructure gives room for development as well

ICT education in Kenya and propensity to use ICT is high.

Kenya is ICT hub in Africa (it competes with South Africa, Nigeria (and a bit with Egypt)).

Google and IBM have their headquarters of Africa in Kenya and large innovation labs.

The result is that there are high capabilities in the local market

7 Which (other) mobile payment systems do you expect to be the most important in the near future?

Globally the current Kenyan model might find legitimacy elsewhere with the combining of mobile money and banking. Banks and telecom operators are converging.

Largest bank is now offering telecom services as well. Equitel offers all mobile money services and has its own masts etc. I myself use Equitel as well. I can now buy credit for my account directly without any barriers.

This is now the most exiting model so telecom operators might respond by offering commercial banking. This is can already be seen as Safaricom is offering loans and accompanied services itself. The line between banking and telecom is disappearing. The regulations have been separate but now these frameworks need to be integrated because they are becoming too similar

Let's see if this model becomes dominant.

K.13 Interview mobile money – ResMM2, 23-09-2017

1 What is your experience with mobile payment systems?

This depends on whether you ask about my experience with customers or in product development.

In product development:

I have been working in the mobile money sector for 7 years. I was involved in the strategy and product development of MPesa. After the system was running I was involved in deepening the market and trying to diversify MPesa to make it more versatile.

The main question was: what can our customers do with their money. We tried to integrate all aspects of their daily lives into MPesa: energy, water and schooling. We launched lots of new products in 2 years with a rate of 1 new product per month. The most successful being accepted by 250 000 merchants. It had 26% of the adopters (people who have an account of the service) to become frequent users (using it once a month). MPesa itself is a platform where we could plug other services into.

With customers:

First let me explain how MPesa was introduced. This mainly revolves around the "send money home" campaign. In Kenya many people who work in the city have family in rural areas. In the rural areas there is no economic activity and city workers support them by sending money through MPesa. Over time more needs were discovered and this made Kenya move towards a cashless system in which MPesa became also a payment platform. This transition came because of 3 reasons:

- Customer demand through social media, which was the main driver

- Internal product development, which asked itself how MPesa could grow
- Insight from analysing social media, by looking into the data gathered from users

For the last driver a comparison was made between what customers said and did. At some point a lot of transfers were done in close proximity indicating that people started using MPesa to pay for goods. In that way MPesa started to replace a card in case people forgot to take their wallets

Do you have personal experience with that?

"I don't carry my wallet anymore, only when I travel to Europe, than I need my card. Everything here [in Kenya] is done from my phone"

I know of an Indian student who is going to travel without any cash through Kenya to see how far he can get with just a phone.

2 Which country would you currently consider to be leading in providing mobile payment solutions and why?

There is a distinguishment between mobile money and mobile payment.

Mobile money is what it is called when a service is offered by a mobile operator who owns the platform it uses to provide a service.

Mobile payment/banking or Finserve is a business that offers a service but does not own the platform.

If we talk about mobile payment it is currently China who is leading that. China is a very closed loop market with little international transactions [this lead to it developing systems of its own in a large market]. 2 large systems in China at the moment to conduct payments: Recharge's Ali Pay and WeChat. These apps respond to all aspects of one's lifestyle. They combine all sorts of apps into 1: you can buy tickets, find locations, use social media, find a date do payments. For the last part you upload your credit or debit card into the app and you can then use it for B2C and B2B transactions. [These are known as superapps in the Western world].

The Western is trying to follow this.

But how about mobile money?

If we go into mobile money than by number of registered accounts Pakistan is the largest. Kenya is still the largest in terms of active users. The leading Markets are now Tanzania, Kenya and Pakistan, but Uganda is also become more interesting. Another interesting market is the USA which has among others apple pay.

3 What other factors do you consider important for success of a mobile payment system?

First of all most importantly, the regulatory support for payment systems and innovation and simply try out new things. Banks tried to halt the rise of mobile money, but they failed at this.

Secondly, in Kenya, the markets economic conditions. The economy itself had already started to grow, there was a lot of foreign investment and good will of the government.

Thirdly was the investments made by mobile operators. They invested highly in R&D, agents and customer education.

Further was that mobile money was meeting a latent customer need. There was a strong value proposition.

4 What factors do you think would inhibit a mobile payment system to become successful?

The lack of all I have mentioned before.

In West-Africa mobile operators have tried, but were not able to copy East-Africa in terms of success. The regulation on mobile money there is bank-led and mobile operators cannot get a license without their cooperation. This is difficult, because when mobile operators demonstrated they can do banking services banks make barriers.

Other factors are:

-lack of customer interest

-lacking capacity of staff and technical capabilities. This comes forth when there is no understanding of the product by either the operator or customer. Safaricom can be seen as being very innovative.

5 *What would you consider the most important factors?*

Regulatory support (was mentioned before)

6 *The lead market theory uses 5 advantage groups, demand, cost, export, market structure and technology advantages. With this in mind is there anything you would like to add to your previous answers?*

Demand advantages

The existing services were not sufficient

Cost advantages

Those could indeed help for a lead market. Regulation helps to reduce cost. Mobile money was not taxed for a long time. In Congo there are high taxes on mobile money so people prefer to use cash.

Export advantages

This seems to be not that apparent in the case of MPesa. Also Kenya was not the first, that was the Philippines where there are 5 million registered accounts and 1 million active users of mobile money. MPesa perfected the idea initiated there. The intention to export might not even have been there back when MPesa started. Learning happened later and GSMA tries to facilitate this. The organisation helped to spread the technology as it tries to spread best practices.

Market structure advantages

The differences in economic conditions between rural and urban areas, people try to balance this by sending money.

The affordability of mobile phones

Partnerships: in the beginning banks tried to fight MPesa and refused to partner up with them. Those who did later cooperate got benefits from it, because a high demand arose to integrate banking accounts with mobile wallets. Bank branches are closing in Kenya and their future depends on innovation.

Again regulation fits in here as well.

Technological advantages:

These appear in Kenya as well. It is a regional hub of technology and innovation.

Also Kenya has the fastest internet in Africa and is home to a lot of foreign direct investment.

It is also an ICT hub. Google, IBM and other companies have their Africa headquarters in Nairobi as well as the UN. The high amount of FDI helped the Kenyan economy.

7 *Which (other) mobile payment systems do you expect to be the most important in the near future?*

Payment systems will take the lead. They are appearing to pay for hotel, meals and much more. A shift from E-commerce to M-commerce [mobile] can also be seen at Amazon and Facebook who are both moving away from desktops.

MPesa might become obsolete, but it will take a long time before USSD dies out.

But doesn't this mean that the BOP will again be left out of the financial system, because they cannot afford phones that support internet usage?

There is a USSD market so it will not be an issue soon. There might be few people that can afford better phones, but these also generate the most revenue. 20% of customers generate 80% of revenues roughly, this is a common rule of thumb. This group will be the early adopters who introduce the new technology. This technology will then become cheaper over time so that late followers can eventually afford it to. The rise of new technologies does not necessarily mean the old ones become obsolete. Older smart phones are also still in use.

Appendix L: Bibliography

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