

## Master's thesis

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# Low cost innovations in resource-constrained markets: An adoption study



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## Abstract

Women's health and menstrual hygiene management (MHM) still constitute inadequately addressed social issue in resource-constrained markets (RCMs). There are simple and affordable solutions provided by social entrepreneurs but their rate of adoption is low. The goal of this study is to investigate how Rogers' (2003) proposed factors of innovation, social system and communication influence the rate of adoption and in how far they interact.

In order to do so, we employed a qualitative case study approach. We examined three social enterprises active in the menstrual hygiene management sector in resource-constrained markets: Ruby Cup (Kenya), AfriPads (Uganda) and Eco Femme (India). Additionally, we analyzed eight TV commercials in the respective countries.

We found that the products' low rate of adoption can only be explained when inspecting the interdependencies between innovation, social system and communication. Upon closer examination, we abstracted these interdependencies into the broad categories of determinants, enhancements and impediments. We elaborated Rogers' (2003) framework by introducing a new dynamic of interactions. Moreover, we enabled practitioners to gain a comprehensive view on the target market.

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# 1 Introduction

## 1.1 The social problem: Menstrual hygiene management in resource-constrained markets

The United Nation's Millennium Development Goals (MDGs) represent the most pressing, yet inadequately addressed social issues for the immediate future (Mair & Martí, 2006). Women's health and menstrual hygiene management (MHM) in resource-constrained markets are two of these issues hindering the achievement of the MDGs (Garg, Goyal, & Gupta, 2012; Tjon A Ten, 2007).

Access to menstrual products is a taken for granted notion in Western markets. Women in resource-constrained markets, where consumers lack buying power, have no access to or cannot afford sanitary napkins. Instead, they use rags, leaves or mud to stop the bleeding (Garg, Goyal, & Gupta, 2012). Although menarche is even celebrated in some cultures, it is generally bedeviled, particularly through myths and misconceptions stemming from cultural as well as religious taboos concerning blood and menstruating girls. Women are seen as 'polluted', 'impure' or 'dangerous', are not allowed to touch men, plants or food or to participate in daily activities such as visiting sacred sites or marriage ceremonies, doing household work or harvesting (WaterAid, 2012).

The result of this stigmatization is the creation of a culture of shame and embarrassment with detrimental effects. First, women are forced to wash and dry their rags in well-hidden places which are often damp and unhygienic and may lead to serious health issues. Second, as many teachers in resource-constrained markets tend to avoid talking about sex issues, lacking education regarding menstruation and reproductive health leaves the women very little informed about these very issues. Third, because they are afraid someone might notice or because of the lack of privacy at these places, women stop attending school or work: For instance, one out of ten African girls misses school during her period and eventually drops out while 73% of Bangladeshi garment workers miss work for an average of six days per month due to vaginal infections caused by unsanitary menstrual materials (Wash United, 2013). Generally, women get left behind men and thus have no equal opportunity (Garg, Goyal, & Gupta, 2012).

Next to social and health considerations, this problem also has environmental consequences. The average American woman throws away 13,000 tampons and pads in her lifetime. Due to the fact that resource-constrained markets exhibit a poor waste management infrastructure, the use of commercial products would create an enormous impact on the environment (Tjon A Ten, 2007).

Multinational, governmental and non-profit organizations (NGOs) have failed in providing all-encompassing solutions for these issues. An emerging stream of literature considers an entrepreneurial approach as the right one to solve social problems instead (Darabi et al., 2012; Seelos & Mair, 2005). Social entrepreneurs address the issues mentioned above by offering low cost, environmentally-friendly designed menstrual hygiene solutions. It appears reasonable to assume that these utilitarian innovations are adopted widely and fast since, being simple and affordable, they obviously fit the resource-constrained market's requirements. However, this is not the case (Ramani, SadreGhazi, & Duyster, 2012). A study of the factors influencing the adoption would help social enterprises to increase it and better serve their constituents.

## 1.2 The scientific problem: The need for an interdependency examination

Research on the diffusion and adoption of innovation is perhaps one of the most widely researched and best documented social phenomena discussed in various academic disciplines such as geography, sociology, economics, and education (Mahajan & Peterson, 1985). Although diffusion has been researched extensively for the past decades, little attention has been paid to the adoption of innovations in resource-constrained markets (Ratcliff & Doshi, 2013). Even less, the findings have been incorporated into diffusion models (Peres, Muller, & Mahajan, 2010). While there are several studies exploring implementation and execution strategies for these very markets (London & Hart, 2004; Prahalad & Hart, 2001), the “first more basic question of the drivers of consumer adoption has received less systematic attention” (Ratcliff & Doshi, 2013, pp. 2-3).

Rogers' (2003) framework of the rate of adoption has been widely and successfully applied in the diffusion of innovation research (Rahman, Hasan, & Floyd, 2013). He suggests that the innovation attributes, the social system the innovation diffuses in and the communication channels the innovation is communicated through influence in how far an innovation is adopted or rejected. Despite its popularity, we consider the current framework as not sufficient for our situation. Previous research mainly focused on the factor of innovation as Rogers (2003) predicted that up to 87 % of the variance in the rate of adoption can be explained by the innovation itself. Given the context, we assume that the social system and communication gain importance. Most importantly, though, the framework breaks down at the point of interdependency examination. Rogers (2003) himself admits that the rather complicated matter of how the social or communication structure affects the diffusion and adoption of innovations remains untangled. There is an urgent need in adoption research to incorporate more fully the interactive character of the different factors

(Wejnert, 2002). Consequently, the triangle of innovation, social system and communication needs a closer examination.

This lack of academic focal mirrors the dilemma the social entrepreneurs face. When they introduced their product to the market, it fit the most obvious requirements of being simple and affordable. However, they apparently relied on the overly broad academic generalizations about these markets instead of taking a holistic view on the adoption of low cost innovations. Our study will help them to understand (1) what factors influence their products' rate of adoption and (2) how these factors interact among each other.

### 1.3 Research goal and research question

Given the importance of what has been discussed above, we intend to comprehensively examine Rogers' (2003) framework in the field of low cost innovations by social entrepreneurs in the MHM sector in resource-constrained markets. The goal of this research is to identify the interdependencies between the three factors of innovation, social system and communication. The problem definition and the research goal translate into the following research question:

#### Research question

*How is the rate of adoption of low cost innovations influenced by factors regarding the innovation, social system and communication and their interdependencies?*

In order to so, a qualitative case study approach will be employed. This approach is considered appropriate as (1) the adoption of innovations in the resource-constrained market context is underexplored (Ratcliff & Doshi, 2013), (2) real-life situations that cannot be controlled are better studied through case studies to capture the nuances (Yin, 2003) and (3) it generates a high internal validity particularly for the ultimate user of research, the social entrepreneurs and other practitioners (Dul & Hak, 2008).

### 1.4 Contributions

The primary contribution of this research is the elaboration of Rogers' (2003) framework of adoption. Our model emphasizes that the adoption of innovations can only be explained if a systematic view is taken. This systematic view identifies the interdependencies between the factors of innovation, social system and communication and how they interact. It allows social entrepreneurs to gain a comprehensive understanding of the resource-constrained customers and



helps them in designing as well as marketing their product or service more effectively and efficiently, respectively. Eventually, it helps the social entrepreneurs in the attempt to solve a social and environmental issue.

## 1.5 Outline of the thesis

In the introduction, we have depicted the social as well as scientific urge for investigating the interdependencies between the factors influencing the adoption. We clarified that the adoption of low cost innovations in the MHM sector is tremendously important because of its social and environmental impact. We have furthermore presented Rogers' (2003) framework as the theoretical backbone of this study as it is (1) widely applied in diffusion literature and (2) needs to be elaborated considering the context. The theoretical chapter defines the concepts underlying the research context and then recapitulates Rogers' (2003) framework of the rate of adoption. The methodological part will justify the use of a qualitative case study approach and lays out the rationale for the case selection, data collection as well as data analysis. Moreover, it will extensively describe the coding operations necessary for a thorough case study. Following the methodology, we will summarize the findings made in the case and marketing analysis along the factors of innovation, social system and communication. In the discussion, we present our elaborated model and make inferences about the mechanisms behind the interdependencies of the three factors. We will then discuss our findings and their implication for theory and practice. Additionally, we describe the limitations of our study and possible future research topics. The concluding chapter will summarize the findings of the research.

## 2 Theoretical framework

*In the following section, we will present the theoretical framework for our study. First, we define the concept of resource-constrained markets (RCMs) and how it parallels but also distinguishes itself from the Bottom/Base of the pyramid (BoP) concept. We explain the significance of innovations in these markets and why social entrepreneurs gain importance. Although there is no dearth of low cost innovations addressing social problems, adoption of these innovations is rather low. We present Rogers' (2003) framework of the rate of adoption as the most suitable way to investigate the problem. Given the context of our research, however, we explain that the model needs to be elaborated by examining the interdependencies between the factors of the framework.*

### 2.1 Resource-constrained markets

Contextually speaking, menstrual hygiene management is an important social issue in emerging economies. Emerging economies are characterized by large income disparities, lack of good infrastructure and weak institutional arrangements (Ray & Ray, 2010). Research studies on emerging economies have taken multiple rubrics to examine social ills and their alleviation, for example, the Base of the Pyramid (BoP), informal economy and resource-constrained markets (RCMs) among others. The BoP approach has traditionally been multinational corporation (MNC) centric and intervention oriented. In both version 1.0 and 2.0, researchers have produced a plethora of prescriptions as to how large companies can find new markets for their existing products and services by adopting these to the local conditions (London, Anupindi, & Sheth, 2010; London & Hart, 2004). One of the shortcomings of the BoP approach is that little attention has been directed to carefully examining the alternative models of innovation offered by grassroots entrepreneurs (Ray & Ray, 2010).

RCM is an appropriate rubric for examining the menstrual hygiene management context for the following reasons. First, it describes the institutional voids that might exist in this market segment going beyond the income disparity of the consumers (Mair, Martí, & Ventresca, 2011). Not only does it describe the institutional voids but it also explores the social underpinnings that give rise to them. Second, it calls for a direct grassroots based involvement of the respective stakeholders. Such an approach to solving these social problems has been the work of social entrepreneurs (Mair & Martí, 2006). By taking the RCM approach, we can better investigate the innovation for a particular issue where governments and society at large have failed. Low cost product innovations introduced by social entrepreneurs fit very well into this category. The entrepreneurial process view also helps to focus on the strategies followed by social entrepreneurs facing extreme resource constraints. Even

though RCMs and their characteristics might primarily evoke the emerging economy setting, it could still be applied to specific pockets of developed countries that face similar socio-economic situations, for instance the inner cities.

## 2.2 Innovation in resource-constrained markets

Innovation is a mandatory condition to succeeding in RCMs (Antúnez-de-Mayolo, 2012). According to Prahalad (2012), the pre-requisite of resource scarcity transforms these markets into an 'innovation sandbox'. This sandbox describes the constraints in which organizations have to operate and innovate. The resource-constrained environment leads to a paradigm for low cost innovations (Agarwal & Brem, 2012). This kind of innovation has been given many names such as appropriate technology (Schumacher, 2009), disruptive (Christensen, 1995), frugal (Zeschky, Widenmayer, & Gassmann, 2011), cost (Williamson, 2010), resource-constrained (Ray & Ray, 2010) reverse (Immelt, Govindarajan, & Trimble, 2009) or scarcity-induced innovation (Srinivas & Sutz, 2008). They "mostly relate to the same definition of redesigning and developing both products and processes from scratch at minimum cost, addressing the region specific needs" (Agarwal & Brem, 2012, p. 2). Their striking characteristics can be summarized as born out of resource scarcity, cheap and simple, 'good enough' or functionally limited, respectively.

There are some resource-constrained product innovations which have been successful in their home markets and have eventually been marketed worldwide, such as the small washing machine Mini Magical Child, Galanz' low cost, energy-efficient and space saving micro wave (Zeschky, Widenmayer, & Gassmann, 2011) or GE's cheap ultrasound device (Immelt, Govindarajan, & Trimble, 2009). Again, the examples mostly stem from the commercial sector and MNCs which tap into the customer base of the emerging middle class (Jha & Krishnan, 2013; Zeschky, Widenmayer, & Gassmann, 2011). Very little research has focused on low cost innovations offered by social entrepreneurs who concentrate of the lower end of the resource-constraint markets (Karnani, 2012; Yunus, Moingeon, & Lehmann-Ortega, 2010).

## 2.3 Innovations solving a social problem in resource-constrained markets

Agnihotri (2013) argues that the resource-constrained consumer is misled to purchase luxury, purely aesthetic goods instead of saving that money for future investments in education or health care. The author requires businesses to make the most utilitarian goods and services affordable for resource-constrained consumers. Moreover, business, governmental, philanthropic and non-profit organizations' (NGOs) efforts to fight destitution have fallen far short of expectations or simply

overlooked these issues (Darabi et al., 2012; Zahra, 2009). Thus, it is argued that the time is ripe for entrepreneurial approaches to solve social problems (Darabi et al., 2012; Seelos & Mair, 2005). While low cost innovations diffused through MNCs are primarily motivated by profit maximization, low cost innovations by social entrepreneurs are “motivated by the goal of meeting a social need and predominantly developed and diffused through organisations whose primary purposes are social” (Mulgan et al., 2007, p. 8). In order to do so, they relentlessly engage in continuous innovating by using scarce resources efficiently and leveraging those limited resources through partnering and collaborating (Maclean, Harvey, & Gordon, 2013; Dees, 1998).

## 2.4 Problem of adoption

One of the necessary conditions for an innovation to succeed in the market is to be adopted by the consumers. Adoption is commonly understood as the decision to make full use of an innovation (Rogers, 2003). There is no dearth of low cost innovations invented by social entrepreneurs like solar cookers, power generation from waste or the \$ 1 glasses. Since their characteristics - being simple and affordable - are in line with the RCM's requirements, it seems reasonable to assume that these utilitarian innovations are adopted widely and fast. However, adoption of these products is rather low (Ramani, SadreGhazi, & Duyster, 2012). A thorough understanding of the customer is fundamental: if the product is not adopted by the customer, any following scaling efforts are useless. Tolba and Mourad (2011) emphasize that the advantages of an innovation finally leading to an adoption are likely to differ from those claimed by a manufacturer or distributor. Consequently, the analysis of the rate of adoption should consider the potential adopter's subjective perspective.

## 2.5 Rogers' framework: a model to examine adoption

As we have shown above, in order to analyse the potential adopter's subjective perspective, Rogers' (2003) framework of the rate of adoption will be applied. According to Rogers (2003, p. 5), diffusion is “the process in which an *innovation* is *communicated* through certain channels over time among the members of a *social system*”. The rate of adoption is the “relative speed with which an innovation is adopted by members of a social system” (Rogers, 2003, p. 221). Rogers presents three major factors affecting the rate of adoption: perceived attributes of an innovation, nature of the social system, change agents, type of decision and communication channels. Probably to stay in line with his definition of diffusion, he groups these five sub-factors under the factors of innovation, social system and communication channels (see Figure 2.1). We will explain Rogers' (2003) framework in the following sections. A brief overview is presented in Table 2.

Figure 2.1: Factors influencing the rate of adoption (in dependence on Rogers, 2003)

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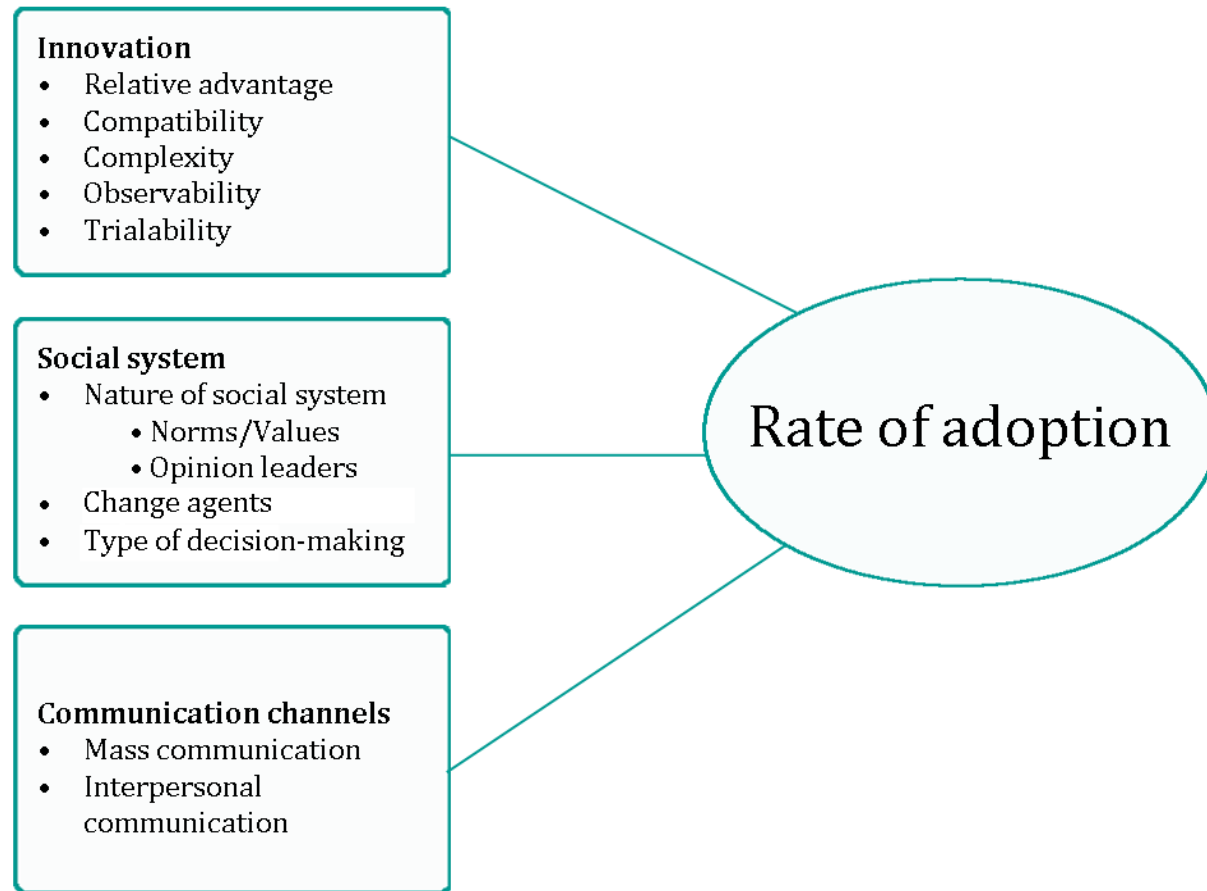


Table 2: Rogers' (2003) framework of factors influencing the rate of adoption

Factors	Sub-factor	Definition of sub-factor
Innovation	Relative advantage	Degree to which an innovation is perceived as better than the idea it supersedes
	Compatibility	Degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential
	Complexity	Degree to which an innovation is perceived as relatively difficult to understand and use
	Trialability	Degree to which an innovation may be experimented with on a limited basis
	Observability	Degree to which the results of an innovation are visible to others
Social system	Nature of system	Is determined by norms/values, opinion leaders and overall social structure and its interconnectness
	Change agent	Individual from outside the system who has influence in the social system
	Type of decision	Degree to which the individual has influence on the decision to adopt the innovation
Communication	Mass communication	Mass media channels (radio, television, newspaper) especially serve to make the audience become aware about the existence of an innovation
	Interpersonal communication	Interpersonal channels (face-to-face exchange) are more effective in forming and changing attitudes, eventually persuading an individual to accept a new idea

### 2.5.1 Innovation

The *relative advantage* of an innovation is the degree to which an innovation is perceived as better than the idea it supersedes. The potential adopter weighs the expected benefits of an innovation against its cost. The nature of the innovation and characteristics of the potential adopters determine which specific sub dimensions of relative advantage are most important to the adopter. The sub dimensions may take forms such as economic profitability, saving of time and effort and low initial cost but also a decrease in discomfort or social prestige.

*Compatibility* is the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential. The more compatible an idea is with a potential adopter's experience and situation, the less uncertain and more familiar it appears to the adopter and the faster it is adopted. A high compatibility, though, is not always beneficial when adopting a new innovation. For instance, if artworks are too similar to older works and thus less radical, they are unlikely to be adopted rapidly. An innovation might be incompatible with socio-cultural values and beliefs. Moreover, an innovation might be incompatible when interpreted against a standard provided by previous practice. It is eventually determined in how far the innovation is compatible with a felt need: When the innovation meets a need, a faster rate of adoption usually occurs.

*Complexity* is the degree to which an innovation is perceived as relatively difficult to understand and use. If a new idea requires the adopter to develop new skills and understandings, its rate of adoption is rather slow.

*Trialability* is the degree to which an innovation may be experimented with on a limited basis. If it is possible to try an innovation before actually adopting it, it results in less uncertainty for adoption.

The easier it is for individuals to see the results of an innovation, the more likely they are to adopt. *Observability* is the degree to which the results of an innovation are visible to others. Such visibility stimulates peer discussion and innovation evaluation of a new idea: Solar water-heating systems, for instance, are found in neighborhood clusters in California while many other city blocks have no solar water-heating system at all.

Except for complexity, the attributes are positively correlated with the rate of adoption: The greater the relative advantage, compatibility, trialability and observability of an innovation, the higher its adoption (Khorshidi & Rajab-Baigy, 2012; Rogers, 2003).

### 2.5.2 Social system

According to Rogers (2003), a social system is a set of interrelated units engaged in joint problem solving to accomplish a common goal. Achieving a common objective binds the system together. As diffusion occurs within a social system, it is influenced by the system's characteristics: its structure and norms, the role of opinion leaders and change agents as well as the type of innovation decision.

*Norms* are established behavior patterns for the members of a social system. They define which behavior is tolerable within the social system and thus serve as a guideline for its members. Norms are highly interrelated with the *compatibility* aspect of an innovation mentioned above.

*Opinion leaders* are homophiles members of a social system who are able to influence other individuals' attitudes through their unique and influential position in social system: As they are the center of interpersonal communication networks, they interconnect individuals and simultaneously serve as a model whose behavior is imitated by other members of the system.

A *change agent* is an individual from outside the system who has influence in the social system. He acts for a change agency outside the system. His aim is to influence the social system in a desirable direction by either fastening, slowing down or even preventing the adoption of an innovation. They often approach opinion leaders in order to reach their goals. As change agents are mostly heterophilous from the social system, effective communication can hardly take place. Consequently, change agent aides, who are usually homophilous, are engaged to bridge the chasm between change agents and the social system.

Innovations can either be adopted or rejected by an individual member of a social system or an entire social system. In *optional innovation-decisions*, the individual still is naturally influenced by the norms of the system and by communication through interpersonal networks but it is the main unit of decision making. In *collective innovation-decisions*, members of a social system must reach a consensus to either adopt or reject the innovation. The individual has, at least, a say in the decision-making. In *authority innovation-decisions*, individuals usually has no influence in the decision-making but implements the decision made by a relatively few individuals in a system who possess power, status or expertise. *Contingent innovation-decisions* can only be made after a prior decision consisting of a combination of two or more of the three types mentioned. While collective and authority innovation-decisions are mostly made in organizations or institutions, consumers rather



make optional innovation-decisions. Innovations stemming from authority decisions are adopted fastest, followed by innovations originating from optional and then collective innovation-decisions.

### 2.5.3 Communication

Generally speaking, communication is the process by which participants create and share information with one another in order to reach a mutual understanding. In the context of diffusion, communication is an information exchange through which one individual communicates a new idea to one or more individuals. Communication is especially effective if the two individuals are homophilous in certain attributes such as education or socioeconomic status.

In order to spread the idea, different communications channels can be used. A communication channel is the means by which messages get from one individual to another. Rogers differentiates between interpersonal and mass communication channels. *Mass media channels* such as radio, television or newspaper reach a large audience quickly. They especially serve to make the audience become aware about the existence of an innovation. *Interpersonal channels* such as face-to-face exchange, instead, are more effective in forming and changing attitudes. As it usually is a two-way exchange of information, it is more effective in dealing with resistance or apathy and eventually persuading an individual to accept a new idea. Individuals rarely rely on scientific studies evaluating the innovation. Instead, most people depend upon a subjective evaluation from peers. This dependence suggests that the diffusion process is a very social process that consists of modeling and imitating the peers.

Regarding the adoption of an innovation, Bass' (1969) model also gives much greater weighting to interpersonal communication. Gatignon and Robertson (1985) present two basic adoption models. There is the high cognitive processing, "hierarchy of effects" model which describes high consumer learning requirements, high innovation costs or high switching costs, high social imitation and a multiperson adoption decision within the family or organization. The low cognitive processing, "low involvement" model describes the complete opposite. The authors suggest that interpersonal communication is mainly operative under a hierarchy of effect model. They admit, though, that "the less the level of cognitive processing, the greater the impact of advertising" (p. 851). When interpersonal communication is in conflict with mass communication, the former has a greater influence on adoption. However, apparently it is not only the cognitive involvement that decides about the communication's influence but the cultural background. Rogers (2003) describes that in developing countries, interpersonal channels may take a similar role to that played by mass media

channels in more developed countries. However, mass media communication may also substitute for interpersonal communication in motivating the adoption of innovations in developing countries as well. Depending on various factors, both forms of communicating can heavily influence the adoption of a product.

## 2.6 The need for examining interdependencies

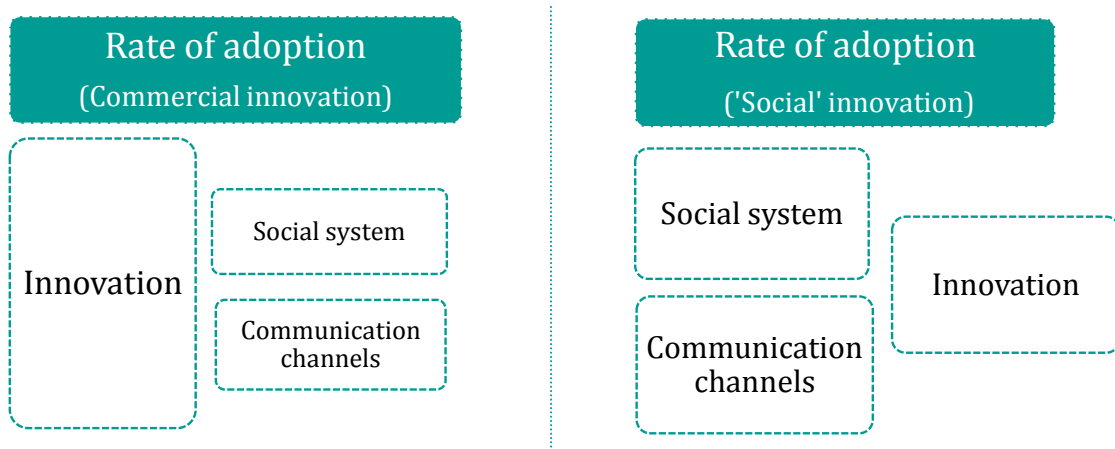
Most of the follow-up research regarding the rate of adoption justifies concentrating on the factor innovation solely because Rogers (2003) argues that 49 to 87 % of the variance in the rate of adoption of an innovation can be explained by the innovation itself, particularly by its attributes relative advantage and compatibility.

Empirical studies testing Rogers' framework in the context of low cost innovations by social entrepreneurs for RCMs are quite few in number. The impact of resource-constrained consumer behaviour on marketing strategies has been discussed but few authors paid attention to resource-constrained consumer behaviour as such (Barki & Parente, 2010) and their influence on innovation adoption. The studies that tested Rogers' framework in a RCM setting have not specifically referred to low cost innovations offered by social entrepreneurs. Moreover, they focused, like many other researchers as previously mentioned, on Rogers' (2003) five perceived attributes of innovations. Rahman, Hasan and Floyd (2013) found that relative advantage and complexity significantly influence the adoption of an innovation within RCMs. Other research in this field confirmed that relative advantage, compatibility and trialability play a major role in the adoption process (Ratcliff & Doshi, 2013). Weidner and Nakata (2011) propose that all three factors, innovation, communication and the social system, contribute to the rate of adoption in RCMs. However, they attribute the greatest influence to innovation. There is a plethora of data on adoption of innovations but the adoption in RCMs has been rather cited as anecdotal evidence than seriously considered in theory elaboration (Peres, Muller, & Mahajan, 2010, p. 102).

This lack of research is also paralleled in the field. When the social entrepreneurs introduced their product to the market, their main focus was on the innovation's characteristics. It seemed most important to offer a product which is simple to use and affordable. However, they found out that only considering the innovation's attributes leaves them with a rather low rate of adoption. Apparently, there were other reasons to adopt or reject a given product.

It might be true for commercial products that their rate of adoption can be primarily explained by the innovation itself, although here issues regarding communication and social systems bear importance as well (Peres, Muller, & Mahajan; 2010; Tuomi, 2002; Gatignon & Robertson, 1985). However, it seems reasonable that the role of social systems gains importance when it comes to social innovations (see Figure 2.3). Social networks and thus interpersonal communication is important in RCMs (Chikweche & Fletcher, 2010) and “advertising and society are closely intertwined insofar as advertising portrays the established social order” (Del Saz-Rubio & Pennock-Speck, 2009, p. 2536).

Figure 2.2: Factors might have a different relevance for a ‘social’ than for a commercial innovation



Moreover, we assume that the interplay between innovation, communication and social systems is crucial for any product but these interdependencies take on a core role in the adoption of low cost innovations especially the given context of MHM. Innovation adoption is a multidimensional process as it is influenced by factors within several dimensions (Damanpour & Schneider, 2006). Rogers (2003) himself indicates that the three factors innovation, social system and communication have not received equal attention from diffusion scholars. He explains that relatively few studies have untangled the rather complicated matter of how the social or communication structure affects the diffusion and adoption of innovations. To the best of our knowledge, there are no adequate details of these interdependencies to date. A vague attempt to describe the interdependencies has been made by Batz, Peters and Janssen (1999). When analyzing the influence of technology characteristics on Kenyan farmers’ rate of adoption, the authors briefly describe that the relevance of the technology characteristics can be explained by the characteristics of farmers and their social system. Wejnert (2002) underscores the need for a closer examination of the interactive triangle of innovation, social system and communication. Consequently, our study will take Rogers’ framework comprehensively to the field and examine the interdependencies between the three factors.

## 3 Methodology

### 3.1 Research design

Given the scarcity of empirical work in the area of product innovations offered by social entrepreneurs in RCMs and the need to obtain rich data from the field, we will employ a qualitative case study approach (Gerring, 2007; Yin, 2003). Da Silveira (2001) explicitly suggests describing innovation adoption in RCMs with the help of specific cases. We consider a case study approach to be appropriate for several reasons. First, it is useful for exploring areas where existing knowledge is limited (Eisenhardt, 1989). Second, it is valuable in generating an understanding of a real-life situation that cannot be controlled by the researcher (Yin, 2003). Third, and in our opinion most important, it generates an insight and high internal validity particularly for the ultimate user of research, the social entrepreneurs and other practitioners (Dul & Hak, 2008).

We apply a multiple case study design as analytic conclusions stemming from a multiple case study are more powerful than those from a single case study (Yin, 2003). The selected cases are first subject to a within-case and then a cross-case analysis. The within-case analysis attempts to identify the factors influencing the rate of adoption for every single case. The cross-case analysis searches for patterns and allows us to elaborate Rogers' preliminary model (Lee, Mitchell & Sablynski, 1999; Eisenhardt, 1989). We attempt to elaborate rather than test or build theory as Rogers' (2003) preliminary model drives the study's design. Typically, formal hypotheses are not present (Lee, Mitchell & Sablynski, 1999).

We investigate how the leading brands in the respective countries portray menstruation in TV commercials because of two reasons. First, it emphasizes the case findings regarding the factor 'social system' as "advertising and society are closely intertwined insofar as advertising portrays the established social order" (Del Saz-Rubio & Pennock-Speck, 2009, p. 2536). Second, it underscores the case findings regarding the factor 'communication'. By making use of pictures, images and music, TV commercials make an emotional-suggestive approach to make an advice or a recommendation to the audience (Del Saz-Rubio and Pennock-Speck, 2009). As lacking education regarding menstruation and reproductive health leaves the girls and women uninformed or very little informed about these very issues, young people tend to rely on information gained from peers or mass media (Garg, Goyal, & Gupta, 2012).

In order to assure validity and reliability, we primarily follow Yin's (2003) tactics. In order to advance external validity, we follow a literal replication logic when designing the research. Thus,

similar cases are selected to provide compelling support for the findings. Moreover, the triangulation of multiple sources of evidence increases construct validity. Reliability is enhanced in two ways. First, we stored all collected data in an Atlas.ti 7 database. Second, two independent coders assured inter-rater reliability. The first one coded the 15 most important sources for the case analyses, while the second one coded the TV commercials. Before coding, we created a codebook for the second coders. Then, the data has been coded in an iterative process consisting of independently coding the data and jointly discussing discrepancies. During this process, the codebook has possibly been modified (Hruschka et al., 2004). Reasons for the disagreements were that one of the coders (1) used another coding category, (2) did not see strong enough evidence and (3) had a different interpretation of the data. The percent agreement is 94.27 % and 93.82%, respectively. Consequently, a high inter-rater reliability is assured compared to published standards (Lombard, Snyder-Duch, & Bracken, 2002).

## 3.2 Case selection

Case study research means sampling theoretically, not randomly as (1) due to the limited number of cases it makes sense to select those that are 'transparently observable' and (2) because the research goal is to elaborate theory rather than obtaining accurate statistical evidence (Yin, 2003; Eisenhardt, 1989). We selected three cases from the population of social entrepreneurs in the menstrual hygiene management sector in RCMs: Ruby Cup, AfriPads and Eco Femme. As mentioned, we followed the literal replication logic to increase external validity (Yin, 2003) as all three cases exhibit a rather low rate of adoption. To further broaden external validity and the potential applicability of the results, we selected cases from different regions of the: Kenya (Ruby Cup), Uganda (AfriPads) and India (Eco Femme). Besides their geographic diversity, we selected the cases based on information availability and accessibility, especially considering time constraints. We briefly describe the three cases in the following sections.

### 3.2.1 Ruby Cup

Ruby Cup was founded by the three former college fellows Julie Weigaard Kjaer (DEN), Maxie Matthiessen (GER) and Veronica D'Souza (DEN) in 2011. The venture runs an office in Berlin as well as in Kenya. Its overall mission is to provide a healthy and sustainable menstrual hygiene solution to women and girls worldwide.

The Ruby Cup is a menstrual cup that needs to be inserted into the vagina in order to capture the menstrual blood. It is made out of 100% medical grade silicone. When it is full, it is emptied and

inserted again. In order to assure hygienic use, the cup must be boiled for five minutes and then stored in the Ruby Cup bag once a month between menstrual periods. It is reusable for up to 10 years. Under the supervision of the Danish medical company Coloplast, the Ruby Cup is produced in China.

In Kenya, Ruby Cup's main target group consists of women between 15 and 35 at both upper income and lower income level. These different income levels are reached via two different distribution models. In order to reach the upper income level, the Ruby Cup is distributed through the extensive network of Harleys Ltd., a leading distributor of pharmaceutical products in Kenya, for approximately \$ 18. However, Ruby Cup eventually wants to enable underprivileged girls to go to school without being afraid of leaking during their period. It is currently targeting the school girls in the slums of Nairobi, namely Kibera, Kawangware and Korogocho. In order to reach these girls, Ruby Cup follows two distribution strategies. First, it works closely with NGOs that purchase the product in bulk sales and distribute it for a small price in local communities. Second, for every cup sold in the Western market for \$ 35, a Ruby Cup for a Kenyan school girl is cross-subsidized ('Buy One, Give One').

### 3.2.2 AfriPads

AfriPads was founded by the couple Sophia Klump (USA) and Paul Grinvalds (CAN) in Uganda in 2009. The social business manufactures and sells cloth pads in dependence on the Canadian brand LunaPads. AfriPads' mission is to empower women and girls through business, innovation and opportunity.

AfriPads are made of poly-cotton material with a plastic layer for leak protection. They are sewn by about 50 Ugandan women and last up to one year. AfriPads are sold in a menstrual kit which consists of holders, winged pads, straight pads and a carrying bag. The Deluxe Menstrual Kit costs \$ 4.60, while the Comprehensive Menstrual Kit costs \$ 5.70. Partnerships with the Marie Stopes Clinics and Plan Uganda make it possible to offer the kit for \$ 2.10 and \$ 2.70, respectively. To date, AfriPads are sold in East Africa only.

### 3.2.3 Eco Femme

Eco Femme is a social business that was established in Tamil Nadu, South India, in 2010. It has been founded by Kathy Walkling (AUS), Jessamijn Miedema (NL) and Anbu Sironmani (I) under the umbrella of Auroville Village Action Group (AVAG). Eco Femme's program consists of three basic

elements: A washable pad; the profit sharing with local, female producers stitching the pads; and education modules to break the taboo and enabling women to have a choice. Eco Femme's mission is to promote and revitalize menstrual practices that are healthy, dignified, affordable, and eco positive.

Eco Femme's cloth pads consist of an absorbent flannel and leak-proof layer made of Polyurethane laminate (PUL). They are reusable up to 75 washes. The pads are produced by 10 local, economically disadvantaged women who are members of AVAG's self help groups. They are sold both in India as well as Western markets. Eco Femme pads are sold through online stores to particularly UK, Germany, Italy and Netherlands. In India, they are made available at about \$ 1.40 per pad in high-end shops. For every pad sold in the international market, a donation of \$ 1.30 is credited to Eco Femme's 'Pad for Pad' scheme, which enables a girl from rural India to get a free cloth pad.

### 3.3 Data collection

A thorough case study requires triangulating the data by using multiple sources of evidence (Yin, 2003). We generate the first round of findings through secondary data and then close the gaps left from the desk research by primary data.

#### 3.3.1 Secondary data: Documentation

The social entrepreneurs' websites served as a starting point for the research. Partly, the websites provided market research results and testimonials. In all three cases, the websites forwarded to press articles about the social business. With the help of the search engine Google, we then found additional press releases, radio interviews, Youtube videos and, for Ruby Cup, one of the entrepreneur's master's thesis. After the interviews, additional internal material was provided by the social entrepreneurs.

#### 3.3.2 Primary data: Semi-structured interviews

According to Judah et al. (2009, p. 405), interviewing participants regarding health-related behavior can be unreliable as it is "morally laden and hence tends to be vastly overreported in interviews". Moreover, as individuals in collective cultures do not want to lose face, interviews might generate answers which are only meant to please the interviewee (Hofstede, 2003). However, the alternative of unobtrusive monitoring suggested by Judah et al. (2009) could not be implemented due to geographical distance and time constraints. Instead, we conducted semi-structured interviews with

key informants within the social enterprises in order to affirm the findings but, more importantly, close the gaps left from the desk research.

Depending on the richness of secondary data, the interviews consisted of seven to ten questions. We conducted the interviews via Skype and recorded them with the freeware MP3 Skype Recorder 4.3 or Audacity 2.0.5, respectively. Keeping time constraints in mind, we transcribed interviews only at the points where a code was linked in Atlas.ti 7. The interview with AfriPads took place at 10 am on June 12, 2014, and was conducted with Helen Walker, AfriPads' communication liaison officer in Uganda. The interview lasted about 1 ½ hours. The interview with Eco Femme took place at 1 pm on June 13, 2014 and was conducted with Kathy Walkling, one of the Eco Femme founders. The interview lasted 66 minutes. Both interviewees allowed follow-up questions which were then answered by email. Ruby Cup agreed to an interview but, unfortunately, it could not take place due to their tight schedule.

### 3.3.3 TV commercials

For our marketing analysis, we chose eight TV commercials from Kenya, Africa in general and India. Timeliness but also theme variety is the most important selection criteria. We retrieve the commercials from Youtube (see Table 3).

*Table 3: The eight chosen TV commercials*

TV commercial	Brand	Country	Year
How to avoid period leaks	Always (Procter & Gamble)	Kenya	2014
Show your confidence	Always (Procter & Gamble)	Kenya	2013
Protection just got fresher	Always (Procter & Gamble)	Kenya	2012
Check Check	Always (Procter & Gamble)	East & West Africa	2010
Job Interview	Stayfree (Johnson & Johnson)	India	2012
School sports	Whisper (Procter & Gamble)	India	2012
Highschool	Whisper (Procter & Gamble)	India	2012
Dance competition	Whisper (Procter & Gamble)	India	2012

The African TV commercials are in English, while the Indian ones are in Hindi. We transcribed Hindi commercials with the help of an Indian PhD candidate at the University of Twente. Raja Singaram then re-checked the translation.



## 3.4 Data analysis

All data collected, documentation and interviews from the cases as well as the TV commercials, will be analyzed within a content analysis. A content analysis is the “study of recorded human communications” (Babbie, 2013, p. 295). Originally, content analysis was meant to quantify qualitative data through the capture of the presence whereas nowadays it is more widely applied to capture meaning (Lerman & Callow, 2003). It basically is a coding operation transforming raw into structured data (Babbie, 2013). The coding will be implemented with the help of Atlas.ti 7.

### 3.4.1 Documentation and interviews

Documentation and interviews are coded line-by-line and in a cyclic process (Saldaña, 2009). The first cycle of the coding process attempts to fracture and split the data in order to identify the factors influencing the rate of adoption. The second and following cycles eventually determine their interdependency. The process of coding was accompanied by memo-writing in order to reflect on the coding process.

Eisenhardt (1989) acknowledges that a priori specifications of constructs can help measuring these very constructs in the data. Saldaña (2009) asserts that these constructs enable the researcher to directly answer the research questions. During the first cycle, we apply *provisional* coding as the study elaborates a previous study (Saldaña, 2009). Consequently, we generate a start list of codes based on Rogers’ (2003) definition of the three factors in order to efficiently code the data and provide a certain degree of reliability. Miles and Huberman (1994) recommend a start list ranging from 12 to 60 codes. We generate 35 codes from theory but during the coding operation, we delete, change or expand the list of codes. Eventually, we use 76 codes. We analyzed the data along the start list of codes. For instance, we coded a quote indicating that the husband decides about the purchase of a menstrual hygiene product *inter alia* as ‘Social system: Type of decision making: authority: men’. One quote can generate not only one, but various codes. Adopting an innovation takes place in a social system and neither is a neat nor isolated action. Thus, multiple meanings justify more than one code and make *simultaneous coding* necessary (Saldaña, 2009). For instance, we coded the previous example also as ‘Social system: Social structure: Position of men’.

Next to provisional and simultaneous coding, we use *magnitude coding* as we attempt to identify which factors do and do not influence the rate of adoption. This type of coding “adds a supplemental alphanumeric or symbolic code or sub code to an existing coded datum or category to indicate its intensity, frequency, direction, presence, or evaluative content” in order to refine or specify the code

(Saldaña, 2009, p. 58). We added a '+' to a quote indicating that a factor has a positive influence on the rate of adoption, while we marked a quote indicating that a factor has a negative, no or unknown influence will be marked with a '-', '/' or 'N/A', respectively. Staying in line with the previous example, we coded a quote indicating that the husband making the decisions has a positive, negative, no or unknown influence on the rate of adoption as 'Social system: Type of decision making: authority innovation decision: men: +,-/, N/A'.

The goal of the second and following cycles is the identification of the interdependency between the factors influencing the rate of adoption. Pattern coding identifies "an emergent theme, configuration, or explanation" (Saldaña, 2009, p. 152) and thus identifies how the factors interact. Magnitude coding is also applied here as it assesses variability and dimensions of a code. In practice, it means simply counting the frequency of a code. Eventually, the goal of the last coding cycle, the elaborative coding, is to analyze the data by comparing it to previous research in order to develop theory further (Auerbach & Silverstein, 2003) or confirm it.

### 3.4.2 TV commercials

We investigate how the leading brands in the respective countries portray menstruation by mass communication. There are various ways to analyze advertisement but a detailed analysis of the commercials would expand the horizon of the thesis. We considered identifying the overall themes of the TV commercials by analyzing the textual content and visuals images as the most suitable method since "issues, values, beliefs, and attitudes are usually discussed in this form" (Kassarjian, 1977, p. 12). We capture the theme(s) in the TV commercials by coding them and then compare them with the results from the case studies. Eventually, they affirm, deny or expand the findings.

## 4 Findings

*As we aim to elaborate Rogers' framework, we will report our findings of the case and marketing analysis along Rogers' framework of the rate of adoption as presented in Table 2. First, we show that the adoption cannot be explained by innovation attributes solely but requires an understanding of the interdependencies between the three factors. Then, we illustrate each interdependency in rich detail by examining the social system and communication environment closely.*

### 4.1 The explanatory power of innovation attributes?

We structure our findings along the innovation attributes of relative advantage, compatibility, complexity, trialability and observability.

#### 4.1.1. Relative advantage

As Rogers (2003) and Rahman, Hasan and Floyd (2013) predicted, we found that the relative advantage of a product influences its adoption to a large extent.

*Decrease in discomfort.* Women appreciate that they feel better when using the offered products. This enhancement of well-being is expressed in different ways. First, physical well-being is improved. The alternative methods used before, mainly old cloth, were uncomfortable to wear as they scratched the thighs and caused vaginal infections. These problems are solved by using the new product. Eco Femme as well as AfriPads users emphasize that the pads are very comfortable to wear due to the used materials of flannel and poly cotton, respectively.

“Before with the pads I would get wound between my thighs” (Grace, Ruby Cup user)

“[AfriPads] have high quality materials and they do not scratch our thighs” (Miriam, AfriPads user)

Second, emotional well-being is improved. The women express that using the new products makes them feel “free”: their physical and social mobility increases as the offered products allow them to run, swim and jump which has not been possible with the methods used before. The emphasis on the relative advantage of mobility can be found in the TV commercials as well (A, B, D, F, G, H<sup>1</sup>). Additionally, as the offered products are long-term investments, the women do not have to worry every month about how to get pads. In contrast to traditional methods, the new products reliably prevent leaking and create no stains on the women's clothes. The offered products cannot fall down on the ground because they are either attached to the underwear by wings (Eco Femme & AfriPads)

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<sup>1</sup> Numbers in brackets indicate the TV commercial analyzed

or inserted (Ruby Cup). It has been further mentioned that the new products do not start smelling like disposables do after a while. The fear that the scent reveals their secret seems to be a big issue for the women as the TV commercials we analyzed capitalize on this anxiety as well (C).

“Initially, when I was on my P’s and sat in public everyone could know because of the bad scent. Since I am using AfriPads, the scent has disappeared, so no one can know” (Moreen, AfriPads user)

Furthermore, women expect the products to be invisible under their clothes. Local products are often rejected because they are lump and bulky, thus easily revealing that the woman is currently menstruating. The offered products do not show it as they are either inserted (Ruby Cup) or quite thin as Western disposable products (Eco Femme & AfriPads). Consequently, the offered products avoid that other people know the woman is menstruating.

*Economical.* The price of the offered products is important for their adoption. Many women recognize that buying the products is economical in the long-run. However, the initial cost for the offered products is higher than the alternative products available in the market (see Table 4).

*Table 4: Price of the offered products and alternatives compared to women’s monthly spending*

	<b>Eco Femme</b>	<b>Ruby Cup</b>	<b>AfriPads</b>
<b>Price</b>	<b>\$1.40</b> (single pad) <b>\$ 4.90</b> (kit) <b>Free</b> (lower market)	<b>\$ 18</b> (upper market) <b>Free/Symbolic price</b> (lower market)	<b>\$ 2.10 – 2.70</b> (kit; price depends on distributor)
<b>Alternatives in the respective market<sup>2</sup></b>	<b>\$ 0.50 – 1.15</b>	<b>\$ 0.60 – 0.70</b>	<b>\$ 1 – 1.15</b>
<b>Average spending on menstrual hygiene<sup>3</sup></b>	<b>&lt; € 0.50</b>	<b>&lt; \$ 1.10</b>	<b>&lt; \$ 1</b>

<sup>2</sup> Price/package of 10-15 pads

<sup>3</sup> Per month, estimated by social entrepreneurs

On the one hand, the products must be offered for a low price because otherwise resource-constrained consumers cannot afford it. On the other hand, offering it for a very low price transmits a wrong image about the product's quality, especially in Ruby Cup's case.

"Low price is not necessarily attractive as this can signal bad quality" (Veronica, Ruby Cup founder)

Overall, the price itself plays an important role in adoption but apparently there are other pivotal mechanisms. For instance, although the Ruby Cup has once been offered for \$ 1.10, only a few Ruby Cups have been sold. Moreover, girls continued to buy disposable pads, although AfriPads have been provided for free in the course of one trial.

*Appeal.* We observed that a product's appeal has a great influence on its rate of adoption. Menstrual hygiene products need to be discrete in their function but women appreciate the offered products' colorful outer appearance. Ruby Cup comes in a pink-creamy box while Eco Femme cloth pads are made of flannel with a floral design. AfriPads are available in the colors light pink and light blue. Especially in the African TV commercials (A-D), the preference for bright colors can be observed as well.

"Here in Korogocho, we like the color pink and we also like flashy and shiny packaging because this shows us that the product is modern and all the cool girls in the city use it" (Rebekka, Ruby Cup user)

We observed a general preference for branded, particularly Western disposable products. Western products are taken as the benchmark the offered products are compared to. Women like that the Eco Femme and AfriPads have wings like disposable pads have. This resemblance helps the offered products increasing their adoption to some extent. However, the lack of complete parity hinders their adoption. Women prefer buying disposables as they express modernity and increase their social status.

#### 4.1.2 Compatibility

Women assess if the offered product is compatible with their previous experience, their norms and values and needs. As Rogers (2003) predicted, we observed in various ways that compatibility is important when deciding whether to adopt or reject the product.

*Norms and values.* We observed that norms and values essentially drive a product's compatibility. Although the APHRC study (2010b) Ruby Cup originally based their business on found that menstrual cups are generally accepted in Kenya, inserting a product is still a rather unknown

concept in RCMs. It is not compatible with the women's norms and values as women refer to cultural beliefs that forbid the insertion. Even in the cases of AfriPads and Eco Femme, where insertion is not applicable for the product, it has been mentioned that inserting a product is generally not appreciated much by women in Uganda and India, respectively.

"In India, too, women prefer external products and there is not a cultural acceptance of internal products unlike in the West" (Kathy, Eco Femme founder)

"Insertion materials generally were seen as culturally inappropriate, with girls questioning their effects on fertility and health" (Loughborough University acceptability study on AfriPads)

"When we asked [women] what they did not like so much about using the cup some reasoned that it needs to be inserted in the vagina" (WoMena acceptability study on Ruby Cup)

Furthermore, women prefer product names that are in line with their norms and values. Women are reluctant to buy a product whose name indicates that they are buying a menstrual product. AfriPads, for instance, has recognized that its name is rather counterproductive for the adoption of its product.

*Previous standards.* Besides norms and values, women compare the offered products against their previous standards. Women are generally suspicious towards a new product, although Eco Femme and AfriPads' users are at least familiar with the form of the offered product. Women that have used cloth before are more willing to use washable pads as they have to wash cloth as well. The women that have used disposables before are more reluctant to 'change back' to products which require more time and effort.

The price is a reinforcing mechanism when comparing the offered product against previous standards. Women using cloth are wondering why they should spend money on just another kind of cloth when they can get old cloth for free. Women using disposables ask themselves why they initially should spend more money on a product which is not as good as the previous standard regarding design and disposability.

*Meets a felt need.* Depending on the situation the women have been in before, the offered products meet the women's needs. Women who struggled with infections, smelly disposables or unaffordable sanitary pads recognized that the offered products meet their needs in a better way. Apparently, this attribute of compatibility is closely linked to the attribute of relative advantage.

### 4.1.3 Complexity

Rahman, Hasan and Floyd (2013) found that, besides relative advantage, complexity mainly determines the rate of adoption in RCMs. They found that the easier it is to use and understand a product, the more likely it will be adopted. We found evidence that women assess in how far the offered products are easy to use and particularly easy to maintain by comparing them to their previous standards. Consequently, complexity and compatibility are linked to each other.

*Difficulty to use.* We found that women determine the difficulty of using a product when comparing it to their previous standards. As women are familiar with pads, AfriPads and Eco Femme face no obstacles regarding their product form. We have identified, though, that women express a physical discomfort and anxiety when inserting something into their body such as a menstrual cup.

*Difficulty to maintain.* Again, women compare the offered product to their previous standards when assessing its difficulty to maintain. The offered products are easy to maintain for the women who have used cloth pads before. Water shortages or handling of blood do not constitute a major problem. For women using disposables, though, the offered products mean giving up the simplicity and convenience of disposability as they need to be maintained.

“Especially for women who have already started using disposables using cloth is a primitive backward step. Why would they do that? Now they have got this freedom of disposability” (Kathy, Eco Femme founder)

“Women who used disposables before wonder why they should engage into washing pads each month although they could enjoy the convenience of disposability” (Helen, AfriPads communication officer)

### 4.1.4 Observability

On the one hand, women expressed a great willingness to try the products offered by the social entrepreneurs as soon as the peers recommended it. Consequently, the results of the innovation stimulate discussion. On the other hand, however, the offered products require a certain amount of maintenance as they are not disposable. Considering the circumstances in RCMs, women have to handle the offered products publicly which is not appreciated. A high degree of observability did rather decrease the rate of adoption.

#### 4.1.5 Trialability

A high degree of trialability is supposed to positively influence an innovation's rate of adoption. Generally, the trialability of a menstrual product is rather low as it is only used once a month. Moreover, we found that the trialability of the offered products is hampered by their high initial costs. Despite the fact that AfriPads and Eco Femme users are mainly familiar with the form of the product, it is a new product in the market the women are naturally suspicious towards. For the women, the cost/risk ratio is too high. However, although Ruby Cup increased the cup's trialability by offering a warranty on the product, the rate of adoption did not increase.

#### 4.1.6 Concluding remarks

The social entrepreneurs examined in our cases designed their products based on what they initially believed were the most obvious attributes to achieve a high rate of adoption: economical (relative advantage) and simple (complexity). In reality, focus on these two innovation attributes alone did not help them achieve the intended rate of adoption. The question then emerges as to why this is the case.

When we take a closer look at innovation attributes such as 'decrease in discomfort', we have to be mindful that it goes beyond individual well-being but can also be influenced by the individual's social surroundings. Similarly, as shown in the previous section, affordable price could both increase and decrease the adoption of the offered products. Therefore, it is important to grasp the mechanisms behind relative advantage to manage it in the right way. Moreover, there are other products in the market which are even more appealing to the women, so appeal of the offered products as such is not sufficient to increase their rate of adoption. Compatibility is another attribute to consider. When the new product is not compliant with the women's norms and values, extant standards and perceived affordability, its adoption is hindered. Finally, from the previous analysis we have shown that against Rogers' assumptions, a high degree of observability and trialability rather decreases the adoption of the MHM products.

Thus, a complete answer could not be found when looking at innovation attributes solely. A full explanation for the phenomena of a low rate of adoption is more likely to be found when considering the social system and the communication environment as well. Therefore, in the following section we turn our attention to examining the interdependencies one after another.



## 5 Discussion

### 5.2 Implications for theory

Rogers' rate of adoption framework (2003) is widely applied in research studies that deal with the diffusion of innovation. We can confirm Rogers' claim that innovation itself has a great influence on the rate of adoption. However, extant empirical studies testing Rogers' framework have narrowed down their focus to innovation's attributes (e.g., Rahman, Hasan & Floyd, 2013) rather than taking a comprehensive view of all the three factors namely, innovation, social systems and communication. Given the context and the nature of the product, we expected that there could be interdependencies between the three factors but there were no adequate details of these interdependencies. The case analyses along with the marketing analysis provided us with the empirical proof that the innovation, social system and communication environment are highly interdependent. We then abstracted the kinds of interdependencies in three broad kinds of interdependencies. Consequently, we have introduced a new dynamic of interactions to Rogers' framework. In doing so, we have untangled the rather complicated issue of how the social or communication structure affects the diffusion and adoption of innovations. The understanding of the interdependencies has revealed some counterintuitive results as well when it comes to adoption. In this research stream, for instance, it is expected that a high degree of observability increases an innovation's rate of adoption (Khorshidi & Rajab-Baigy, 2012; Rogers, 2003; Gatignon & Robertson, 1985). However, in a situation where discretion of use is an important product attribute, observability might turn out to be counterproductive for adoption. The low cost alternatives offered by the social entrepreneurs require maintenance in the form of washing and drying which is publicly observable due to the women's lack of privacy. Consequently, in our cases the high degree of observability has a negative influence on adoption. Next to a high degree of observability, it is predominantly expected that low price increases an innovation's adoption. Gatignon and Robertson (1985) proposed that the lower the innovation's price, the faster its rate of adoption. Within the resource-constrained context, Nakata and Weidner (2013) assert that affordability moderates the negative relationship of poverty to new product adoption. We can confirm that affordability plays an important role in the adoption of low cost innovations in RCMs. However, we revealed that besides affordability itself, its interaction with other attributes influencing the rate of adoption needs to be examined carefully. The cases showed that products were not adopted although they were affordable. Moreover, a low price can even lead to rejecting the product as it may signal that the product is meant for poor people. Our findings are more in line with Olshavsky (1980) as well as Desiraju, Nair and

Chintagunta (2004) who found no significant correlation between the cost of an innovation and its adoption.

These observations are not only crucial for theoretical work on adoption of innovation but also for disruptive innovations. Hart and Christensen (2002) suggest that the BoP market is the perfect market for introducing a disruptive innovation. In their opinion, the market is perfect for a disruptive innovation as it is (1) poorly served or not served at all and (2) requires a simple and affordable product. Christensen et al. (2006, p. 111) add that the innovation “may be perceived as having a lower level of performance, but users consider them to be good enough”. Based on our findings, we argue that a product with these very product characteristics solely will not disrupt the market. Resource-constrained consumers are used to being offered inefficient, poor quality products and service (Barki & Parente, 2010; Seelos & Mair, 2005). We revealed that this is particularly because of the history with NGOs. In line with Barki and Parente (2010), we found that dignity plays an integral role in RCMs. In their eyes, a no-frills and simple format of a product “reflects disregard and lack of respect for their dignity” and transmits the feeling of not deserving a better product (Barki & Parente, 2010, p. 17).

Besides innovation, we have some contributions to marketing research as well. Our analysis showed that, among others, dignity and social status are selling points in Western media. The examination of interdependencies contributed to our understanding of how Western marketing for menstrual hygiene products creates an aspiration for its brand in RCMs. To date, research in this field has concentrated on Western markets only (Raftos, Jackson & Mannix, 1998; Merskin, 1999; Simes & Berg, 2001; Del Saz-Rubio & Pennock-Speck, 2009). Even there, menstruation is depicted as a ‘hygienic crisis’ or ‘curse’ that is to be managed and controlled (Merskin, 1999; Simes and Berg, 2001). In the RCM context, where the taboo is even stronger than in Western markets, the MNCs and their media message makes it a selling point. They entice their audience with the claim that their product helps concealing the experience of menstruation. This in line with the criticism offered by Karnani (2009) in that many corporations may exploit poor people’s vulnerabilities, such as their lack of education and their desire for cheap relief from chronic distress. This inadequate consumer protection raises ethical concerns regarding the implications of this marketing approach by MNCs (Landrum, 2007).

### 5.3 Implications for practitioners

While the latest social entrepreneurship literature has concentrated particularly on organizational efforts such as social scaling (Desa & Koch, 2014; Bloom & Smith, 2010) and the influences of networks (Dufays & Huybrechts, 2014; Coviello, 2006), we direct back to the fundamental customer perspective. We argue that carefully considering that perspective is important for social entrepreneurs. Initially, they have been very enthusiastic about their product innovations and designed them based on the, what they believed, most important product attributes to trigger a high rate of adoption: affordability and simplicity. Our study showed that it is necessary to moderate the expectations for a high rate of adoption and return back to a more realistic view. The results of the study stress the importance for social entrepreneurs offering low cost innovations to gain a comprehensive view on the resource-constrained customers. The identification of the determining, enhancing and impeding mechanisms helps understanding how the adoption of an innovation is influenced by the factors of innovation, social system and communication. For the social entrepreneur active in MHM, the identified interdependencies could serve as a guideline or checklist in order to design an effective product but also marketing strategy.

### 5.4 Limitations and future research

We attempted to bring this research to its completion as much as possible but still methodological as well as practical gaps remain open for future research to investigate. Although there is no ideal number of cases, Eisenhardt (1989) suggests analyzing between four and ten cases. Fewer than four cases do not generate a complex theory while it is difficult to cope with the volume of the data of ten cases. Originally, we even had more than four cases but they were either (1) still in the pilot stage, (2) secondary data was very little or (3) the social ventures did not respond to interview requests. We suggest further case studies to ground the findings even more and to increase generalizability.

Time constraints constituted a further limitation for this study. Eisenhardt (1989) asserted that case study research should be finished as soon as theoretical saturation is reached. We think that we have reached a certain degree of completeness that was required to answer the research question but theoretical saturation could possibly not be reached fully due to time limitations. As there was not sufficient time, it was difficult to assure for a thorough inter-rater reliability. First, although the inter-rater reliability percent agreement was over 90 %, we are aware that percent agreement is not the best way to calculate inter-rater reliability as it fails to account for agreement that would occur simply by chance. Using measures like Cohen's Kappa ( $\kappa$ ) or Krippendorff's Alpha ( $\alpha$ ) would have been more accurate (Lombard, Snyder-Duch, & Bracken, 2002). Moreover, the second coder only

coded the sources containing the most important information but not the complete dataset. The reliability of the findings could be strengthened if more coders coded the data or a bigger part of it. Furthermore, because of time restrictions and geographical distance constraints, there can be shortcomings in depth of the research (Eisenhardt, 1989). For health-related case studies, Judah et al. (2009) suggested unobtrusive monitoring. This method could not be implemented because of the reasons mentioned above. However, we think that the interviews with the key informants of the social ventures are of high validity as they have gained some trust from the women in RCMs and can answer the questions objectively. Future researcher might physically go in the field to obtain even more accurate data. Considering the findings from this study, we recommend to engage change agent aides to get valid answers.

From a practical point of view, we would like to mention that the ranking in reporting the various attributes does not allow making any inference about their relative importance. Moreover, we are not claiming that this list is exhaustive. From our observation, these attributes were mentioned the most often but all of them could be equally important in different situations. The study serves as a good starting point for exploring the topic rather than providing conclusive empirical findings. Ratcliff and Doshi (2013) assert that a narrative approach can have difficulties answering how the factors reinforce or offset each other. Consequently, an explanatory case study approach is needed in future research to assess cause and effect relationships.

The findings of our study also raise new questions that are worth investigating in future research. We structured them along the research streams of adoption, BoP and social entrepreneurship. It might be interesting to identify to what extent factors outside of Rogers' (2003) framework influence the adoption of low cost innovations. Factors such as weather conditions, unready distribution as well as access to water, soap and underwear have been mentioned in the case studies but no inferences could be made regarding their influence on the adoption. Wejnert (2002) also suggest that next to innovation, environmental aspects should be considered when examining the adoption of innovations.

Our analysis made no distinction between rural and urban and old and younger women. This was especially because the social entrepreneurs themselves have been struggling identifying their target group. Moreover, our goal was to identify and display a comprehensive overview about the interdependencies and expose where they stem from and how they work. It is advisable for future research to differentiate between the different target groups in order to specify the

interdependencies for each of them. When examining the cases, the question emerged if there are different factors influencing the rate of adoption of the various adopter categories. Rogers (2003) enumerates the different categories of adopters as innovators, early adopters, early majority, late majority and laggards. This examination went beyond the scope of our study but might add to the understanding at what stages of the product lifecycle certain interactions between the factors must be paid attention to.

We agree that “firms [should] devote significant time and resources to understanding the needs and specific cultural context of low-income customers in their target market, and then develop an entire strategy of education, distribution, and service to go with a new product or service designed to match these needs” (Ratcliff & Doshi, 2013, p. 2) Additionally, we stressed the importance that it is fundamental to understand the interdependencies between the strategic elements. This theme of ‘co-creation’ has taken a central role in BoP literature (London, 2008; Simanis, Hart, & Duke, 2008). We did not find consistent pattern across the cases but in Ruby Cup’s case it has been mentioned that the involvement in the co-creation process gave the resource-constrained consumers the feeling of being pitied and treated as poor. Future research might investigate if the involvement of resource-constrained consumers is an attribute increasing or decreasing the rate of adoption.

The examination of the interdependencies further revealed that NGOs and national governments support MNCs which are a great source hindering the adoption of the offered products. Among others, Bloom and Chatterj (2009) suggest alliance building and lobbying as organizational capabilities to stimulate successful scaling. For the social entrepreneurs, it might be worthwhile to gain a deeper understanding of how to deal with the power of MNCs and to identify other strategies to cope with the MNCs’ influence.

## 6 Conclusion

The interdependencies between innovation, communication and the social system have to be examined carefully. While attempting to unlock the intricacies behind these interdependencies, we have identified determining, enhancing and impeding mechanisms that govern the interrelationship between innovation, communication and the social system. Consequently, we answered our research question by revealing how the interdependencies related to innovation, communication and social systems are increasing or decreasing the adoption.

Gaining insight into the customer in a commercial setting potentially leads to a greater generation of profit. In the worst case, experimenting in the commercial sector without a strategy might end up in losing profits. However, in the field of low cost innovations meant to solve a social problem, specifically in the MHM sector, setting up a social business without a strategy comes with the cost of endangering a girl's education or health. Consequently, understanding the interdependencies between the factors influencing the rate of adoption is important to develop a strategy and helps the social entrepreneur in designing as well as marketing their product or service more effectively and efficiently, respectively.

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