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OVERFLOWS OF TECHNOLOGICAL INNOVATION IN EMERGING ECONOMIES: THE CASE OF MPESA

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OVERFLOWS OF TECHNOLOGICAL INNOVATION IN EMERGING ECONOMIES: THE CASE OF MPESA

ABSTRACT

This paper contributes to the debate on technological innovation in the domain of emerging economies. Using the example of M-Pesa, the well-known m-banking application developed in Kenya, we argue that technological innovation in emerging markets should be seen as arising from an assemblage of actors in which context matters. We develop this argument by drawing on concepts from the sociology of markets. Through our detailed empirical analysis of the career of M-Pesa in Kenya, we propose that innovation in this case is emergent, highly provisional and politically constituted. Overall we provide insights into the non-technological issues critical to technological innovation in emerging economies. We will conclude by discussing the implications for future mobile technological innovation specifically and technological innovation more broadly in emerging economies.

KEYWORDS

Innovation; Assemblages; Framing; Overflow; M-Pesa

INTRODUCTION

Technologies have been recognized as pivotal to providing possibilities for innovation in both high income economies¹ and emerging economies for more than two centuries (from Schumpeter, 1942 to World Bank, 2012). With regard to the latter, the rapid growth in emerging economies and the potential of new information technologies to provide relatively low cost interconnection is stimulating business, academic and policy interest in the possibilities they provide for innovation (George et al 2012; World Bank 2012). Two

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¹ There are difficulties in terminology in this area and the paper broadly adopts terms used by the World Bank classifying countries using their income. This classification is economic and ignores important social and cultural issues (see World Bank 2012).

predominant approaches to innovation are evident. First, multinational enterprises (MNEs) remain the most important source of innovation (National Science Board 2012) as increasingly new processes and goods are sourced and developed through global production chains (Coe et al. 2008). Equally MNEs recognize that low income and emerging economies are important growth markets for existing and innovative products. Prahalad, (2004) identified the importance of the 'bottom of the pyramid'; while Govindarajan and Trimble (2012) pushed it further spotting early signals that developing and emerging economies can produce innovations to spread globally. New technologies are also crucial in enabling a second approach where users of existing products and services engage in incremental innovation. This democratization of innovation (von Hippel 2005) promises to include low income consumers as both producers and consumers in a global playing field of development and create conditions enabling inclusive innovation (George et al. 2012). A third and lesser known approach has recently emerged based on ideas such as 'jugaad' and 'frugal innovation' (Radjou et al, 2012). They posit that innovations generated in low income economies often come from the use of fewer resources and are more resilient and lower cost than comparable products developed in high income countries. Specifically in relation to information and communication technologies, one well known case of frugal innovation is M-Pesa, the well-known m-banking application developed in Kenya (Lahiri, 2012).

M-Pesa is a money transfer system operated by the Kenyan mobile phone operator Safaricom that allows individuals and organizations to transfer money from one registered account to another. An M-Pesa application is resident on a subscriber's SIM card and all transactions take the form of SMS messages. Cash is converted to M-Pesa credit and vice versa by retail agents who retain a small commission for this service. Launched in 2007 M-Pesa had over 15 million customers in 2012 and is a major revenue stream for Safaricom (Safaricom 2012).

The paper analyses M-Pesa as a process of framing and overflowing, in which actors are entangled and disentangled to create products and markets enabling technological innovation (Callon 1998; Callon et al 2002). Rather than seeing this framing as the norm, a definition of products and creation of a market is difficult to achieve and always susceptible to overflow as externalities which agents may try to manage and reframe. This conceptual

understanding of innovation can help explain aspects of how M-Pesa has developed and provides insights as to how m-banking can take place in other low income or emerging economies. The aim is to demonstrate the importance of the organization of networks of actors in technological innovation which goes beyond the predominant economic accounts in the literature and give insights into the non-technological issues critical to mobile technological innovation specifically and technological innovation more broadly in emerging economies. The paper highlights the importance of a dynamic and processual engagement with context that shows how a focus on economic accounts or on the technological artefact needs rethinking (Hayes and Westrup: 2012).

The paper begins by reviewing a literature of technological innovation and development before discussing the contribution of the sociology of markets to conceptualizing such innovation. The following sections discuss M-Pesa beginning with the methodology of the research; followed by short description of M-Pesa which leads into a history of M-Pesa analyzed in terms of framing and overflow. The discussion returns to considering the significance of this approach in relation to the existing literature on innovation in emerging economies and the contribution of the paper. The final section offers some brief conclusions.

INNOVATION AND EMERGING ECONOMIES

The literature on innovation has and remains largely focused on high income economies, first in terms of Europe and North America and most recently East Asia. Indeed, recent statistics show that 90% of global R&D spending in 2009 was focused on these three regions (National Science Board 2012). Despite the importance of state funded research institutes, universities and NGOs, the firm, and especially the multinational enterprise (MNE), is the primary agent producing and transmitting innovation (ibid). As Kaplinsky (2011: 196) puts it '... in the contemporary global economy where innovation is driven by the search for profit, the key innovation actors are profit-maximising firms.' For MNEs innovation is often recognised to have four stages. Basic knowledge is produced leading to specific knowledge (the process of research and development, R&D) which can lead to specific inventions which in turn may lead to specific innovations in goods or services (Kaplinsky 2011).

However, over the last ten years several features have made emerging economies much more significant for innovation. These are threefold. Technological change especially ICT related reduced the cost and ease of organising across continents and time zones. Second, global production networks have increased based on outsourcing, on continuing ICT change, and lowering trade barriers through multinational agreements. These trends increase the capabilities of low income economies through organizations and individuals learning by participating in global production networks and adapting new technologies and techniques to their economies (Miscione 2012). Finally, many low income economies recently have experienced very rapid growth rates leading to the emergence of a large number of people who remain relatively poor by high income country standards but have increased disposable income. These emerging markets are attracting considerable interest as a source of growth for MNEs based in high income countries (Meyer and Kirby 2012). Also emerging economies, remarkably China, are now revising their economic policies to stimulate internal consumption to find new markets for their own enterprises. In both cases, a widely discussed strategy is to innovate and produce specific products and services to create markets at the base of the pyramid (Prahalad 2004). Indeed, though MNE's R&D facilities still cluster in their home countries, a trend towards the internationalization of corporate R&D continues based on two rationales - to enable products and services to be adapted to local markets and to exploit the resources in other countries and augment a companies' knowledge (Barlett & Ghoshal 1990).

Though MNEs remain the major source funding innovation, a second stance in the literature indicates a shift towards a more network centred perspective (Swan and Scarbrough 2005). Rising production costs and shorter cycle times in innovation are reasons for companies to develop innovation networks with other companies and to license their innovations to other organisations. This open innovation shares the costs of innovation and reduces the time for successful implementation (Chesbrough et al. 2006). Technologies facilitate engagement between producers and consumers leading to user led innovation which challenges some of the assumptions of the linear movement of innovation discussed earlier. User led innovation points to the increasing ability of users either as companies or individuals to

create new products and services (Benkler 2006; von Hippel 2005). The open source movement exemplifies how innovative products can be produced by a combination of users and companies (Fitzgerald 2006). Crowdsourcing is the application of this approach also to areas other than software (Howe 2006) in which companies or intermediaries can source innovative ideas or designs from individuals or other companies. One example is web 2.0 which as a broad category refers to the participation of individuals in providing content such as Wikipedia or collaborating together as in Facebook or Twitter (O'Reilly 2006). However a key issue is one of control and who manages the network. In open source, users largely speaking self-organize, whereas in many systems users provide material but have limited control on how the network is organized or on the IPR of the network (Zittrain 2007). These are important in relation to who benefits from innovation.

An important development pertaining to innovation in emerging economies has been the advent of frugal and jugaad innovation. Jugaad innovation arising in India refers to improvisation and the innovative use and reuse of technologies to create cheap, robust, and locally maintained technologies (Radjou et al. 2012). It has many affinities with approaches such as appropriate technology (Schumacher 1974).

In the IS and development literature, technological innovation provides an economic opportunity for low income economies to rapidly improve their income and productivity (Toyoma and Diaz 2008). Technological innovations provide opportunities for increased inclusion and participation in other areas such as healthcare, education, and government services. In this literature it is argued that there is a need to strengthen studies of ICT innovation and socioeconomic development on the one hand with theories of contextual innovation in use (Avgerou, 2010: 12). Similarly, Rai et al. (2011: 53) suggest that '[...] the *actual nature and evolution* of ICT innovation in developing countries has mostly escaped investigation.' (emphasis in original). These calls for better theorisation and more careful empirics are complementary as theorisation refocuses attention in specific empirical areas and likewise cases develop theorisation. One outcome of such developments could be to help address the vexing scaling problem in IS and development. Numerous studies have shown benefits facilitated by new technologies but it is a common experience that it is difficult to scale up these new systems to replicate these benefits elsewhere (Walsham et al.

2007). This paper contends that the importance of variety of actors for innovation points to how frequently technological innovation is an outcome of networks, generally international in nature, which engage and redefine a variety of actors in the shaping and creating of markets. We turn to the sociology of markets to discuss this further.

INNOVATION AS FRAMINGS AND OVERFLOWS

Drawing on aspects of science and technology studies (STS) and the sociology of markets literatures, technologies are heterogeneous networks or assemblages encompassing a range of actors that develop their identities and their capabilities through relations with others (Callon 1998; Callon et al. 2002; Fligstein and Dauter 2007; Latour 2005; Pinch and Swedberg 2008). Technological assemblages expand by creating new relationships and dropping others which involves a translation of other actors. Translation reconceptualises the travel of technological innovation as continuing change as they are re-organised to create or engage with networks (Czarniawska and Sevón 2005). For Callon et al. (2002) the movement of commodities/technologies is one of *disentanglement and entanglement* and the construction of markets. Technologies circulate because they are capable of being cut-off from the numerous relationships at the place of their design or manufacture which enables them to be incorporated into new relationships which involve new entanglements. Netbooks, such as the well-known One Laptop Per Child XO-1 (OLPC), offer a case in point (cf. Kraemer et al. 2009). They have to be capable of being dissociated from their place of manufacture, becoming a commodity so that the user is able to make them work without continually referring back to the manufacturer or the OLPC foundation. Equally for the XO-1 netbook to be useful it has to become entangled in the educational and home environments of the student. Another illustrative case of framing and overflow of technological innovation comes from the early history of radio waves use for communication. At the beginning they were thought to substitute wired telegraph, and then got reframed as broadcasting medium. A benefit of this conceptualisation is that it avoids the notion of embedding technologies in specific settings (see Giddens 1991) instead there is a dynamic rearrangement which involves both innovation in the technology and engagement that changes the context of its use as markets are created and reconfigured (Hayes and Westrup 2012).

The need to limit relationships, disentanglement, is evident with technologies which centre on the artefact. Callon (1998: 245-264), drawing on Goffman, adopts the concept of *framing* as a metaphor for the bracketing of relationships in specific situations. Framing refers “an operation of disentanglement that allows the myriad of associations between agents to be sorted and classified” (Araujo, 2007:212). For Callon, framing is a process that allows for the separation of relationships defines agents and objects as distinct from others in a network of relationships (Callon 1998: 17). Framing then refers to organising relationships and thereby attempting to re-organise the context of its use. Framing is a fragile process and requires ongoing work to maintain a separation so as to contain possible *overflows*. As such there is always the potential for alternate frames to emerge and thus challenge, complement or coexist alongside existing frames.

This analysis anticipates that innovation takes place through the transformation and travel of technological innovations not just in its initial design. It proposes that innovation will be a mixture of considered decision making by actors and an emergence of innovation that are properties of frames and overflows rather than specific decisions. The concepts of entanglement and disentanglement suggest that technological assemblages are different from specific products and that their scaling up depends on both limiting relationships in the first instance and then entangling these assemblages with other networks. However such moves involve a redistribution of resources and therefore innovation cannot be isolated from economic, political and social issues which are significant aspects of such assemblages. Finally, the concepts of framing and overflowing alert us to the difficulty of bracketing off aspects of networks and how, in the history of a technology (Appadurai 1986), different phases of framing and potential overflow may occur which lead to the technology being commodified differently. It is these concepts that will inform our analysis and discussion of M-Pesa that follows.

METHODOLOGY

The empirical basis for this paper comprises of the case study of M-Pesa. Additional research has been undertaken on m-banking elsewhere in Africa and on emerging m-banking systems in the UK. Our research methods have been selected so as to elicit data

that allow for a multifaceted description of our main case-study (Silverman 2009, Walsham 2006). Our empirical research is predominantly based upon secondary data (Harris 1998 provides relevant insights; Edwards 2010 is an exemplar study relying on this approach to ICT). Data has been derived from three main sources. First, the authors conducted a prolonged and comprehensive documentary analysis of academic, journalistic and 'gray' literatures published on m-banking and M-Pesa. There is a considerable amount of data publicly available on the M-Pesa case. The variety of independent sources provided significant opportunities for comparison and correlation about key developments. Second, one of the authors has worked extensively with a PhD student who undertook an ethnographic study on M-Pesa from 2007 to 2010 (non-continuously). This led to in-depth discussion about the case data and thus familiarity with the trajectory and the qualitative data. Transcripts have been reviewed and detailed discussions took place so as to consider the differing perceptions of informants. Third, one of the authors has been directly involved in undertaking research on mobile applications in East Africa from 2009 onwards and thus has gained an understanding of the contextual conditions pertaining to M-Pesa's growth. The last two sources helped substantially in differentiating what people say and mean from what they do (Silverman 1998), and allowed for their practices to be identified.

Our limited primary data relates to an interview that has been undertaken with a member of the Red Cross that focused on their recent involvement with M-Pesa specifically, as well as the use of M-Pesa more generally in Kenya. Overall the data covers the period from 2005 until 2012. In line with a number of scholars, rather than providing a snapshot, we argue that researching large-scale information systems projects such as M-Pesa requires a longitudinal approach so as to better appreciate the ways in which complex phenomena are linked and unfold over time (e.g. Ribes and Finholt 2007; Rai et al. 2011). Our stance is influenced by actor-network theory's recommendation of attempting to follow changing actors (Latour 2005), and pays special attention to the consequences of their actions. The collected empirical data was then organized chronologically. This allowed for an overview of the key chronological events, for any periods with gaps to be identified, and for discussion between the authors to ensue. Analytical themes were discussed and developed in relation to conceptual insights relating to the STS literature generally, and an approach based on framing and overflowing specifically.

M-PESA BACKGROUND

M-Pesa represents an intriguing mix of stated philanthropic motivation to promote financial inclusion at the bottom (or base) of the pyramid whilst maintaining tight control on the M-Pesa platform as a commercial opportunity that provides 18% of Safaricom's revenue and is referred to Safaricom's cash cow which locks consumers into the M-Pesa platform (Reuters 2012).

M-Pesa has attracted much interest and it is documented widely (among others: Aron 2007; AFI 2010; Camner & Sjöblom 2009; Hayes and Westrup, 2012; Jack and Suri 2009; Morawczynski 2009; Morawczynski & Miscione 2010; Ngugi et al. 2010; Omwansa, 2009; Plyler et al. 2010; Essegbey & Frempong 2011). M-Pesa started as a jointly funded research project of the UK Government's Department for International Development (DFID) and the multinational mobile operator Vodafone. Originally, it was conceived of as a way to support micro-credit. It later developed into a facilitator of urban-rural remittances and into a payment platform commonly used by a large part of the Kenyan population. It was officially launched in March 2007 by Safaricom (which is 40% owned by Vodafone), a Kenyan local mobile operator which had operated in Kenya for the previous 10 years. Technically, an M-Pesa application is resident on a subscriber's SIM card and all transactions take the form of real time secure SMS messages that are processed by IBM Global Services in the UK and Germany for Safaricom. Cash is converted to electronic 'cash' and back again at a network of retail agents who are paid a small commission for this service. Within a few years, this system has scaled in terms of outreach (within Kenya and to other countries where similar, if not the same, services were rolled out) and scope (as the functionalities it is used for increased). Within two years from its launch, M-Pesa reached 6.5 million registered users and 2 million transactions a day. In 2010, 11% of Kenyan GDP was transferred through M-Pesa (according to Economist, June 10 2010 and Daily Nation, October 20 2011). In 2012 the number of users reached over 15 million (out of a total population of about 40 million), with 305 million transactions per year and 32,000 M-Pesa agents / retailers (Safaricom 2012). Outside Kenya, Vodafone though local companies and partnerships launched M-Pesa in Tanzania in 2008; South Africa in 2010, and India in 2011 and 2012.

PROCESSES OF INNOVATION WITH M-PESA

This section analyses the biography of M-Pesa (Appadurai, 1986) as an ongoing process of framing (both entanglement and disentanglement) and an overflowing of specific frames. Overflowing provides the possibility for alternative frames and innovation, not necessarily their substitution. Importantly, they should not be read as a sequential innovation as each theme is interlinked with other usages of M-Pesa and allows for multiple framings (Slater 2005: 60). Instead they represent an analysis to illustrate the framings and overflows emerging over the lifetime of M-Pesa. Cumulatively they provide a basis for our discussion about how frugal innovation in large scale technical systems works itself out in emerging economies.

Migration overflow - from microcredit to urban-rural remittances

M-Pesa was initially conceived, co-founded and started by a consortium comprising of the UK Government's Development Agency (DFID) and Vodafone as a research project and ran from 2003 to 2006 (DFID, 2006a). Sagentia, a UK IT company, developed the service, and made a number of modifications based on the feedback gained from the initial pilot (Mas and Morawczynski 2009; Morawczynski 2009). At the time of M-Pesa's inception, microcredit was commonly perceived as being the panacea for many of the problems related to poverty in low income countries. M-Pesa was initially framed of as a tool to support microcredit by facilitating loan re-payments for those who did not have easy access to the traditional banking system (DFID 2006a; DFID 2006b; Hughes and Lonie 2007). Based on the lessons that arose from a pilot of an early prototype of M-Pesa, in 2007 it became clear to Safaricom that a re-focusing on urban-rural remittances rather than for micro-credit would be more promising as opportunity to lock users in to using their mobile network. This refocusing of the project reflected changing demographics as many Kenyans (usually men) were migrating from rural areas to cities so as to increase their income. M-Pesa provided an expedient way for them to transfer money home to their family members who typically remained in rural districts. It led to a 30% increase in their average household income (Morawczynski 2008). This re-orientation away from microfinance was also reinforced as the financial organization (Faulu Kenya) that provided microcredit for the project was having

difficulties. This initial sequence of events shows how an early framing of M-Pesa as micro-credit overflowed from being a micro-loans repayment support as it became entangled with more pressing issues for Kenyans: maintaining money flow among geographically dispersed family members. Although an increase of income has been registered in rural areas, the effect of digitalization of money transfer has been proving a double edged sword. The ease to send money home seems to imply a reduction of urban immigrants' visits to their families and to challenge marital relations. Several informants mentioned the increased risk of "co-wives" or "city-wives" of immigrant workers who "feel lonely". Consequently, the initial consortium of DFID, Safaricom and Vodafone unintentionally provided resources for a system that came to be framed as a way to support the urbanization of Kenyans.

Unsafety overflow - reverse money transfer and money storage

While urban-rural remittances became an established use of M-Pesa, other unanticipated uses of M-Pesa emerged due to the perceived insecurity around money in Kenya at that time. There were violent riots in urban areas during the 2008 post-electoral period. This sudden deterioration in the safety of Kenyans had two discernible effects on the use of M-Pesa. First, family members residing in rural areas started to send money back to their relatives in the city to support them during this difficult period. This reversed the urban-rural flow of money that typified the use of M-Pesa up to that point, but simultaneously cemented the framing of M-Pesa as channel for intra-family money flows. Second, Kenyans living in urban areas started to look for safer places to store their money. In addition to M-Pesa being perceived as being a safer way to store money than cash, it was also seen to be secure for two specific reasons. First, M-Pesa was perceived to be secure as it was not owned by any of Kenya's tribes as inter-tribal tension was central to the violence. This is evident in a quote in Morawczynski & Miscione (2010, p. 9) referring to the sense of uncertainty during the riots: "I asked him whether he was afraid that Safaricom would crash and that he would lose the money in his M-Pesa account. He shook his head. He said that everyone knew that Safaricom would not involve themselves in "tribal politics" because Michael Joseph [then CEO of Safaricom]) did not belong to any of Kenya's tribes... He was just a mzungu [white person]." Therefore, these two mutually exclusive framings (tribal politics and foreign business) created positive externalities that played out in M-Pesa and

the users' favour. We have found a similarly advantageous mutual exclusive framing between mobile carriers and banking service – see below.

Secondly, M-Pesa continued to gain from connotations of security after the 2008 riots. M-Pesa provided a way for wives to gain more control over money. Several women mentioned that it is not unusual practice for them to save some 'small amounts of money', and specifically hide it from their husbands who may spend it on purposes other than they intended. M-Pesa provided a way to make these small savings invisible. Such a perspective was captured by Plyler (et al. 2010, p.22) who reported that M-Pesa "...kept them safe from pickpockets, but even more importantly from their husbands. [...] With M-Pesa, women could either claim they did not have any money or could refuse to turn it over." Thus while safety might have been a frame that was anticipated, the social tensions and domestic dynamics helped M-Pesa to expand in reach and scope.

These overflows of use, which did not substitute remittances, highlight how M-Pesa became framed and used to store money safely. This was also indirectly assisted by Safaricom's framing of M-Pesa as a money transfer system. While M-Pesa charged a fee for money transfer there was no fee for money storage (nor did the money gain interest).

Sector overflow – ambiguity between mobile payment and banking service

Exploiting the mismatching frames of mobile carrier or banking service was useful as money saving has proved important for customers. However, this has been downplayed by Safaricom as it would have made M-Pesa seem more like a bank than a money transfer service (Pickens 2010). Indeed, providing obvious services like saving accounts have been avoided until late 2012. This disentanglement has been evident from M-Pesa's inception. From its launch in 2007 M-Pesa was framed as a money transfer system by Safaricom and Vodafone. Indeed, its rapid expansion was due to three dimensions, typical of mobile operators (Camner & Sjöblom 2009; Morawczynski & Miscione 2010). First Safaricom already had an extended network of retailers for its mobile operations. Second an incentive scheme was created for retailers to register new users. Third M-Pesa was able to operate outside of banking regulations as it was given a special license premised on the fact that the identity of all its customers could be confirmed using their national ID card (Makin 2010).

However, over time this disentanglement from banking regulation became more and more noticeable. Indeed, the ambiguity pertaining to M-Pesa's regulatory status was evident at its launch, as it was attended by the Minister of Finance even though M-Pesa was not licensed as a bank. Further while M-Pesa sought to play down the overflow towards money storage, relations with banks became strained (Pickens 2010). Being able to frame itself as a money transfer system, meant that unlike banks, it did not have to comply with banking regulations and for example maintain a costly minimum level of capital. Banks resisted this and in late 2008 the Kenyan banking sector unsuccessfully lobbied against M-Pesa because it did not adhere to or bear the costs of financial regulation (AFI 2010). At that stage it was too late and Safaricom went on to split the banking lobby by entering into a partnership with Equity bank to create M-Kesho (Safaricom 2010). Overall the success that M-Pesa had in framing itself as a money transfer system rather than as a banking service allowed M-Pesa's overflow into banking.

Payment overflow – from transactions among known people to microtrade

A further overflow has emerged more recently has been the shift from M-Pesa being framed as a money transfer system used between known people, usually family, to being framed as a microtrade payment platform. M-Pesa is being used to transfer payments between individuals and businesses for everyday goods and services such as food shopping and paying for taxis as well as between businesses themselves. This came about due to a convergence of two main aspects. First, the fees for using M-Pesa did not increase during a period of high inflation, making payments with M-Pesa increasingly attractive. Second, over 50% of Kenyans have, for different reasons, an M-Pesa account. Importantly, due to the prevalence of small businesses in Kenya, many of the M-Pesa's initial customers were also small business owners and thus this overflow was probable. Behind this overflow was the ongoing trust that the increasing number of users were building up with M- Pesa.

This overflow was further accelerated following M-Pesa's partnership with Equity Bank using ATMs. This integration alleviated the negative externalities of using cash: liquidity problems that the retailers often encountered, namely if there was an imbalance between the withdrawals and the deposits they may run out of cash and thus withdrawals could not be made.

Cumulatively, the significant user base, the high number of small business people, and the perceived trustworthiness in the system and operators as well as the partnership with Equity Bank and its operators facilitated not only transactions between known individuals but overflowed to provide for transactions between unknown people, marking the emergence of a more anonymous and commercial framing.

Recent overflows

M-Pesa's introduction has been a condition for many unforeseen innovations in areas such as the payment of utility bills and low rate international money transfer. In relation to the development and humanitarian sphere, M-Pesa has been central to the project set up by Grundfos Lifelink, part of a Danish based company making water ground pumps for people without adequate water provision. At each of its 30 sites within Kenya, a user with an M-Pesa card can credit money to a Grundfos account, and charge up a card which will provide access to a water tap for a specific amount of water (Grundfos 2012). The money is used to pay for the installation and running costs of the pump and makes a small profit and links the poor into the financial system. An unforeseen humanitarian example of innovation relates to a 'crowdfunding' famine relief appeal set up by the Kenyan Red Cross in conjunction with M-Pesa. In 2012, areas in the north of Kenya suffered from the worst drought in 60 years (Chonghaile, 2012). Safaricom set up an account number specific to the appeal and waived the charge they normally make for each transaction (Mutua, 2011). A final example relates to improvements in food security in rural Kenya (Plyler et al. 2010: 28-21). M-Pesa facilitated the supply of money to farmers who could both buy seeds and pay for labour. Markets for their produce were also facilitated by the flow of money into rural areas from M-Pesa.

DISCUSSION: INNOVATION IN EMERGING MARKETS

This section begins by discussing technological innovation and M-Pesa as framing and overflow. In particular the section explores the inseparability of MNEs, and high income

and emerging economies in mobile technological innovation and specifically technological innovation more broadly.

Innovation as overflow

Our case highlighted that M-Pesa has overflowed in a number of different ways since its introduction. These overflows have led to it being considered as an innovation in ways that its designers did not envisage nor necessarily have any direct control over. What then does this imply about our understandings of innovation and mobile information and communication technology, and technology more broadly, within emerging economies?

The process of innovation in M-Pesa is one of discontinuous and emergent innovation - some of which is planned and some of which is contingent and unexpected. Frames, we argue, are always in a process of contestation. In the case we saw the conflict over banking regulations and security. These contestations were entangled with, and contingent on, the economic and social demographics of Kenya over time. Thus while frames may appear to remain relatively stable for periods of time they are constantly subject to potential overflow as new relationships arise and innovations emerge. Frames and overflow then are only partially shaped by the ongoing recognition of changing possibilities, and more specifically by being attentive to the process of overflow. Vodafone and Safaricom were unquestionably highly attentive to the frames and overflows that have followed the career of M-Pesa. Crucially, while the seed funding and its initial framing may have been about the possibilities for development with regard to micro-credit, it was clear that there was a strong commercial framing present from the outset and has subsequently become the dominant framing around M-Pesa. Despite this, the overflows analysed could hardly have been planned and controlled.

Framing then helps us to understand innovation as being a highly fragile process which involves attention to the ongoing work required to maintain the separation of a specific frame, while simultaneously being attentive to the ways in which overflows provide the possibilities for alternate frames to emerge. The latter may come to be complementary to or in conflict with existing frames. Thus we argue that technological innovations are also

shaped by the ongoing tensions and conflicts evident in the relationships, and the politics thereof, of these specific entanglements. Overflows deriving from such entanglements are unpredictable. Translation leading to innovation may take place in relation to the technological artefact such as M-Pesa or in other relationships that are needed for an assemblage to become more entangled with new frames. Such a view offers a contrast to the literature that tends to consider innovation as being a deliberate and linear process that can be planned, captured and repeated with the right skills, technologies and resources in place (Kaplinsky, 2011).

MNEs and innovation in emerging economies

A second analytical theme is the close engagement of MNEs in high income economies with innovation in emerging economies. While viewing innovation as frames and overflows provides insights as to the ways in which innovation emerged within Kenya, the case also provides basis for amendment and development of existing conceptualizations about how innovations such as M-Pesa may be MNE driven.

While it is easy to see M-Pesa as being an innovation that has emerged within Kenya and one that the rest of the world has sought to study and replicate in some form or other, M-Pesa has many characteristics of an MNE driven innovation. Vodafone owns 40% of Safaricom's shares; retains the right to choose the CEO and CIO of Safaricom for 10 years after M-Pesa's launch in 2007; and charges a license fee for M-Pesa ranging from 10% to 25% of revenues. Recently Vodafone increased its share of directors in Safaricom from 3 to 5 and prompted comment that the Kenyan government has less control despite its 35% share of Safaricom (Okutah 2012). The processing of transactions takes place in Germany under Vodafone and a couple of outages, the most recent in October 2012 for over 18 hours due to corrupted servers, drew attention to transcontinental networks of M-Pesa and a vulnerability of M-Pesa and the Kenyan economy where 11% of GDP was transferred through M-Pesa in 2010 (Economist, June 10 2010). Safaricom have promised to relocate processing to Kenya within the next two years. Cumulatively this reflects a certain amount of control by the MNE, and a significant flow of Kenyan GDP processed outside Africa.

Innovations then are far simply from bottom up , in this case more of a global-local network which , at least in part, is tied to the commercial priorities and infrastructures of MNEs.

However, despite this, the M-Pesa case shows that the idea of MNEs as the prime actors in technological innovation needs some reappraisal to understand them as key elements of assemblages. Importantly, the initial impetus for M-Pesa came from a joint research project with DFID. This political alignment allowed for M-Pesa to be initially framed as a development project that could benefit the rural poor. It was thus framed at the outset as being a development project as well as being a way to experiment with the potential commercial viability of mobile payment in an emerging economy. As the case shows the relationship with the Kenyan regulatory authorities is very important in allowing M-Pesa develop with limited banking regulation and with a dependence on servers in Europe. In short, M-Pesa shows many elements of MNE driven innovation but its success in Kenya has depended on an assemblage of relationships that framed M-Pesa in different ways and established important linkages within Kenya.

Indeed, this close co-ordination of MNEs, often based in developed economies also highlights their centrality in shaping aspects of technological innovation in emerging economies. In relation to the recent writing on frugal innovation, the presence of MNEs in technological innovation has been insufficiently discussed. In this case, while the product itself (e.g. handset) and aspects of the operation (e.g. airtime sellers) may be considered frugal, their processing and infrastructure is not as they are highly complex. Innovation, we argue, is an ongoing accomplishment in assemblages such as M-Pesa. A salient characteristic of our times is that such assemblages are, at the same time, globally distributed and common in the micro-activities of a plethora of actors in the most diverse settings spanning from rural Africa to the UK finance sector. Innovation in relation to mobile telecommunications within emerging markets is likely to be interlinked with MNE global telecommunications and data processing infrastructures. In this sense the degree to which it can be considered frugal is open to question.

Movement of technological innovation within emerging economies

While the framings of M-Pesa were central in making sense of its success in Kenya, the framing of such relationships makes it more difficult for M-Pesa to spread rapidly to other countries and jurisdictions. A number of M-Pesa look alike services have been launched by other providers in emerging and developing economies (Ivstry and Pickens 2006; Pickens 2010). Many of these launches have had mixed fortunes in countries such as Tanzania and South Africa.

Tanzanian growth has been comparatively slow and in South Africa, M-Pesa has made little headway due to the enforcement of local banking regulation. Also, in Kenya M-Pesa benefited from being launched by the largest telecom provider with over 80% market share at that time so that it already had a nascent large network. Also, M-Pesa used an already existing network of air-time resellers to act as agents (Camner & Sjöblom 2009). Further, the political instability crucial to the uptake of M-Pesa in Kenya was not present in other countries. In countries like Tanzania, the social environment is usually much safer than in Kenya and the political regime contained urbanization and favored rural settlements, so family relations were less geographically scattered. Because its success in Kenya was predicated on a complex (and changing) assemblage, M-Pesa has proved difficult to implement in other countries as we would predict, in part because incumbent banks became more aware, and alerted, to the disruptive potential of such systems to their markets. As a consequence of M-Pesa's success being the outcome of multiple framings, M-Pesa is not a stable phenomenon, and when the term is used elsewhere it represents only certain elements of the assemblage that has been successful in Kenya. For example, in November 2012, Vodafone announced the launch of M-Pesa in India with the Indian ICICI bank as a partner and using a wholly owned subsidiary. In this case M-Pesa will have many of the features of M-Pesa in Kenya though with notable differences. For instance each user will have an account with the ICICI bank and near field communication (NFC) will be used with the latest smartphones to enable contactless payment. As Vodafone themselves say, M-Pesa is a brand which has to be formulated into specific partnerships and relationships in each country. In short, M-Pesa shows that MNE's such as Vodafone can seek technological innovation to create new markets for their products and services in low income or emerging economies but they innovate by forming assemblages and framing relationships with other agencies. It follows that M-Pesa is much more than a technology and refers to a different assemblage in each country it is deployed in.

User Innovation

Based on our discussion of the travel of technological innovation, a final theme relates to user innovation, a key approach discussed in the literature earlier. It is a contention of this paper that innovation should be seen as taking place across multiple sites and as an ongoing activity. User innovation raises the issue of control – are users able to innovate using M-Pesa and what are the constraints on this activity? In 2007 Zittrain opened up an ongoing debate on the control of the internet. He made a distinction between a generative internet conducive to innovation that is relatively unconstrained and ‘sterile appliances linked to a network of control’ (p. 3 emphasis removed) which take existing innovations and package them as consumer products. What Zittrain draws attention to is how innovation and control are attributes of networks, and, as Castells (2009) argues, these issues are ones of power. M-Pesa, despite its origins as a development project, is a property of Safaricom with Vodafone, France Telecom, the Kenyan state and other shareholders having ownership and Vodafone having IPR rights. For instance M-Pesa has been criticized recently for how slow it has been in providing a platform to add further applications based around an application protocol interface (Collymore 2012). On the other hand, even though technological changes in M-Pesa have to have Safaricom’s approval as the examples of Grundfos, and the Red Cross indicate, there is flexibility in practice (like storing money without transferring them) which allow for innovative frames to gain momentum

As Zittrain might caution us, M-Pesa lacks a generative element despite its continuing process of innovation. But we do not assume that generativity produces inclusion for at least two reasons: only technologically skilled organizations may be able to exploit it (putting tools at the fringes of infrastructures does not imply people will use them and successfully innovate). Second, creating an open platform to launch an ecosystem may help Safaricom in ‘hooking’ other organizations to its services and installed base, therefore increasing their switching costs and reducing actual openness. Thus, M-Pesa has brought many innovations to the lives of the urban and rural poor in Kenya (see Plyler et al. 2010) which has been consequences of overflows and of re-framings of M-Pesa by Safaricom and Vodafone. These processes provide a clear exemplification of Callon’s statement that markets do not expand, but emerge and re-emerge along a process that Schumpeter (1942),

reportedly inspired by Hinduism, called 'creative destruction'. In order to do that, innovations need to frame positive externalities (preferably not monetized yet, as for example safety) and avoid negative externalities (such as banking regulations).

Overall the analysis in this paper adds a different voice to much of the literature to date that adopts a lens using economics in general and neo-liberalism in particular and largely focuses on the technological artefact. In contrast this paper analyses M-Pesa as a network of relationships -made and broken- in which technological innovation occurs through the framing and qualifying of relationships to create products and markets. This process is inherently unstable and susceptible to overflow as other relationships develop which may realign that framing and create further innovation. The process is one of emergent innovation, often unpredictable, and a consequence of the entanglement and disentanglement of relationships. Context is network specific and is a dynamic set of relationships rather than structures or relationships that technologies are embedded into (Hayes and Westrup, 2012). M-Pesa does have features of MNE innovation, user innovation and frugal innovation but the approach adopted here adds analytical depth to understand how technological assemblages like M-Pesa travel, transform and innovate.

CONCLUSION

The paper seeks to address with conceptual insights the challenges posed by technological innovation in low income and emerging economies. Innovation should be understood as an ongoing and partly unpredictable accomplishment. We propose that Callon's (1998) concepts of framing and overflow provide important insights into the differing frames that simultaneously shape the scope and nature of innovation and use the example of M-Pesa to make a start to address Rai et al.s (2011) call to investigate the nature and evolution of ICT innovation in low income and emerging economies. In short we argue that innovation and technologies are aspects of power relations in which innovation takes place through the emergence of technology enabled networks which redistribute resources.

Overall we suggest that our analysis provides insights into the possibilities for innovation. Complex innovation can take place and travel from emerging economies that goes beyond

the dichotomy of user produced or MNE generated innovation in high income countries. M-Pesa is a SMS based money transfer platform that is low cost, as frugal innovation theories would expect. Its scaling up in Kenya is marked by different framings (and overflows) which created new relationships and innovation. One example is that of regulation. In part, M-Pesa expanded in Kenya due to a careful framing of it as a system which avoided bank regulation. Absence of regulation and IPR is common in the early development of most high income countries to date (Chang 2008). Low income and emerging countries have some of these characteristics which may also stimulate innovation, but in the M-Pesa case innovation is also framed by restrictive IPR which gives extensive royalties to Vodafone despite Kenyans often considering M-Pesa to be a Kenyan innovation (see Mohapi 2012). In short skillful management of M-Pesa technological assemblage in between IP and banking regulations appears to have enabled banking innovation while Vodafone was leveraging IP and stocks to benefit from this success. Regulation is but one example of multiple framings of M-Pesa but it indicates that technological innovation is not a sufficient condition for M-Pesa's subsequent success.

In conclusion, our study foregrounds the unpredictability of how different framings and overflows interact in shaping actual chances for innovation. We stress that unpredictability does not mean that everything is possible: framings by assemblages shows clearly that power relations are important in not allowing some configurations to emerge and consolidate. Indeed, we expect that innovation in IT will become more common in emerging economies which have differences in political, economic and social arrangements from industrialized societies and provide conditions for novel technologically based assemblages to develop and scale up globally. Learning from these innovations requires rethinking IT as assemblages which are particular to specific settings and require a disembedding and a cutting of relationships for them to move elsewhere and a subsequent entangling of relationships to scale in another setting.

REFERENCES

AFI (2010) *Enabling mobile money transfer: The central bank of Kenya's treatment of M-Pesa*, Alliance for Financial Inclusion. Bangkok, Thailand.

- Appadurai, A., (ed.) (1986) *The Social Life of Things: Commodities in Cultural Perspective*. Cambridge: Cambridge University Press.
- Araujo L M, (2007) Markets, market-making and marketing, *Marketing Theory*, vol 7, no. 3, 211-226.
- Aron, M. (2007) *Kenya: Trend-setting M-Pesa goes international*. Business Daily
- Avgerou, C. (2010) Discourses of ICT and Development. *Information Technologies and International Development*. 6(3), 1-18.
- Barlett, C.A. and Ghoshal, S. (1990) Managing Innovation in the Transnational Corporation in Barlett, Y.D., and Hedlund (eds), *Managing the Global Firm*. Routledge. London, 215-255.
- Benkler, Y., (2006) *The Wealth of Networks: How Social Production Transforms Markets and Freedom*, London, Yale University Press.
- Callon, M. (1998) 'An Essay on Framing and Overflowing: Economic Externalities Revisited by Sociology', in M. Callon (ed.) *The Laws of the Market*, pp. 244–69. Oxford: Basil Blackwell.
- Callon, M., Méadel C., Rabeharisoa V., (2002) The Economy of Qualities, *Economy and Society* 31:2 194-217.
- Camner G Sjöblom E (2009) Can the success of M-Pesa be repeated? – A review of the implementations in Kenya and Tanzania, http://valuablebits.com/camner_sjoblom_differences_ke_tz.pdf.
- Castells, M. (2009) *Communication Power* Oxford: Oxford University Press.
- Chang, H-J, (2008) *Bad Samaritans: The Myth of Free Trade and Secret History of Capitalism* New York: Bloombury Press.
- Chesbrough, H.W., Vanhaverbeke, W., West, J. (2006) *Open Innovation: Researching a New Paradigm* Oxford: Oxford University Press.
- Chonghaile, C. (2012) Kenya denies plan to close refugee camp, <http://www.guardian.co.uk/world/2012/feb/22/kenya-denies-plan-to-close-refugee-camp>
- Coe, N., Dicken, P. Hess, M. (2008) Global production networks, realizing the potential. *Journal of Economic Geography* 1-25.
- Collymore, B. (2012) Interview with Bob Collymore - CEO Safaricom (January) <http://www.youtube.com/watch?v=Pblc-5zPIEQ> accessed 28 March 2012.

- Czarniawska, B., & Sevón, G. (2005) *Global ideas. How ideas, objects and practices travel in the global economy*: Liber & Copenhagen Business School Press
- Daily Nation (2011) M-Pesa transactions surpass Western Union moves across the globe, October 20 2011 <http://www.nation.co.ke/business/news/-/1006/1258864/-/4hyt6qz/-/index.html> accessed 29th, March 2012.
- DFID (2006a) Mobile Micro-Finance Project Report. *Department of International Development*, November.
- DFID (2006b) Mobile Banking: Knowledge Map and Possible Donor Support Strategies, *Department for International Development* <http://webarchive.nationalarchives.gov.uk/+http://www.dfid.gov.uk/Documents/publications/mbanking-knowledge-map.pdf> accessed 29 March 2012.
- Economist, (2010) Out of Thin Air - The behind the scene logistics of Kenya's mobile money miracle, June 10th, 2010.
- Edwards, P. N. (2010) *A vast machine: computer models, climate data, and the politics of global warming*: The MIT Press.
- Essegbey, G.O. and Frempong, G.K. (2011) Creating space for innovation—The case of mobile telephony in MSEs in Ghana, *Technovation*, Volume 31, Issue 12, December 2011, 679-688.
- Finextra (2012) Mobeyday 2012 <http://www.finextra.com/news/fullstory.aspx?newsitemid=23546> accessed 26 March 2012.
- Fitzgerald, B. (2006) The Transformation of Open Source Software. *MIS Quarterly* 30:3 587-598.
- Fligstein, N., & Dauter, L. (2007) The Sociology of Markets. *Annual Review of Sociology*, 33(1): 105-128.
- George, G., McGahan, A.M. and Prabhu, J. (2012) Innovation for inclusive growth: towards a theoretical framework and a research agenda. *Journal of Management Studies*, 49(4): 661-683.
- Giddens., A., (1991) *Modernity and Self – Identity: Self and Society in the Late Modern Age* Stanford: Stanford University Press.
- Govindarajan, V. & Trimble, C. (2012) *Reverse Innovation: Create Far From Home, Win Everywhere*, Harvard Business Press .

- Grundfos (2012) Kenya Fights Climate Change with Danish Water Technology <http://www.grundfos.com/about-us/news-and-press/news/kenya-fights-climate-change-with-danish-water-technology.html> accessed 12 April 2012.
- Harris, H. (1998) Content analysis of secondary data: A study of courage in managerial decision making. *Journal of Business Ethics*, 34(3), 191-208.
- Hayes, N. Westrup, C. (2012) 'Context and the processes of ICT for Development' *Information and Organisation* 22:1 23-36 .
- Howe, J. (2006) The Rise of Crowdsourcing. *Wired* 14(6): 176-183.
- Hughes, N., & Lonie, S. (2007) M-Pesa: mobile money for the "unbanked" turning cellphones into 24-hour tellers in Kenya. *Innovations: Technology, Governance, Globalization*, 2(1-2), 63-81.
- Ivetry, G., & Pickens, M. (2006) Mobile phone banking and low-income customers: Evidence from South Africa. *Consultative Group to Assist the Poor* Washington, 1-14
- Jack, W. and Suri, T. (2009) *Mobile Money: The Economics of M-Pesa*. MIT Sloan, <http://www.mit.edu/~tavneet/M-Pesa.pdf> (accessed July 2010)
- Kaplinsky, R., (2011) Schumacher meets Schumpeter Appropriate Technology below the Radar *Research Policy* 40, 193-203.
- Kraemer, K, Dedrick J, Sharma P. (2009) One Laptop Per Child: Vision vs. Reality *Communications of the ACM* June 52: 6 66-74 .
- Lahiri, T. (2012) Q&A: Why the West Needs 'Jugaad' Creativity. *WSJ's Indiarealtime blog*. Dow Jones & Company Inc. June 6, . Retrieved June 23, 2012.
- Latour, B. (2005) *Reassembling the Social: An Introduction to Actor-network-theory*. Oxford: Oxford University Press.
- Makin, P. (2010) Regulatory Issues Around Mobile Banking. *OECD, Consult Hyperion* www.oecd.org/dataoecd/40/24/43631885.pdf accessed 15 November 2011.
- Mas, I., & Morawczynski, O. (2009) Designing mobile money services lessons from M-Pesa. *Innovations: Technology, Governance, Globalization*, 4(2), 77-91.
- Meyer. C., Kirby, J., (2012) *Standing on the Sun: How the Explosion of Capitalism Abroad Will Change Business Everywhere* Harvard Business Press.
- Miscione G., (2012) Making Sustainable Infrastructures by Federating and Learning in the Global Context. in Sowe S., Parayil G., Sunami A. (eds.), "Free and Open Source

Software and Technology for Sustainable Development” United Nation University (UNU) Press.

Morawczynski, O. (2008) Surviving in the ‘dual system’: How M-PESA is fostering urban-to-rural remittances in a Kenyan Slum.

Morawczynski, O. (2009) Exploring the usage and impact of “transformational” mobile financial services: the case of M-Pesa in Kenya. *Journal of Eastern African Studies*, 3(3), 509-525.

Morawczynski, O., and Miscione G. (2010) Trust and Mobile Transactions through M-Pesa: A Longitudinal Study on Money Transfer in Kenya. In Latusek D. and Gerbasi A. (Eds.), *Trust and Technology in a Ubiquitous Modern Environment: Theoretical and Methodological Perspectives*. IGI Global, Hershey, PA, USA, pp. 160-173

Mohapi, T., (2012) Is M-PESA really Kenyan or British? *Human IPO*
<http://www.humanipo.com/blog/2132/Is-M-Pesa-really-Kenyan-or-British> accessed 12 November 2012.

Mutua, N. (2011) Kenyans Feeding Kenya: What Have You Done?
http://www.vibeweekly.com/index.php?option=com_content&view=article&id=1294:kenyans-feeding-kenya-what-have-you-done&catid=115:dizzybee&Itemid=558
accessed 24 March 2012.

National Science Board. (2012) *Science and Engineering Indicators 2012*. Arlington VA: National Science Foundation (NSB 12-01).

Ngugi, B., Pelowski, M. and Ogembo, J. (2010) M-Pesa; A case study of the critical early adopters’ role in the rapid adoption of mobile money banking in Kenya. *Electronic Journal of Information Systems in Developing Countries* 43(3), 1-16.

Okutah, M. (2012) Vodafone takes home Sh1Bn of M-Pesa revenue, *Business Daily*, November 9th.

Omwansa, T. (2009) M-Pesa: Progress and Prospects. *Mobile World Congress*.

O'Reilly, T. (2005) What is Web 2.0: Design Patterns and Business Models for the Next Generation of Software, O'Reilly, <http://oreillynnet.com/1pt/a/6228>

Pickens, M. (2010) Mobile Money Takes off - where is the innovation in product design
<http://technology.cgap.org/2010/03/08/mobile-money-takes-off-where-is-the-innovation-in-product-design/> accessed 27 March 2012.

- Pinch, T., & Swedberg, R. (2008) *Living in a material world: economic sociology meets science and technology studies*. The MIT Press: Cambridge MA.
- Prahalad, C.K. (2004). *The fortune at the bottom of the pyramid: Eradicating poverty through profits*. Philadelphia, PA: Wharton Business School Publishing.
- Plyler, M., Hass, S., Nagarajan, G., (2010) Community-Level Economic Effects of M-Pesa in Kenya: Initial Findings *Financial Services Assessment*, <http://www.fsassessment.umd.edu/publications.html> accessed 28 March 2012
- Radjou, N., Prabhu, J. and Ahuja, S. (2012) *Jugaad Innovation: Think Frugal, Be Flexible, Generate Breakthrough Growth*. New York: Jossey-Bass.
- Rai, S., Chatterjee, S., Sarker, S., (2011) ICT Innovation in Contemporary India: Three Emerging Narratives, *ASCI Journal of Management* 41(1): 53–64.
- Reuters (2012) UPDATE 2-Safaricom sees strong end to year as price war ebbs, *Reuters*, <http://www.reuters.com> (accessed November 7 2012).
- Ribes D., and Finholt, T. (2007) Tensions across the scales: planning infrastructure for the long-term, *Proceedings of the 2007 international ACM conference on Supporting group work*, ACM New York, NY, USA 2007.
- Safaricom (2012) Safaricom website <http://www.safaricom.co.ke/index.php?id=123> accessed 28 November 2012
- Schumacher, E., (1974) *Small is Beautiful: A study of economics as if people mattered*, London: Abacus.
- Schumpeter, J. (1942) *Capitalism, Socialism and Democracy*. New York: Harper and Brothers,
- Silverman, D. (1998). Qualitative research: meanings or practices? *Information Systems Journal*, 8(1), 3-20.
- Silverman, D. (2009) *Doing qualitative research*: Sage London.
- Slater, D., (2005) From calculation to alienation: disentangling economic abstractions in A. Barry, D. Slater (eds.) *The Technological Economy* London Routledge pp 101-121.
- Swan, J. and H. Scarbrough (2005) The politics of networked innovation, *Human Relations*, 58, 913–943.
- Toyoma K, and Diaz B. (2008) Information and Communication Technologies for Development. *Computer* (41:6), 22-25.

Vodafone.com (2012)

[http://www.vodafone.com/content/index/about/sustainability/sustainable societie s/our contributiontodevelopment/innovation for development.html](http://www.vodafone.com/content/index/about/sustainability/sustainable_societie_s/our_contributiontodevelopment/innovation_for_development.html)

von Hippel, E. (2005) *Democratizing innovation*. Cambridge, MA: MIT Press.

Walsham, G. (2006) Doing interpretive research. *European Journal of Information Systems*, 15(3), 320-330.

Walsham, G., Robey, D. and Sahay, S. (2007) Foreword, Special Issue on Information Systems in Developing Countries *MIS Quarterly*, 31(2), 317-326.

World Bank (2012) *ICT for Greater Development Impact: World Bank Group Strategy for Information and Communication Technology 2012-2015* World Bank

Zittrain, J. L. (2009) *The Future of the Internet* London: Penguin.

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