Trajectory Dynamics in Innovation: Developing and Transforming a Mobile Money Service Across Time and Place

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Abstract

This paper examines how and why innovations are reshaped as they become implemented and used in locales that are distant and distinct from those where the innovation was initially developed. Drawing on an in-depth field study of the innovation process that produced a mobile money system for Kenya, we contribute an understanding of the particular dynamics that arise when an innovation trajectory interacts with local trajectories that constitute the local conditions and practices of specific places. We identify four distinct patterns of trajectory dynamics — separation, coordination, diversification, and integration — each of which has different implications for the innovation, its implementation, and consequences on the ground. Developing a model of trajectory dynamics in innovation, we theorize the processes through which innovations are transformed over time as they interact with multiple local trajectories, and the specific innovation outcomes that are generated as a result. Such theorizing reconceptualizes traditional notions of innovation diffusion by explicating how and why innovations change in multiple and unexpected ways as they move to particular places and engage with local conditions and practices.

This paper examines what happens when an innovation trajectory interacts over time with the multiple local trajectories constituting a geographical place. We build on earlier work that has recognized the complex, multi-faceted, and inter-organizational nature of distributed innovation and its related trajectory interactions across different sectors, such as construction (Boland et al. 2007) and automotive (Henfridsson and Yoo 2014). While these studies have furthered our understanding of how innovation trajectories emerge and move across an innovation space, we know less about trajectory dynamics more globally, as innovations travel to geographically distant places. We address this gap by focusing on how innovations are influenced and changed as they become implemented and used in locales that differ from those where the innovation was initially developed. Our research provides insight into the processes through which an innovation and its trajectory are transformed through interactions with the local practices, materialities, and values associated with distinct places (Lawrence and Dover 2015), and with what consequences.

Our study investigated the innovation processes that produced a mobile money payment service (MPS) for implementation in developing economies. Initially conceived and developed by a peripheral unit of a UK corporation for a niche market in Kenya, the MPS innovation was intended to be low-cost, small in scale, and modest in scope, and it was expected to generate limited novelty and value. Yet as the MPS innovation moved from the UK to Kenya, its purpose was reframed and its scope and scale grew rapidly and unexpectedly. Over time, the viral uptake of MPS has generated substantial and widespread value for customers and providers of the service, and in so doing has disrupted traditional flows of money within Kenya and profoundly altered the level of financial inclusion in the country.

We examine this unanticipated innovation transformation through a process study (Langley 1999) of MPS that offers a unique window into understanding how an innovation was radically changed during its deployment in a place that differed significantly from where it was developed. Our interest in the role of geographically distant locales in shaping innovation resonates with recent research that has emphasized the important role of place in organizational work (DeVaujany and Vaast 2014; Lawrence and Dover 2015). It also reflects the long-standing recognition in the social sciences that physical and social spaces influence interaction in multiple ways (Latane and Liu 1996; Lefebvre 1992; Massey 2005).

Within the innovation literature, a process perspective has highlighted the value of understanding innovation processes through the notion of trajectories. We adopt this trajectory lens to understand how the MPS innovation was developed and transformed over time, and adapt it to incorporate a broader view of trajectories. Rather than taking a phase view of trajectories that examines how an innovation moves from conception to deployment, we take a relational view of trajectories that emphasizes how the course of a phenomenon is shaped over time by multiple practices, people, locations, and infrastructures (Corbin and Strauss 1987). Such a view allows us to focus not just on the innovation trajectory, but also on the local trajectories that collectively constitute a specific place and with which the innovation interacts. We argue that to the extent that local trajectories entail specific conditions and practices that differ from those where the innovation was initially conceived and developed, they will exert a strong influence on the innovation and its implementation process. In the case of the MPS innovation — initiated in the UK and then moved to Kenya — we found that it was powerfully and unpredictably shaped by local trajectories that differed significantly from those in the UK, specifically conditions and practices related to economic development that constituted the Kenyan trajectories of microfinance, migration, banking, and local enterprise.

Drawing on our MPS study, we propose the notion of *trajectory dynamics* to theorize the ways in which the innovation trajectory intermingles with and is transformed by interactions with local trajectories in a specific place. We identify four patterns of trajectory dynamics — separation, coordination, diversification, and integration — that are generated as the innovation trajectory engages with one or more local trajectories over time. Our study makes three key contributions to the understanding of innovation in an increasingly complex and connected world. First, we develop a model of trajectory dynamics in innovation that articulates how an innovation can be significantly and unexpectedly transformed over time as it crosses different geographies. Second, our theorizing offers a novel approach to understanding change in innovations by taking account of their multiple and dynamic interactions with the local trajectories constituting distinct places. Such theorizing reconceptualizes traditional notions of innovation diffusion by highlighting how an innovation may be transformed over time and space through its interactions with local trajectories. Third, we provide insights into four distinct patterns of dynamics between trajectories,

explaining how and why these emerge through different processes, and how they generate specific consequences for innovation outcomes.

Relevant Literature

Innovation is a complex, multi-faceted, and shifting process (Chesbrough 2003; Van de Ven et al. 1999) that involves multiple organizations and distributed capabilities (Garud et al. 2013; Nambisan et al. 2017). Most relevant for our investigation of the MPS innovation are those studies that consider distributed innovation, innovation in developing countries, and innovation trajectories.

Distributed Innovation

The innovation literature has highlighted the need to study innovations as occurring in emergent, heterogeneous networks that are distributed through space and time (Boland et al. 2007; Garud et al. 2013; Williams and Pollock 2012), moving beyond a view of static innovations diffusing though a progression of linear stages (Rogers 1995). Contemporary innovations are seen to be increasingly complex, designed and constructed by multiple actors with different skills and interests, and involving collaborations that travel beyond the boundaries of single communities (Boland et al. 2007). The locus of innovation is more and more found in multi-party relationships where customers and others outside the firm serve as important sources of knowledge and experience (Von Hippel 1988, 2005). As boundaries become more porous with the shift to open innovation, organizations are becoming increasingly flexible in their innovation strategies. At the same time, they must reconcile tensions that may emerge from the divergent perspectives being introduced into the innovation process (Lakhani, Lifshitz-Assaf, Tushman 2015).

As digital technologies become more widespread, they are increasingly shaping distributed innovation through processes of digital invention and deployment that can provide novel value to multiple stakeholders (Nambisan et al. 2017; Yoo et al. 2012). A central focus of this literature has been the nature and role of convergence (across digital platforms) and generativity (associated with re-programmability) in enabling innovation. These create the possibility of integrating user experiences (von Hippel 1988) while also allowing for new capabilities to be incorporated after initial design (Huang et al. 2017; Kallinikos et al. 2013; Yoo et al. 2012; Zittrain 2006). Organizations attempting to take advantage of

digital convergence and generativity find they have to align their innovation processes with an ecosystem of multiple players such as suppliers, complementors, regulators, and users (Siggelkow 2002; Svahn et al. 2017; Trantopoulos et al. 2017; Williamson and De Meyer 2012). While the development of platform ecosystems (Parker et al. 2017) is challenging, these can enable digital innovations to grow and scale rapidly in unprecedented ways (Huang et al. 2017; Henfridsson and Bygstad 2013; Yoo et al. 2010).

The multiple facets of distributed innovation have also been highlighted in recent studies of social innovation. Defined as "the process of inventing, securing support for, and implementing novel solutions to social needs and problems" (Barley 2003, p. 4), social innovation typically involves distributed actors from multiple sectors (e.g., governments, corporations, philanthropists, and non-profit organizations (Barley 2003; Hardy et al. 2006; Le Ber and Branzei 2010; Mulgan 2006). Of particular value in such innovation are digital technologies such as mobile platforms that can facilitate the spanning of conventional boundaries across organizations and sectors (Lettice and Parekh 2010; Nicholls and Murdock 2012). As social innovations eschew centralized top-down approaches in favour of local and distributed strategies, we see the emergence of hybrid social enterprises that combine social goals with commercial activities (Battilana and Lee 2014; Jay 2013; Tracey et al. 2011). Concurrently pursuing divergent perspectives across boundaries may raise tensions that require reconciliation, for example through mechanisms such as "spaces of negotiation" – arenas of interaction for different groups to discuss their varying interests and agree on how to proceed (Battilana et al. 2015). In this way, social innovation entails collaborative, cross-boundary dynamics involving users, local communities and multiple organizations (Di Domenico et al. 2009). As our study involved the development of a specific social innovation – a mobile money payment service aimed at addressing financial inclusion in Kenya – we considered the research on innovation within developing countries.

Innovation in Developing Countries

A growing stream of scholarship has organized around the banner of "ICT4D" – information and communication technologies for development (Avgerou 2008; Heeks 2002, 2010; Thompson and Walsham 2010; Walsham 2017) – with a focus on assessing the influence of technological innovations on developing countries (Dewan and Kraemer 2000; Pohjola 2001). Recent studies have sought to

investigate the impact on economic development of such innovations as identity verification services in Nigeria, Bangladesh, and the UAE (McGrath 2016), e-commerce systems that support rural development in China (Leong et al. 2016), and ecosystem platforms that address smallholder farmer poverty in India (Jha et al. 2016). Given the widespread use of mobile phones in the developing world, the role of mobile devices in promoting economic and social development has garnered considerable attention (Aker and Mbiti 2010). Studies have examined the influence of mobile phones on developing countries' well-being (Ganju et al. 2016), quality of healthcare (Hoffman et al. 2010; Lester et al. 2010), access to financial services (Duncombe and Boateng 2009; Mas and Morawczynski 2009; Shamim 2007), and profitability of micro-enterprises (Donner and Escobari 2010; Esselaar et al. 2007; Jensen 2007).

Studies of technological innovation in developing countries have focused on how users' various ways of understanding and adopting technologies influence outcomes (Heeks 2002; Simanis and Hart 2009; Thompson 2008). For example, a recent study of the correspondent banking system in Brazil shows that users appropriated the technology differently to meet their needs in different settings, and in so doing produced multiple versions of the same system (Leonardi et al. 2016). Such research highlights the critical relevance of the local context in the implementation of technologies, a theme that is characteristic of much of the ICT4D research (Avgerou and Walsham 2000; Hayes and Westrup, 2012; Krishna and Madon, 2003; Walsham 2017).

Understanding and engaging with the local context is seen to be even more important when innovation processes are managed by actors who are distant from specific locales, such as multinational enterprises developing products and services for base of the pyramid (BOP) markets (London and Hart 2011). Given low profit margins in BOP markets, early BOP innovations (what are referred to as first generation BOP strategies) placed a strong emphasis on achieving economies of scale by targeting a large number of consumers (e.g., by replicating an innovative business model across different geographies) (Prahalad, 2004; Prahalad and Hart 2002; Seelos and Mair, 2007). More recently, the importance of understanding BOP marketplaces from the bottom up has been recognized, and next generation BOP strategies have emerged that build on local resources and capabilities (London and Hart 2011; Simanis et al. 2008; Viswanathan, 2011). Understanding and engaging with local resources and capabilities that are

unique to each place while at the same time achieving scalability is seen as critical for succeeding in low-income consumer markets and realizing social impact (Hammond, 2011; London 2016; Seelos and Mair 2017). How to do so effectively remains a key challenge for innovation in developing countries.

Looking across the literatures on distributed innovation and innovation in developing countries, we see an emphasis on managing tensions across boundaries, divergent perspectives, and multiple interests, as well as the importance of local contexts in influencing the implementation of innovations in distant locales. These insights offered valuable lenses for our empirical investigation. As our phenomenon also entailed the transformation of an innovation trajectory, we next turned to the research on trajectories.

Innovation Trajectories

An innovation trajectory is understood as the path an innovation typically follows on its journey from development to deployment. Recent work has examined the agency of institutional entrepreneurs in redirecting an innovation trajectory over time, expanding our understanding beyond central actors' structural positions (Battilana 2011) to account for their specific capabilities and actions. For example, in a study of innovation within automotive entertainment, Henfridsson and Yoo (2014) found that it was institutional entrepreneurs' reflective capacity during the production process that enabled them to reframe possibilities and experiment with alternatives that shifted the innovation trajectory from a familiar track towards one that was riskier and more uncertain but ultimately more effective.

Other studies have examined the ways in which innovation trajectories are influenced and changed as a result of digital capabilities. Yoo et al. (2010, p. 732), for instance, argue that with the layered modular architectures characteristic of contemporary digital innovation, "the types of knowledge resources needed for innovation cannot be fully known *a priori* and interactions are indeterminate and emergent." As a result, the innovation trajectory will necessarily entail "a myriad of previously unconnected firms" that "become interwoven over time, generating a staccato-like pattern during innovation as the firms influence one another reciprocally and nonlinearly." An example of such changes is evident in Boland et al.'s (2007) study of a 3-D design representation tool within the AEC (architecture, engineering and construction) industry. They found that as multiple AEC firms adopted the 3-D design innovation, they each incorporated additional ideas that built on the initial digital capabilities, which produced spinoff

design tools that spawned their own path-creating innovation trajectories with their own distinct logic and tempo. These multiple "wakes of innovation" (Boland et al. 2007) overlapped and intersected with each other to generate widespread and multiple practice changes within the AEC ecosystem. Other studies have highlighted the need to follow the innovation beyond a single site to examine its interactions with networks across space and time (Williams and Pollock 2012).

These studies have contributed an understanding of the interactions between multiple innovation trajectories, the capabilities of digital technologies, and the role of mindful actors and distributed agents in innovation processes. The focus however has been centred explicitly on the innovation trajectories. As our phenomenon entailed different kinds of trajectories (including non-innovation trajectories), we sought a broader understanding of trajectory dynamics than that of innovation trajectories.

A number of scholars have used the notion of trajectories to study a wide range of phenomena including personal development and learning (Dreier 2003), chronic illness (Strauss et al. 1984, 1985), science standards (Millerand and Bowker 2007), and project coordination (Oliveira and Lumineau, forthcoming). The work of Strauss in particular, offers a valuable, general understanding of trajectory, defined as the course of a phenomenon as it changes over time through shifts in the practices, workers, locations and relationships that shape it (Corbin and Strauss 1987). In this view, as Timmermans (1998, p. 429) observes, "the phenomenon at the center of the trajectory does not unfold through an 'internal logic' (inherent to the phenomenon itself) but instead is shaped and managed through the actions and interactions with others."

Building on the understanding of trajectories developed by Strauss and colleagues, Timmermans (1998) examined the development of resuscitation techniques, finding that the method of closed-chest cardiac massage that eventually became the dominant medical protocol emerged from the intersection of diverse trajectories (e.g., patient medical histories, laboratory research projects, developments in anaesthetic agents) that transformed the technique over time from laboratory novelty to standard practice. Drawing on these insights, Timmermans highlights the importance of understanding multiple trajectories in any situation, and for viewing these trajectories as influencing each other through their concrete

practices. A given trajectory will thus vary contingently as a result of its interactions with other trajectories that will redefine its contours, meaning, and content.

In examining our empirical phenomenon — the development and transformation of a mobile money payment service — we build on Timmermans' insight that phenomena are shaped by different trajectories that influence outcomes. Highlighting place as an important and active influence on the innovation trajectory, we focus on local trajectories to unpack the multiple, interrelated conditions and practices that constitute a specific place. In particular, we found that such a perspective offered a useful starting point and analytical lens to understand how the MPS innovation was transformed over time by interactions with four local trajectories and how these interactions further served to reciprocally reshape the local conditions and practices of a place.

Research Setting and Methods

Research Setting

We conducted a longitudinal field study of MPS, a mobile money payment service that was developed in the UK for deployment in Kenya. The national launch of MPS in March 2007 proved to be enormously successful. Almost 250,000 subscribers signed up in the first three months (a number predicted for the first year). After one year, there were close to 2.5 million subscribers, and after four years almost 15 million active users (see Figure 1). In 2015, the service was used by over 50% of the country's adult population and over 38% of the national GDP was transacted through the system.

Initially developed as a service to facilitate the disbursement and repayment of microloans via mobile phones, the MPS innovation was transformed into a service to transfer money from one mobile phone to another through a network of agents who manage the deposit and withdrawal of cash. These transfers were first used for personal remittances (e.g., a family member sending money home) and subsequently for more general payments (e.g., to pay salaries, utility bills, and school fees). In just over four years, the mobile money service had penetrated widely into rural and remote areas where people had limited access to banking and other forms of financial services.

We followed the MPS innovation trajectory through the iterative processes of initiation, development, implementation, and uptake, paying attention to the multiple distributed agencies that were salient in the enactment of the trajectory over time and space. These agencies included a number of organizational actors: GlobalCom, a global telecommunications corporation headquartered in the UK; Santana, a boutique technology development firm based in the UK; LocalCom, a mobile network company operating in Kenya and partly owned by GlobalCom; FinCo, a microfinancing institution based in Kenya; and the Central Bank of Kenya, the key financial regulator in Kenya. Particularly active communities were LocalCom agents, the country-wide network of local, authorized MPS service providers, and MPS users, the local customers who subscribed to and used the MPS system on their mobile phones. Further influencing the MPS innovation were the available mobile technology, the mobile network infrastructure, the urban-rural migration patterns, the national ID system, the banking sector, legal and financial regulations, and the education and advertising campaigns run by LocalCom to promote the MPS system.

The richness of the MPS case is further enhanced by the multiplicity of geographical and cultural spaces involved — the UK and Kenya, developed and developing economies, urban and rural communities, and global and local concerns. The longitudinal, multi-sited design of our field study was especially important in allowing us to examine the shifting relations and practices that transformed the MPS innovation trajectory as it engaged with multiple other trajectories over time and space.

Research Methods

The data collection process was conducted over three years from January 2009 to January 2012, and involved sites in both the UK and Kenya. As the development of MPS can be traced back to 2003, we retrospectively constructed the early period of the innovation process through interviews and archival data. The later period of the innovation process was studied in real time with interviews and observations, and the collection of various documents and visual materials.

Our primary source of data was 87 semi-structured interviews that we conducted with managers and staff members of GlobalCom, Santana, and LocalCom (28 interviews), as well as multiple MPS agents (18 interviews) and users (41 interviews). Our interviews involved participants in the MPS innovation, including the initiator of the MPS project (the head of Corporate Social Responsibility at GlobalCom), the

individuals who built the MPS system (the core team of technology developers at Santana), and the person responsible for the MPS deployments in Kenya (the MPS project leader at LocalCom). These participants were interviewed multiple times over the three years of study.

Interviews typically lasted about an hour, ranging between 30 minutes and two hours. Our interviews with participants from GlobalCom, Santana, and LocalCom were conducted on site in their offices or nearby meeting rooms. Most of these interviews were recorded and transcribed. Our interviews with the MPS agents and users in Kenya were conducted in various settings, such as MPS shops, buses, homes, farms, and open spaces in rural villages. About half of these interviews were recorded and transcribed. For the interviews where recording was not feasible, detailed notes were taken at the time and then typed up later on the day of the interview. In addition, we collected 21 drawings from MPS agents and users depicting how MPS had affected their lives. The drawings were useful in complementing the interviews, particularly in rural areas where higher illiteracy rates made communicating pictorially a common practice. This visual data approach builds on the tradition of collecting graphic materials produced by participants in organizational research (Diaz Andrade et al. 2015; Meyer 1991; Zuboff 1988).

Our interview data were supplemented with notes from observations and experiences in the field. One of the authors spent five months in East Africa (three months in 2010 and two months from late 2011 to early 2012) doing field research. As she did not have a bank account in the region, she registered for MPS on arrival and managed all her research and travel budget from her MPS account. She made deposits and withdrawals, bought airtime, sent money to other people in the region, and paid for products and services (e.g., transportation fares) by MPS. She carried a basic handset in which she inserted different SIM cards from multiple mobile operators in the region (including the LocalCom one linked to the MPS account), just as many Kenyans did because it was cheaper to make phone calls to numbers registered with the same operator. This allowed the field researcher to experience mobile telephony and MPS in ways similar to Kenyan users of the technology, including those who do not have bank accounts.

During her time in the region, the field researcher kept a record of her daily MPS experiences, including for example, having to visit five MPS shops in a row to make a relatively large deposit via a number of smaller amounts (as agents were often short of e-float), making a money transfer by MPS on

behalf of a friend who did not have enough MPS balance but who immediately repaid her in cash, and being required to show her ID to those agents who requested it (particularly in big cities) and not to others (e.g., in rural towns and villages). The researcher visited over 50 MPS shops in urban and rural areas to make deposits and withdrawals, and while there she recorded her observations of routine interactions among agents and users. The field notes thus provided multiple details of the researcher's first-hand experiences as a user and observer of MPS. These grounded descriptions of everyday practices complemented the information gained from interviews with MPS users and agents.

In addition to interviews, observations, and experiences, we drew on several additional sources of data, including documents generated during the conceptualization and design of the MPS innovation (e.g., design specifications, press releases), marketing materials generated during MPS deployment (e.g., news stories, promotional leaflets, posters, printed advertisements, TV commercials, and internet postings), regulatory policies, statistics and maps of the mobile network infrastructure, manuals for using MPS, and the MPS menus on mobile phones. Where possible and permissible, we also took photographs of MPS advertising on billboards and shop fronts, and interactions between agents and users at MPS shops.

The data were inductively analysed in four phases. During the first phase of analysis, thematic summaries were produced to articulate the insights concerning the coordinating of the innovation process across the geographies of the UK and Kenya. These were developed during the data collection process as we engaged with the multiple stakeholders involved and the documentary evidence available (see Table 1). Shifting roles and relationships emerged as important themes and our summaries highlighted the distinct activities of the innovation process, namely idea initiation, system development, pilot and testing, use and improvisation, and expansion of the service. In the second phase, we drew on theoretical ideas from the research on innovation trajectories (Boland et al. 2007; Henfridsson and Yoo 2014) to develop analytic displays that depicted the changing boundaries and stakeholders of the innovation trajectory associated with MPS across time and locations. We shared and discussed our emergent themes and analytical diagrams with our participants, updating our understanding as appropriate.

In the third phase of our analysis, we foregrounded the multiple local practices that were particularly evident in our thematic summaries as influencing the implementation and uptake of the MPS innovation

within Kenya (e.g., rural to urban migration patterns). This led us to draw on the ICT4D research insights that highlight the relevance of local contexts of economic development for technological adoption. Working iteratively with the data and these theoretical ideas, we focused analytically on the various ways in which the MPS innovation trajectory was influenced by different local practices including micro-credit lending, banking, and mobile services provision (Table 2). The historical continuity and co-existences of these local practices helped us understand them as constituting distinct yet interrelated trajectories, prompting a search for broader conceptualizations of trajectories.

Informed by work on illness trajectories (Strauss et al. 1985) and the extensions by Timmermans (1998) that highlight the importance of paying attention to multiple, intersecting trajectories, we moved to our fourth phase of analysis, where we re-analyzed the data with a focus on trajectory interactions. This process identified the local Kenyan trajectories that appeared to have the most salience with respect to how the MPS innovation trajectory was shaped over time. We then identified the specific similarities, differences, and tensions that arose as these local trajectories engaged with the MPS innovation trajectory, and the processes and outcomes that ensued. As we worked to further characterize the trajectory interactions we had identified, we found it helpful to draw on research that has examined collaboration dynamics across organizations (Hardy et al. 2006; Le Ber and Branzei 2010; Majchrzak et al. 2014). This led us to identify specific dimensions for distinguishing and articulating the patterns of trajectory dynamics that shaped the MPS innovation over time. We then theorized this understanding into a model of trajectory dynamics that proposes the specific ways in which innovations may be transformed as they interact with the local trajectories constituting particular places.

Trajectory Dynamics: Transforming the MPS Innovation over Time

We found that the MPS innovation was transformed over time through what we characterize as *trajectory dynamics.* We identified four specific patterns of trajectory dynamics – separation, coordination, diversification, and integration – that arose through the interaction of the MPS innovation trajectory with different local trajectories associated with Kenyan economic development. In particular, these local trajectories involved practices of microfinance, migration, banking, and local enterprise (see

Table 3). As we discuss below, the innovation trajectory interacted in multiple and unexpected ways with each of these local trajectories (see Figure 2). In the process, the trajectories' core practices intermingled and produced overlapping and diverging interests, as well as problematic and generative tensions. But first, we trace the inception of the MPS innovation and its trajectory.

Onset of the MPS Innovation

In the mid-2000s, there was a strong move within the UK to get private sector firms to collaborate with new partners so as to generate novel business value in developing economies. In particular, the UK Department for International Development (DfID) introduced a Challenge Fund for financial inclusion to encourage firms to engage in opportunities that could lead to commercially viable innovations. With DfID funding (via a £1 million grant), a senior member of GlobalCom's Corporate Social Responsibility (CSR) unit was charged with taking on such a project and he became focused on the possibilities of a digital innovation for sustainable development.

> I was attending a conference in Johannesburg … targeting the private sector in addressing sustainable development issues. … I was looking for [projects with] what you might call reputational benefit or social value. *(GlobalCom CSR Manager)*

While inspired by the challenge to engage with development work through an innovation project, this CSR manager realized that his unit lacked the technical skills to accomplish such a task. He thus sought to partner with an outside technology vendor, Santana, a boutique software firm in the UK. As he noted,

> CSR is a small area, it's a very small idea. ... There was no [internal] team … to call on to develop it. GlobalCom doesn't have a branch of developers all hanging around … waiting for someone to invent a good idea. … Whereas if you go to Santana, that is their culture, that's what they do. *(GlobalCom CSR Manager)*

Working in partnership with Santana, a project team within GlobalCom's CSR unit developed a proposal to produce a mobile application that could support microfinance loans. The focus of the project team was heavily influenced by the conventional wisdom at the time regarding the potential of microloans to support financial access via microfinance institutions (MFIs). One participant explained:

> [We] definitely went in there with the MFIs in mind ... because microfinance was the hot topic of the day […] We were thinking originally around microcredits, microfinance, what could we do to disburse loans and recover payments and take the cost base out of delivering financial services. *(Santana Business Analyst)*

The CSR project team based within GlobalCom's London office actively collaborated with Santana to

develop the MPS digital platform, while also establishing contact with LocalCom, the local mobile network operator in Kenya. While Santana was initially contracted as a traditional vendor, Santana's project leader worked to shift this relationship over time to be more of a partner to the CSR team within GlobalCom. Outside of the CSR unit, senior managers within GlobalCom showed little interest in controlling or overseeing the innovation process of what they saw as a modest, small-scale CSR initiative. This allowed the collaborating project members to remain largely disconnected from GlobalCom's mainstream innovation management practices and budget constraints, affording some autonomy and protection in the early development phase.

Once the basic idea for the MPS digital platform had been conceived, members of the project team travelled to Kenya to visit both LocalCom and possible local MFI partners. Spending time in the field facilitated the team's learning about micro-lending practices, MFI requirements, and possible forms of value to be delivered via a mobile application.

> So with that £1 million we spent about 18 months talking to the market, listening to customers, talking to banks and microfinance institutions and obviously working with our local network operator LocalCom at that end. And that's quite important because we actually spent quite a long time doing that, more than we normally would do. If I was under a quarterly budget review with GlobalCom, you'd have to whizz as quickly as you can through to the design phase. *(GlobalCom CSR Manager)*

The local insights that were developed on the ground became incorporated into the design of the MPS platform being built back in the UK. At the time the MPS innovation was ready for its initial pilot test in Kenya, its trajectory was explicitly oriented towards enabling microloan disbursement and repayment through the use of mobile communications across a wide geographic area. The project team had designed the MPS innovation with specific MFI clients in mind — configuring the innovation with simple mobile processes having low literacy requirements and strong protocols for ensuring the flow of small amounts of money safely and easily. Yet, as the MPS pilot got underway in Kenya, the innovation trajectory interacted with the microfinance trajectory in unexpected ways, leading to tensions and challenges that ended up transforming the MPS innovation through the dynamics of separation. As summarized in Table 4, we examine the similarities, differences, tensions and consequences in relation to each local trajectory as it interacted with the innovation trajectory. Such tensions may be either ignored through inattention or

addressed through specific action especially if the tensions are acute, problematic, or generative. Resolving or leveraging the tensions involve dynamics that may reinstate and reinforce the prior practices, or they may result in novel outcomes through incremental or radical changes in the local trajectories and their practices. We found that four distinct patterns – dynamics of separation, coordination, diversification, and integration – changed the innovation and the local trajectories in powerful and unexpected ways.

Pattern 1: Dynamics of Separation

For the MPS pilot, the LocalCom lead facilitated access to a Kenyan microfinance institution (FinCo) that helped to recruit its clients to test the initial MPS service. The relationship between the two organizations was established with a focus on the similarities of their goals, namely transferring small amounts of money and supporting financial inclusion.

> The pilot project was initially allowing people to repay their MFI loans via the system, being able to receive money via the system from the MFI. So they apply for a loan and they actually got the money as e-money and they repaid, they put money in at the agent and they repaid. *(Santana MPS Manager)*

The MPS pilot began in October 2005 with 500 microfinance clients and 8 MPS agent shops in both urban and rural regions and ran for six months. The FinCo clients were enrolled, given free phones, instructed how to use the MPS system, and given a few dollars in their MPS accounts to get started. In setting up the MPS pilot microfinance initiative, the project lead developed a good relationship with the Commercial Bank of Africa (CBA), which acted as the primary account holder for the MFI. As he noted:

> We went straight into signing up some of FinCo customers ... We had a bank account opened with CBA; they did all the compliance work for us and led on the conversations with the regulators who of course were interested. *(Santana MPS Manager)*

Regulators (in the form of the Kenyan Central Bank) were interested in MPS as they saw its potential to improve financial inclusion, a significant challenge in a country where over 80% of the population was unbanked. The focus on supporting financial inclusion through facilitating the transfer of small amounts of money across the country engendered strong commonalities in the practices of the MPS and microfinance trajectories. Nonetheless, the extent of interaction between commonalities was limited over

this single point of commonality. The interactions also involved limited breadth as focus was on users requiring microloans.

The initial MFI focus of the MPS technology was to support the traditional cash-based economy of the rural villages. Prior to the pilot, NGO workers would travel around the country in security vehicles to collect loan repayments from FinCo leaders in villages and then physically transport the cash to the FinCo office for deposit. This was a very different way of transferring money that the one being piloted by MPS technology which allowed remote money transfer. A developer explained these differences,

> The idea was [to develop] a better way to make loan payments, because what [FinCo] do is they send lots of big groups of big men to all these villages to go and collect the cash, and … they wanted a better way of actually distributing the money and collecting the payments, which was more secure and convenient. *(Santana MPS Developer)*

Over the course of the pilot, the MPS team learned that while mobile loan services were seen as an easy, convenient, and efficient way for dispersed FinCo clients to repay their loans, the FinCo leaders came to view the MPS service as threatening the social structure of their community. In particular, the FinCo leaders were concerned that because their clients were repaying loans via their phones, they were no longer obliged to meet in person and interact face to face with each other or the FinCo leaders. This was viewed as eroding opportunities for the relationship building critical to maintaining the microfinance community. Such meetings were seen as vital to ensuring mutual accountability and to encouraging high levels of loan repayment.

> The FinCo [leaders] pushed back a bit as well; they actually liked the [existing] processes. They liked the way they had to tie people to meetings and physical space. *(Santana MPS Manager)*

The pilot repayment process produced new dynamics of community interaction that were incompatible with FinCo's interests of developing strong group solidarity and promoting accountability through peer pressure. Thus the valence of the interactions became negative. A member of the MPS team observed,

> [MPS] was more convenient for the customers, but inconvenient for FinCo… FinCo put their people in groups so [they] self-manage… [I]f someone doesn't pay back their loan the group is responsible. *(Santana Business Analyst)*

The similarity between the goals of the MPS and microfinance trajectories were thus challenged, generating tensions that triggered a process of disengagement where the two trajectories' respective practices disconnected from each other. As a consequence, the FinCo leaders' negative response to the

mobile repayment service triggered much examination and (re)consideration by the MPS team. They sought more data by tracing and analysing MPS usage by the FinCo clients as captured in LocalCom's customer database. These revealed interesting and unexpected patterns of MPS activity that did not correspond directly to microloan repayment. For example, they discovered that some FinCo clients were depositing money at one MPS agent shop only to withdraw it a few hours later from another MPS shop in a different location. This led the MPS team to have follow-up conversations with the FinCo clients to learn more about their use of MPS. One developer gave an example,

> In a small market town called Thika …this guy kept putting money into the system. So he'd go along with his cash, you'd see him load it … in Thika at the agent's store. We could spot it on the system. Then about an hour and a half later he'd be taking it out in Nairobi. And so the next time we had somebody down at the field, we said "Why are you doing that?" and he goes "Well I don't like to carry the money on the bus." *(Santana MPS Developer)*

Another pattern showed the FinCo clients depositing considerably more money than necessary for loan repayment and using MPS to make personal payments (unrelated to their MFI loans) to their families particularly those living in the rural areas of the country. As the project lead noted:

> What people were doing was putting more money into their accounts than they needed to repay the loan. We watched what customers did [over] several months. What became clear was what they liked [to do] was sending money between themselves. *(Santana MPS Manager)*

Through analyzing usage data and collecting on-the-ground insights, the MPS team learned that FinCo clients were engaging with MPS in ways that were different and distinct from the original microfinance proposition entailed in the pilot. This knowledge about actual MPS practice shifted the project team's understanding of the possibilities of MPS, creating awareness of its potential to support mobile financial services more broadly and generate novel forms of value. This created incompatibilities between the MPS and microfinance trajectories and led the MPS team to disengage from the challenging dynamics of supporting microfinancing for the MFI community. Instead, they adopted an alternative conception of MPS as facilitating money transfer through mobile phones. After making appropriate modifications to the technology, they launched MPS as a peer-to-peer money transfer service.

In redesigning the MPS innovation, the project team emphasized openness and inclusiveness, allowing the participation of multiple actors within the system. For example, the platform enabled anyone with a mobile phone in Kenya to receive money transfers via text messaging without the need to sign up

with LocalCom. This was important as it ensured engagement from a wide range of users, across both urban and rural areas. Yet, they also provided an incentive to register with MPS, as money transfer fees were lower for MPS subscribers and only registered users could initiate transactions. The experience of non-registered users in receiving money by phone played an important role in the growth of the MPS service over time.

As articulated in Table 4, we see the dynamics of separation emerging after the initial interest by both the MPS team and a microfinance institution to work together on financial inclusion and the transfer of funds for microloans. The commonalities in focus and goals were limited in extent and breadth and then subsequently became challenged by marked differences in key practices of the MPS and microfinance trajectories that were manifest through the pilot: the microfinance institution required face-to-face meetings for the exchange of funds (loan disbursement and repayment) in order to build community and accountability, while MPS enabled the transfer of money remotely via mobile phones. The decreased need for in-person contact during the MPS pilot created considerable tensions as MFI leaders saw the MPS-based microfinance practices eroding opportunities for relationship building among their clients and threatening the social fabric of their community. These incompatibilities in practice led the MPS team to explore the possibility of alternative services after the pilot. The two trajectories thus separated as their practices disconnected through processes of disengaging from each other. The microfinance trajectory began to re-enact prior practices of in-person contact for the exchange of funds, while the innovation trajectory began to enact new practices that redesigned the MPS innovation around the unexpected uses that had become evident in the pilot. As a result of the redesign, the MPS platform and mobile application was re-oriented to support practices of money flow across Kenya, leading to significant changes in the MPS innovation that became manifest through the dynamics of coordination.

Pattern 2: Dynamics of Coordination

Kenya has a large, rural, farming-based population, with most families having at least one member who has migrated to an urban centre in search of work. In some cases, the arrangements are seasonal, and in others more permanent. As a result, the Kenyan urban population has gradually increased over time. Over the past fifty years, the number of urban dwellers has increased from 7.4% to 25.6% of the total

population (see Figure 3). The capital Nairobi is the largest preferred destination, and many shantytowns housing migrant workers have sprung up around the city.

> In Kenya, the demographics we have got traditionally are this rural–urban migration. Customers coming [to the city, and] leaving behind a homestead that they are supporting. *(LocalCom Project Manager)*

Kenyan cities thus have a large local population of workers who have moved to urban centres to seek income. These individuals would periodically travel back to their rural homes with cash that was used to support their families. The practices that entail workers relocating from rural areas to urban centres and then carrying money back home are critical aspects of the migration trajectory, and this has strongly shaped Kenyan life. With the reorientation of the MPS innovation around supporting money flows via mobile phones, the MPS and migration trajectories became mutually supportive across multiple points of connection. The similarities across both trajectories were the practices involving money flows between urban and rural areas across the country and dynamics between the trajectories focused around these common goals. Maintaining family contact during the time between visits to the rural home was an important reason for the high penetration and usage of mobile phones in Kenya. As a user pointed out, there is a mobile phone in every home, so essentially everyone has access. This allowed for rapid uptake of the MPS service among mobile phone users. One Nairobi resident described the experiences of his mother who lives in a rural village.

> Forget Internet and all that! [Laugh] What's critical is communication and MPS. My mother knows how to communicate in voice, and she knows MPS. *(MPS User)*

At the same time, the practices around money transfer that constituted the two trajectories differed substantially. For example, while there was an ease of transferring money electronically through the MPS system, moving cash physically was difficult within the migration trajectory. Rural roads were poorly maintained and public transportation was primarily provided by minibuses, known as *matatu*. These minibuses do not run on a schedule; they leave when the vehicle is full with passengers. The field researcher frequently travelled using the matatu and learned about the local travel infrastructure. The following is an excerpt from her fieldnotes;

> It took me 3 hours and 10 minutes to travel a distance of less than 25km, from Nyeri town to Othaya village. I left my accommodation at 7:30am to walk to the bus stop and boarded the matatu at 7:50am. … At around 8:10am, I called [my contact] to let him know that I had got into

> the matatu and should hopefully arrive by 9am or so. I was hoping to arrange a time to meet at Othaya. He kept saying, "Just call the driver when you're there." In the end, his advice made a lot of sense, as it was almost useless to guess what time I might get there. I waited in the matatu (at Nyeri) for 1 hour and 40 minutes. I arrived [at my destination] at 10:40am.

Travel, particularly in rural regions, took considerable time and effort. It was also unsafe as there was a constant risk of ambush and robbery during the journey. The rural routes were isolated, far from potential police protection, and known to be frequented by migrants taking cash home. Those carrying a large amount of money or valuables would routinely hire "men with guns" to accompany them and provide protection. With the onset of MPS, alternative possibilities for money transfer emerged resulting in complementarities that were mutually beneficial. In this way the extent and breadth of interaction between trajectories were across multiple points of connection involving several practices.

> [MPS] is the only way you can send money to a person who is in a very far place, instead of travelling to that place. [To travel] you're going to use a lot of expense to pay the fare and you're going to waste a lot of time travelling to that place. *(LocalCom MPS Agent)*

When interviewed about why he used MPS and what difference it had made in his life, one user drew a picture showing his experiences before MPS and after MPS in an urban area (see Figure 4a). He explained that the left side represents his experience of being robbed in Nairobi, during which he lost a large sum of cash. He noted that moving around with cash was generally unsafe due to the high crime rates, indicating the considerable tension associated with the practices of the migration trajectory. He went on to explain that the right side of the picture represents his present experience of no longer travelling with cash. Instead, he uses MPS agents to deposit and withdraw money as needed. In describing his sketches, this user commented that he now felt less vulnerable because he did not need to carry cash on his person. Many users echoed these experiences as a key motivator for adopting MPS.

An important difference between the trajectories of migration and MPS was the ease and security of transferring money. The need for frequent travel to rural areas where the transportation infrastructure was poor and safety was a key concern meant that users sought creative ways of using MPS to deal with the challenges raised by risky and inconvenient travel:

> They put the money on MPS and just take the SIM card with them. … It's very hard to get robbed of a SIM card. [Then they use] the SIM card at the other end and get the money back out again. *(Santana MPS Developer)*

These complementarities also began to influence other aspects of the migration trajectory, and these further helped to align the practices of the trajectories. For example, because sending money was now easily done via MPS, people no longer needed to travel as frequently. One user, a tea farmer, provided a picture of her daily routine before and after becoming an MPS user (see Figure 4b). She explained that as she lived in a rural village she would have frequently had to walk to distant locations in order to conduct financial transactions, such as collecting money or paying tea farm workers. Though she did not use a cane for walking, she added one to her drawing to emphasize the laborious nature of her walk (left side of picture). After she had become an MPS user, her routine changed significantly, as shown on the right side of her picture. She commented that now, "people can stay, and money moves."

The ease and speed of being able to transfer money also helped strengthen relationships between separated families and friends. In particular, emergency or unexpected needs could now be provided for at a distance. One participant explained,

> MPS also, it has also helped me to communicate, and to stay well with my relatives, my friends, and everybody, because when somebody has a problem, I just tell them to visit an MPS agent, and if I have some money, I just send it for her. Then she withdraws. We don't take a lot of time. *(MPS User)*

Table 4 depicts these dynamics of coordination in practice. Resonances across the two trajectories were evident in that both involved the periodic flow of money across the country. There were also differences across these trajectories as migration necessitated unsafe, time-consuming, and irregular travel to physically carry cash from urban to rural locations, while MPS allowed for safe, quick, and frequent transfer of cashless money via mobile phones. Such different ways of moving money across distances produced generative tensions in the contrast between physically conveying money to rural areas and simply using a mobile phone to electronically transfer funds with MPS. These interactions resulted in the MPS team choosing to engage in processes of aligning the MPS innovation trajectory with Kenya's trajectory of rural to urban migration. They did so by reconfiguring the MPS innovation as a peer-to-peer money transfer service that provided a safe, secure, and convenient way of sending money to the rural home.

> We kept it very, very simple. As I said earlier, we turned off some of the complexity of the loan proposition. We went out with a very simple product. "Do you want to move your money? Then use MPS." "Send money home" was a strapline on TV ads. … To the customer, it was a very

> simple proposition. They were familiar with text messaging and mobile phone. It was a small step from a technical perspective. *(GlobalCom CSR Manager)*

The consequences of such alignment was to produce strong complementarities in the practices of the MPS and migration trajectories. The valence of interaction was steadily positive and reinforced over time as the sending of money home associated with migration was substantially enhanced through the MPS capability to transfer money via mobile phones. The two trajectories thus became coordinated and more and more migrant workers began transferring money to rural family members through MPS. The interaction of the MPS and migration trajectories through mutually beneficial practices of money transfer facilitated the strong uptake and growth of the MPS innovation, while also reshaping aspects of the migration trajectory. In the process, the MPS innovation trajectory engaged with the Kenyan banking trajectory, highlighting a number of tensions that accentuated the distinctiveness of the MPS innovation through dynamics of diversification.

Pattern 3: Dynamics of Diversification

The MPS innovation trajectory was further shaped, though in a different way, through its interactions with the Kenyan banking trajectory. While there were similarities in the mandates motivating both trajectories (the provision of financial services), there were also considerable differences in their constitutive practices. For example, few Kenyans had bank accounts, due in part to the large deposit required to open and maintain an account, the high fees associated with transactions, and the urban concentration of branches. The 2006 Financial Access National Survey[1] found that only 14.2% of Kenyans had an account with a bank licensed under the Banking Act and 5.6% of the population banked with the Postbank (often these were the same individuals). The difficulty Kenyans encountered with traditional banking is evident in the following comment:

> There are monthly fees [with banks]. … [And the] fees are probably at least 300-500 shillings per month. These fees are constantly deducted from the account, regardless of the transactions you make. So imagine, if you have 500 shillings in your account, after 2 months you have zero, in fact it goes negative. (*MPS User)*

Banking was thus largely limited to the relative wealthy who lived in cities. It was also mainly used by men as it was rare for women to engage in banking even in urban areas, as one participant noted,

[1] http://fsdkenya.org/publication/financial-access-in-kenya-results-of-the-2006-national-survey/

> For a long time, the bank was a mysterious place for most people in Kenya. It was a place where there are security guards with guns. It wasn't the place you would dare to go. [Many women I know] never thought that women could enter that door. Even when they went with their husbands, they were told to wait outside, and it was the husband who entered the door and took money. (*MPS User)*

Additionally, banking entailed extensive paperwork to open and manage an account, and consequently required a reasonable level of literacy. The activities associated with conducting banking transactions involved going to a branch on a weekday during the times it was open, filling out forms, and standing in queues. These activities and requirements were in stark contrast to those of MPS, and revealed considerable tension between the trajectories, as some participants explained,

> If you want money in the bank, it will take a process, a process that MPS omits. … In a bank, you have to write … sometimes very, very [many forms] involving details which MPS does not have. *(MPS User)*

> These banks… they're only in cities, towns. But you go to the place out in nowhere, and you'll see MPS there. So, for those people there, this whole thing about banks … it's almost meaningless. It's meaningless to them. *(MPS User)*

> The bank, you use it depending on the time they open. But MPS you use it 24 hours, either day or night. … The bank is 9 to 4. And at the weekend, they don't open. Public holidays, they don't open. But MPS, you can use it, it's accessible. *(MPS User)*

> Banks are not accessible to illiterate people, you know? There are documents and all that. It's not friendly to those illiterate people in villages. [With] MPS in rural places … an old mama just comes to the shop and gives her phone to the agent. "Here's some money, somebody sent it to me, so give it to me!" That agent would do the transaction for her, the illiterate old mama. She can never do that in a bank. In fact, those security guards will throw her out! This MPS, it's so, so friendly to those people in villages. *(MPS User)*

The trajectory of banking was thus constituted of practices that tended to exclude rural Kenyans, the poor, women, and less literate members of society. This was in marked contrast to the more inclusive MPS practices, and these critical disparities in practices further stimulated the widespread uptake of MPS throughout Kenya. While the interactions between trajectories focused on a number of overlapping goals, none of these points of connection were taken up, even though the breadth of interaction could have been potentially extensive.

An important actor in the banking trajectory was the Central Bank of Kenya, a key regulator responsible for monitoring and safeguarding financial practices within Kenya. With its goal of increased financial inclusion, the Central Bank agreed to work with the MPS developers to ensure that the redesigned MPS platform and mobile money services complied with banking regulations, while remaining

separate from banking. The emphasis on differentiation reflected in part the banking industry's lack of interest in MPS, and allowed for MPS to be positioned as distinct from the exclusive and hard-to-access banking practices and associated with practices that were already familiar and available to most of the population — the use of mobile phones. One participant observed,

> Banking is useless without a bank account, but you can have MPS without a bank account. Your account is your phone. You only need a phone number to register. For MPS, opening a line is opening an account. *(MPS User)*

To extend the reach of MPS, LocalCom ensured that MPS could be used with even the simplest phones, allowing for a larger group of potential users, as another participant noted:

> You see, even those people selling papers and shoe polishers [pointing to people on the street], all of them have mobile [phones]. They have those cheap, cheap phones. Because once there is an offer, like LocalCom gives us an offer, the phone is going for 900 bob, 1000 bob [1000 bob is approximately US$10]. *(MPS User)*

Even individuals without their own phone had a family member whose phone they could use. This made access to MPS and the possibility of transferring money, even in small amounts, available and affordable to large numbers of Kenyans. An important consequence from the interactions between these two trajectories was that the people viewed MPS as distinct from banking. One user who lived in a rural area explained:

> In the bank, they deduct a large amount of money, compared to the MPS people. And you're using the [transportation] fare to and from [town], to get your cash from the bank. That's why I had to opt for MPS.

The contrast between banks and "MPS people" with their strikingly discrepant practices underscores the considerable economic, social, and practical distance perceived between the MPS and banking trajectories.

Table 4 encapsulates these dynamics of diversification, with the two trajectories exhibiting significant differences in their provision of financial services to Kenyans. Banks served predominantly urban, literate and wealthy men, while MPS was available to all, regardless of literacy, gender, location, or wealth. Whereas banks operated with complex procedures, high fees, and limited sites and hours, MPS involved simple mobile phone exchanges of money that could be transacted anywhere, anytime, and for minimal fees. The exclusive and restrictive practices of the banking trajectory were seen as in stark contrast to the open, accessible, and inclusive practices of the MPS innovation trajectory. These discrepancies resulted in processes of differentiating with the result that the MPS innovation trajectory and the banking trajectory

become explicitly diversified. The disparate practices of the two trajectories proceeded to co-exist, side by side, with each serving different needs and customers and negative valence between their interactions.

Over time, however, the marked success of MPS in providing financial access to large segments of the population[2] gradually convinced many banks of the need to reconsider their initial dismissal of MPS. A LocalCom participant noted towards the end of our study,

> In the early days we wanted to partner with banks and we invited them to work with us, but they were reluctant and perhaps even showed opposition. … They have [now] changed their tune. … They've realized that we're here to stay, that we are not directly competing with them. *(LocalCom Manager)*

A gradual accommodation with banks thus emerged, which was especially helpful for MPS agents who needed to manage their cash float and maintain stable access to capital. These were both key requirements as MPS services expanded significantly with the interaction of the MPS trajectory with that of local enterprise, a process that generated substantial changes through the dynamics of integration.

Pattern 4: Dynamics of Integration

The MPS innovation trajectory was further shaped, powerfully and unexpectedly, by its interaction with the trajectory of local enterprise. These two trajectories shared similarities in supporting local business activities, depending on strong interpersonal relations and trust, and maintaining a broad urban and rural presence. In a context of high corruption and low affinity for large foreign corporations, most Kenyans avoided transacting with entities or people they did not know personally. Amidst this climate of low trust of large companies, the local MPS provider (LocalCom) stood out as an especially trustworthy enterprise. The LocalCom CEO was a key reason for the high levels of trust imputed to the company. He was widely regarded as a respected leader in Kenyan society, and a forthright spokesman for local citizens. One developer described him as "pretty much next to God in Kenya." The CEO was also a strong advocate of MPS, which helped to validate the system in the eyes of many Kenyans. A rural resident commented,

> MPS is popular because LocalCom management is very good. Do you know [LocalCom's CEO]? His management is very, very good. *(MPS User)*

[2] A 2014 World Bank report notes that 75% of the Kenyan adult population is now banked through bank and mobile money accounts. It credits this high financial inclusion rate to the success of mobile money that has made financial services available to the previously unbanked population (http://datatopics.worldbank.org/financialinclusion/country/kenya).

High levels of trust were also accorded to LocalCom because it had earned a positive reputation as a longstanding Kenyan enterprise, despite being partly owned by GlobalCom. It was largely viewed as a company of which Kenyans could be proud. It was also a particularly well-known enterprise, enjoying a dominant market position as a leading mobile phone service provider in Kenya, as a participant explained,

> LocalCom is Kenyan. LocalCom started in Kenya, it's almost like the history of mobile phones in Kenya. LocalCom is the only Kenyan mobile operator. All the rest are foreign. *(MPS User)*

Importantly for the MPS trajectory, much of the trust and esteem granted to LocalCom were also accorded to MPS. Some project members were initially concerned whether an economy so heavily cash-based and oriented to personal connections could develop trust in an abstract electronic form of money. However, the strong standing of LocalCom and people's confidence in and familiarity with the company appeared to allay concerns and doubts about the abstract nature of money transfer services, which was a tension between the two trajectories.

LocalCom had also developed an extensive distributed agent network through which its mobile services were conducted, ensuring it had a strong presence even in small rural villages.

> The agent network is crucial, because without the agent network, if you can't get cash in and cash out, well … you're stuffed… I mean most people work in … the big cities and send their money to their families back home. [So] you need agents all over the country. *(Santana MPS Developer)*

> Critical to the success of a service like this is the distribution network ... We were rapidly able to get to market with a good agent distribution network, and good quality agents *(LocalCom Manager)*

Within rural villages, agents were generally owners of small shops that sold more than just LocalCom services. Given the nature of village communities, these shops were an important social meeting place, and agents were typically both known and trusted, as a participant explained,

> Even old mamas and wazee [elderly men] can use MPS, because they're assisted. They're assisted by MPS agents. These agents, they know people in the area, so there is trust. My mother always goes to the same agent, just next to home. The agent knows her and helps her to withdraw money. Even me, I always go to the same agent when I'm in my parish. There's trust between me and that agent. *(MPS User)*

In addition to LocalCom being seen as a dependable enterprise, its agents were trusted members of their rural communities who helped to support the adoption and use of MPS within local contexts. This was particularly helpful for the elderly who were often illiterate or had limited phone skills, and thus unable to send and receive money themselves. The role of MPS agents in helping these users navigate

MPS was especially valuable. Yet, assisting such users often entailed the MPS agents bypassing the official procedures for operating the MPS system. These informal protocols and flexible rules followed by most local enterprises contrasted substantially with the formal protocols and strict rules entailed in the MPS service. For example, while formal identification was required to use MPS, many villagers did not have ID cards or did not carry such documents, as one observed,

> When a grandmother comes in… if an agent asks for ID, she will say, "What?" [Laugh] "I don't have an ID, but you know me!!" That's what she's going to say. [Laugh] So that's how things work in villages. *(MPS User)*

The field researcher, who spent time with agents and users in MPS shops, captured details of these informal practices. She observed customers leaving money and personal details (phone and ID numbers) with the MPS agents to enable quick and easy transactions, as noted in these excerpts from her field notes:

> There was a woman who came to the shop and when [name of agent] asked for an ID number, she said: "It's there" [pointing to the wall]. The agent found her number on the piece of paper pinned to the wall, and proceeded with the transaction. I later asked a question about what had happened, and the MPS agent replied, "Most of them are regular customers. They leave their ID numbers here so that we can proceed easily."
>
> Another woman came to the shop, gave a piece of paper and money to the agent, and left immediately. The agent explained: "She left her phone number with me, because she's in a hurry. So I'll make the deposit for her." There is a high level of trust between this agent and her customers: people are comfortable leaving their phone numbers, ID numbers, and even money with the agent.

It was common for MPS agents, notably in rural regions with low levels of supervision and high levels of resourcefulness and independence, to "bend" the rules set by LocalCom, particularly when these were seen to be constraining. Such user-led experimentation expanded the possible uses of MPS within local enterprises and created further synergies increasing the extent and breadth of interactions between the two trajectories and with the consequence that MPS became used for a wide range of payments. One participant explained,

> You know, when I have no cash … I just call my agent and ask, 'Please put some money in my MPS account. I'll bring money later." You see? That's the local arrangement, which is helping a lot of people … According to the rules, you need to present an ID and you need to be there in person… but these are our local arrangements. And because of this trust, agents make a lot of money, because they're paid on commissions. *(MPS User)*

With the growing popularity of MPS, other local businesses such as restaurants and transportation providers (e.g., bus drivers) also started accepting payments through MPS transfers, instead of relying

primarily on cash as they had before. Non-profit organizations such as schools, medical facilities, national utilities, and even prisons also joined the move to MPS as they shifted their practices to accept MPS payments for fees, bills, or bail. In addition to supporting wider segments of local enterprise, the growing trend towards MPS use also reduced the need for transacting parties to hold/carry cash and incur the risk of theft. Two users in a small town explained that this entrepreneurial use of MPS payments to support local businesses started within a year of the MPS launch:

> User 1: OK at first, they [shops, pubs] didn't accept MPS. But after … it was, how many months?
>
> User 2: After a year
>
> User 1: A year, now that's when they …
>
> User 2: [The shop owners] came to realize it makes work much easier …
>
> User 1: For them. So they trusted MPS. Everybody trusted MPS. That's why you get so many people load money into that account, so that they [do not] carry [money]. If you carry money and you're travelling …
>
> User 2: You can be robbed.

The informal use of MPS for various transactions by local businesses and users sometimes led to formal partnerships and agreements between LocalCom and Kenyan enterprises, synergies that further leveraged the use of MPS as a versatile payment method. For example, LocalCom partnered with the national electricity provider as well as supermarket and department store chains to facilitate MPS payments for electricity and purchases at supermarkets and stores (see Table 5). While the formal arrangements were important milestones for the development of MPS, our data suggest that they were often preceded by informal practices on the ground. For example, field notes and interviews with school teachers show that the payment of school fees by MPS was already a well-established practice in July 2010, several months before the launch of a new service in January 2011 to formally allow educational institutions to receive fees via MPS.

Furthermore, the increasing uptake of MPS by Kenyan enterprises generated both strong growth for existing businesses and new opportunities to launch local businesses. During fieldwork, we encountered several MPS agents who were shop owners but who had left a previous occupation such as teaching to set up their own businesses. MPS had achieved such a prominent profile that this kind of step was considered a valuable move towards economic independence. As shown in Figure 1, the number of MPS agent outlets

rapidly increased in tandem with the number of MPS subscribers, facilitating the growth of MPS agencies as well as local enterprises. The multiple ways in which MPS payments were integrated into everyday trading activities were unanticipated by either LocalCom or the MPS project team. One developer pointed to the "layering effect" that came from combining MPS and local enterprises, which he explained allowed for MPS "to go viral," an outcome that he attributed mostly to "the Kenyans." As he noted "It wasn't really our business model … it was everyone else's vision." Two participants elaborated further,

> [LocalCom] launched it, but they can't tell the small trader that actually, "No, you can't use MPS for that," you know. It's entirely an autonomous process. [The traders] have taken it up and bent it to deliver whatever it is they want to deliver to their customers. *(Santana Developer)*

> Kenya is a nation of astute small traders … And it was interesting, to see how small traders running small businesses like flower sellers and whoever, you know, mobile phone fixers, whatever. How they have taken MPS and are using it and integrating it into their business, using it as a channel to do more business with people. And that's amazing. Because nobody told them to do that. They've taken it and are using it to actually, in turn, grow their business … create a new channel to consumers for their business. And that, I don't think anybody could have predicted that. I think that's just Kenyan resourcefulness. (*Santana Business Analyst)*

The interactions of the MPS and local enterprise trajectories thus produced substantial changes in both practices and outcomes on the ground.

These dynamics of integration in practice are detailed in Table 4. As MPS became increasingly drawn on in everyday transactions – rather than being used solely for urban-to-rural funds transfers – the innovation trajectory came to interact extensively with the local enterprise trajectory. A positive valence in their interactions was maintained and the interactions centred around the foci of multiple common and emerging goals. The similarities across these two trajectories were apparent in that both relied on trust and interpersonal relations, and both involved practices that supported activities and enterprises in urban as well as rural locations. Nonetheless there were notable differences as local enterprises, accustomed to long-standing cash-based operations, were challenged to process transactions through an unfamiliar, abstract, cashless system that many of their customers perceived to be more convenient and less risky. As the multiple synergies in the practices of the MPS and local enterprise trajectories became evident, local businesses began adapting and expanding their services to mobilize the generative possibilities of MPS. Such shifts in conducting local businesses also influenced the nation-wide MPS system, as manifest in the emergence of formal agreements between LocalCom and major Kenyan enterprises (e.g., electricity

provider, supermarkets), and in the new services launched by LocalCom to support using MPS as a payment method (e.g., utility bills, school fees) increasing the breadth and extent of interactions. In these processes of leveraging each other, the two trajectories began to integrate and their practices were significantly changed over time: MPS usage escalated as it became increasingly drawn on in a range of everyday transactions, while large numbers of local enterprises improvised new uses of MPS to spawn multiple, additional entrepreneurial opportunities, further scaling the innovation.

Discussion

Our study examined what happens when an innovation becomes implemented and used in locales that are distant and distinct from those where it was initially developed. We found that the innovation trajectory interacted with multiple local trajectories and that this significantly and unexpectedly transformed both the innovation and the local practices over time.

A Model of Trajectory Dynamics in Innovation

Generalizing our insights, we develop a model of trajectory dynamics that articulates the specific ways that an innovation may be transformed as its trajectory interacts with the local trajectories constituting particular places (see Figure 5). The model contributes to the innovation literature by identifying and theorizing the multiple dynamics and processes through which innovations and their trajectories are reconfigured across time and space as they interact with different local trajectories. Specifically, these interactions — characterized by distinct foci on goals, extent of connections, breadth of influence, and valence of influence — produce tensions that are experienced as problematic or generative. These tensions are addressed through processes of disengaging, aligning, differentiating, or leveraging, resulting in dynamics of separation, coordination, diversification, or integration that lead to specific innovation outcomes (see Table 6). Together, our model explains how an innovation (and its trajectory) may be powerfully and surprisingly transformed over time through its engagement with different local conditions and practices.

We identified patterns of trajectory dynamics by examining distinct changes in practices resulting from trajectory interactions over time. As interactions between trajectories involved several organizations, user

groups, and local communities, we turned to research that has sought to characterize collaboration dynamics among organizations (Hardy et al. 2006; Le Ber and Branzei 2010; Majchrzak et al. 2014). Drawing on this work, we discerned a number of dimensions that resonate with our findings. Adapting the definitions as appropriate, we propose the following four dimensions as usefully characterizing patterns of dynamics between trajectories: focus of interactions (attention to and commonality of goals), extent of interactions (number of points of connection), breadth of interactions (number of specific practices involved), and valence of interactions (direction and type of influence). These dimensions helped us further specify the distinct interaction patterns that characterized the four patterns of dynamics (see Table 6) and the consequences to the innovation outcome.

Dynamics of separation refer to the process through which the practices of an innovation trajectory disengage from the practices of a local trajectory over time (see the first figure in the first row of Table 6). Such separation dynamics emerge as the innovation trajectory and a local trajectory initially connect around a clear focus on a few common goals, establishing a single connection involving a limited set of practices that share core commonalities. However, critical differences in practices generate tensions that surface incompatibilities in interests. These incompatibilities — manifesting as differences that are so considerable as to preclude coexistence — are experienced as deeply problematic and serve to overshadow the common ground previously achieved. If these tensions cannot be resolved effectively, their practices will disconnect through processes of disengaging. The consequences for the innovation is that it does not become taken up as expected, an outcome often noted in the literature (Henfridsson and Yoo 2014; Van de Ven 1999). However, if the failure of the intended connection is treated as a learning experience and novel ideas for modifying the innovation are explored, new distinct practices may emerge that interact and align with another local trajectory and yield valuable innovation outcomes.

Dynamics of coordination refer to the process through which the practices of an innovation trajectory align with the practices of a local trajectory over time (see the second figure in the first row of Table 6). Such coordination dynamics emerge as the innovation trajectory engages with a local trajectory through a clear focus on similar goals, activating multiple points of connection. Interactions are positive and key complementarities arise when the relationship between elements is such that one element enhances the

value or performance of the other. The consequence to the innovation trajectory is that alignment takes place that can strategically take advantage of the complementary connections. Going forward, the innovation trajectory will proceed in a way that is coordinated with the local trajectory thereby promoting the innovation, helping it grow and gain momentum.

Dynamics of diversification refer to the process through which the practices of an innovation trajectory diverge from the practices of a local trajectory over time (see the third figure in the first row of Table 6). Such diversification dynamics emerge as the innovation trajectory and a local trajectory experience diverse foci on overlapping goals. Despite some overlaps in interests, engagement is viewed as negative given the differences in activities, and no connections are taken up as a result. The disparities between the two trajectories' respective practices serve to challenge the potential value of any interaction, and as a consequence, their practices diverge through a process of explicit differentiation. Such diversification can provide value to the innovation, creating visibility to potential users by highlighting its distinctiveness relative to alternative practices. In this sense, diversification can have a strong positive impact on the innovation outcome.

Dynamics of integration refer to the process through which the practices of an innovation trajectory combine with the practices of a local trajectory over time (see the fourth figure in the first row of Table 6). Such integration dynamics emerge as the innovation trajectory interacts with a local trajectory through multiple common goals, mobilizing numerous points of connection entailing a substantial range of practices. While some differences and tensions are evident in practice, these are experienced as creative tensions that stimulate explorations and experiments to realize the benefits of reciprocal engagement. The consequences for the innovation are that over time the trajectories engage in a process of mutual leveraging that generates powerful synergies in practice. The synergies spawn multiple user-led improvisations that further extend and enhance the innovation and its usage. Going forward, the trajectories and their practices will integrate, and both will be substantially changed in the process.

The prior literature on distributed innovation has highlighted the importance of managing tensions across divergent perspectives and interests, whether in multi-organizational networks, across platform ecosystems, or within hybrid social enterprises. Our model articulates additional insights into the kinds of

tensions that may arise in distributed innovations, locating these tensions in the commonalities, incompatibilities, complementarities, disparities, and synergies that arise among the practices of interacting trajectories. These tensions will be experienced as either problematic or creative, and will be addressed through being ignored, resolved, or leveraged. As a consequence, the trajectory interactions will be discontinued or advanced. Our model also contributes further understanding of the local contexts that have been emphasized in the research on technological innovations in developing countries. We offer further insight into the effectiveness of innovations in distant locales, specifically articulating the kinds of contexts that matter and how, and by identifying the characteristics of interactions (on a number of dimensions) that produce particular patterns of trajectory dynamics and certain innovation outcomes.

We believe our model of trajectory dynamics provides insights into the transformation of multiple kinds of complex and distributed innovations that travel to and interact with geographically distant places. Such transformations over time and across locales are likely to be more significant with digital innovations (e.g., mobile and platform technologies), where the malleability of the innovations allows increased engagement and shaping in practice. As we saw in the case of the MPS mobile money service, the digital capabilities of the distributed innovation enabled substantial changes to the service over time, resulting in rapid and expanding uptake that has profoundly accelerated the level of financial inclusion on the ground.

Our insights and model are particularly significant in a global world where complex distributed innovations increasingly cross geographic, cultural, political and temporal boundaries as they are deployed and used in places that differ from those where the innovation was initially developed. In the Kenyan conditions of our study, the key local trajectories that the MPS innovation engaged with were those relating to microfinancing, migration, banking, and local enterprises. In other locations and times, the key local trajectories will likely differ, and their influence on innovations will consequentially vary.

Implications for Research and Practice

Garud et al. (2013, p. 774) suggest that innovation is better understood as unfolding through the development and implementation of ideas within firms, multi-party networks, and communities. Boland et al. (2007) as well as other scholars (e.g., Henfridsson and Yoo 2014) argue that distributed innovation

provides new ways of understanding innovation management: that innovations are not confined to clearly delimitable boundaries; that innovation agency can be decentralized and unpredictable; and that innovation outcomes and processes are often interdependent. Our study supports and extends these arguments by developing a model of trajectory dynamics that takes account of how an innovation trajectory interacts with local trajectories in a distinct place. We point to specific implications for how innovations are changed as they span geographic boundaries and engage with various local trajectories that shape them in multiple and potentially unexpected ways.

First, our study highlights the importance of broadening the current focus in research on innovation to further our understanding of distributed innovation. In particular, our study suggests the *importance of trajectory dynamics,* and more specifically the process through which an innovation trajectory interacts with and is shaped by one or more local trajectories. In doing so, we advance existing understanding of the complex, cross-boundary, and multi-faceted nature of distributed innovation. For example, the current literature on social innovation focuses on tensions between social and financial goals (Battilana and Lee 2014; Battilana et al. 2015). Our study, however, highlights that the tensions between an innovation trajectory and local trajectories can be of particular salience in innovation process and identifies four distinct trajectory dynamics that can ensue. More research is needed to assess whether and how the distinct dynamics of separation, coordination, diversification, and integration may be relevant for other innovations and their trajectories. Further, our articulation of the process through which trajectory dynamics are enacted can provide some guidance for what researchers should attend to in the field. We suggest that examining the similarities, differences and tensions at play in the interactions between trajectories on the ground can offer insight into the possible commonalities, incompatibilities, complementarities, disparities, and synergies in constituting practices that may arise and lead to specific outcomes.

We suggest that our identification of trajectory dynamics in innovation helps to reconceptualize understandings of innovation diffusion in the case of contemporary innovations that are increasingly complex, distributed, and involve multiple stakeholders. In particular, rather than viewing innovations as progressing sequentially through a series of adoption stages, we suggest that innovations change in

multiple and unexpected ways as they move through time and space, encountering various local trajectories and interacting with specific conditions and practices in particular places.

Second, we draw attention to the importance for global innovation of attending to *the influence of local trajectories*. In our case, the local trajectories that were most relevant to the innovation trajectory were related to economic development and we expect that these kinds of local trajectories may be increasingly important as innovations spread globally into developing economies. By taking account of the wider dynamics of local trajectories constituting specific places, we provide insight into the different types of interactions that can arise as an innovation trajectory becomes implemented in the developing world. In our Kenyan context, the local trajectories were constituted by practices related to microfinance, migration, banking, and local enterprise. Further work will no doubt identify other local trajectories that are relevant in other locales and which will interact with innovation trajectories in different ways over time. Our research thus sheds light on the flows and processes of innovation that arise in an increasingly interconnected world (Garud et al. 2013) where different cultural and political contexts influence the trajectory of innovation in locally specific and contingent ways.

Third, our research contributes to the innovation literature by identifying new ways of understanding *the transformation of innovation trajectories over time.* While the literature has explained how multiple related trajectories may be spawned by a powerful innovation, we highlight how innovation trajectories may be transformed through interactions with multiple different trajectories where processes of disengaging, aligning, differentiating and leveraging can prove unexpectedly generative. Our research indicates the value of looking beyond the focal innovation to consider the interaction of the innovation trajectory with other local trajectories that may not, on the face of it, have much connection to the innovation. Yet, every innovation has to be implemented in a specific place and the local trajectories that most significantly define that specific place will necessarily shape and possibly transform the innovation over time. For example, in the case of MPS, we recognize that the early decoupling of trajectories enabled by the dynamics of separation strongly shaped subsequent trajectory dynamics. As our evidence is from one particular innovation trajectory's interactions with distinct local trajectories, we are unable to make stronger claims about how the succession of trajectory interactions may influence outcomes. Further

research would help to articulate the different consequences associated with the various ways in which dynamics between interacting trajectories are ordered over time.

Fourth, by unpacking the similarities, differences and tensions between the interacting trajectories, we are able to make sense of *the processes underpinning the rapid scaling of innovation* (Huang et al. 2017) as evidenced in the unexpected, bottom-up, viral uptake of mobile money services across Kenya by local enterprises. Our study resonates with an emerging understanding of scaling as a deeply contextualized process in space and time. Bansal and colleagues (2018) note that scale is often confounded with size in organization and management scholarship, and argue instead that successful "scaling up" requires a fine-grained understanding of local spaces and temporal considerations rather than simply "sizing up" across different geographies. The dynamics between interacting trajectories in our study show that the seemingly rapid scaling of the innovation was achieved through interactions among the innovation trajectory and multiple trajectories of a specific local place over time. Such ongoing dynamics cannot be captured by the common understanding of scaling as the replication of templates (Chliova and Ringov 2017).

While it is tempting to focus solely on the significant point of inflection, our study highlights that the generativity and rapid scaling of the innovation trajectory was not produced *de novo* or overnight. Rather it emerged through gradual and contingent processes, involving different dynamics between trajectories over time. In particular, the innovation trajectory was transformed through often-unexpected interactions with specific local trajectories and the commonalities, incompatibilities, complementarities, disparities, and synergies that resulted in practice. It is through prior and ongoing pattern of dynamics that possibilities for a rapid scaling of the innovation are generated. During this process, we see that while developers' practices influenced the dynamics of separation and coordination, their influence was more limited in the dynamics of integration where the practices of local enterprises strongly shaped the possibilities for rapid scaling. We thus add to the literature that emphasizes the strategic influence of entrepreneurs and orchestrators in coordinating innovation processes (Henfridsson and Yoo 2014; Nambisan et al. 2017). While the influence of such key actors is important, our study suggests that the patterns of dynamics between trajectories necessarily overflow such actors' interests, intentionality, and problem-solving capabilities. Thus, in addition to the deliberative action of key agents, we found that

innovation processes and outcomes were powerfully shaped by serendipity, opportunism and improvisation. Future research should take broader account of the multiple, distributed dynamics at play when trajectories interact across time and space and how diverse dynamics may influence each other.

Fifth, our study contributes insights into *the transformative contribution that users in developing countries can have in shaping and scaling innovations.* The literature has long understood the importance of skilled users in modifying products in the field, often with important commercial effects (von Hippel 1988). Our findings add to this knowledge by articulating the many different, locally contingent adaptations that were performed by a range of users with MPS, many of them at lower rungs of the economic ladder such as the rural poor, women, and poorly literate members of society (e.g., FinCo clients, MPS agents, small traders, customers, etc.). We find that these users' small, simple, and varied improvisations in using a mobile technology (e.g., transferring money to oneself at another time and place, accommodating non-literate customers with paper workarounds, and sending/receiving mobile money instead of physical cash for fees, bills, and wages) were cumulative and over time generated significant effects (e.g., leading the project team to redesign MPS around peer-to-peer money transfer) and even transformative consequences (e.g., leading to the viral uptake and explosive growth in MPS usage). The rapid scaling driven by local users' practices in our study suggests a new way of understanding the scalability of innovation for base of the pyramid markets beyond the prevalent focus on replication and redeployment (Chliova and Ringov 2017; Seelos and Mair 2007). As innovations increasingly move into the developing world, we might expect a multiplicity of new ways for these kinds of users to engage with and adapt new technologies in their daily practices. More research in this domain is needed to understand how organizations can better engage with local users to unlock the potential of innovations to improve the lives of the poor in developing countries (London and Hart 2011; Walsham 2017).

Sixth, we suggest that the ICT4D literature may find it valuable to consider *the trajectory dynamics that arise as innovations move to developing countries.* We identified a number of dynamics through which digital innovations can be significantly transformed through their interactions with local trajectories on the ground. We believe these transformations cannot be effectively understood by looking primarily at technological impacts, adoption, appropriation, or specific contexts of use. We found that a

process perspective, which takes seriously the notion of trajectories, can facilitate an examination of the contingent interactions that can reconfigure technological innovations in practice, over time and within particular locales. Through attending to the differential consequences resulting from different trajectory dynamics, novel insights may be generated into the mutual influence of digital innovations and the local practices constituting different places.

Seventh, by *broadening the notion of trajectory* that is common in the innovation literature, we are able to contribute new understanding of the interactions and outcomes that can ensue as multiple trajectories engage over time. Earlier work on trajectories by Strauss et al. (1985) and Timmermans (1998) focused on domains of illness and laboratory research, while more recent work (Boland et al. 2007; Henfridsson and Yoo 2014) focuses on the innovation trajectory and its related transformations across specific sectors such as construction and automotive over time. Our study shows that the analytical value of the trajectory concept is also useful in other domains, specifically those of global innovation and economic development. We contribute to this broader literature by elaborating the specific kinds of trajectory dynamics that can transform a phenomenon through the interaction of the innovation trajectory with specific local trajectories. While more research is needed, our articulation of the multiple kinds of dynamics that shaped an innovation trajectory over time suggest some possible avenues for further research on trajectories in domains other than innovation.

Our study of dynamics arising between an innovation trajectory and other local trajectories also offers some practice implications for developing and implementing innovations. While innovators are encouraged to be reflective in framing new service areas (Huang et al. 2017) throughout the innovation trajectory, we suggest it is also important for those implementing innovations to be mindful of the local trajectories that an innovation trajectory will interact with. This requires paying close attention to and understanding the different local trajectories that are significant and relevant in a particular place. While such knowledge will always be partial, it can inform the ongoing process of engagement over time. Our study also suggests that innovators can usefully explore the potential similarities and differences in trajectories and the tensions that might ensue as ways to identify potential challenges, leverage opportunities, and transformative possibilities.

Finally, we note that our findings are limited to the extent that we only examined the transformation of a distinctive innovation trajectory in a specific geographic locale, albeit over a number of years. Our study also focused on mobile services and did not examine the transformation of innovation trajectories in other domains. The trajectory dynamics that we identified here may thus differ from those that are salient in other contexts, times, and places. However, we believe that the theoretical insights we have generated concerning how an innovation trajectory is transformed over time as it interacts with the local trajectories constituting a distinct place are both valuable and suggestive. While the specific local trajectories that an innovation trajectory will engage with as it moves across time and space will vary, we believe the trajectory dynamics of separation, coordination, diversification, and integration are likely to be relevant more broadly, and provide a useful starting point for exploring the fluidity of innovation trajectories globally.

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Table 1: Thematic Summaries of the Innovation Process (excerpt from analysis table)

Innovation Process	Themes
Idea Initiation	• Project for financial inclusion launched in 2003 following DfID's Challenge Fund to encourage private sector firms to develop new initiatives in developing economies - Proposal by GlobalCom to support microloans via mobile phones in Kenya
System Development	• Managed from within Corporate Social Responsibility (CSR) in GlobalCom - Low priority, limited support, minimal oversight, "under the radar" • Partners enlisted for development/ delivery - Santana: hi-tech innovation firm in the UK - LocalCom: mobile operator in Kenya
Pilot Testing	• Pilot testing in the field from October 2005 to March 2007 - LocalCom and its retail stores (Agents) - Microfinancing organization: FinCo and 500 clients - Commercial Bank of Africa (CBA) - Central Bank of Kenya (Regulators)
Rejection, Improvisation, Reconfiguration	• MPS perceived to be threatening to FinCo's social structure and norms • FinCo clients using MPS beyond intended objectives (e.g., depositing more money than needed for repayments; withdrawing funds after a few hours at other locations, etc.) • System reframed as simple/secure peer-to-peer money transfer service in March 2007, with strong advertising and an education campaign to "send money home"
Expansion of Service	• Rapid and steady uptake of service • Large parallel growth in MPS agents • Considerable and ongoing user innovation (with increased diversity of payments: food, bus fares, school fees, utility bills, payment of salaries, aid distribution by NGOs, etc.)

Table 2: Local Practices and the MPS Innovation Trajectory (excerpt from analysis table)

Local Practices	Interactions with the MPS Innovation Trajectory
Banking regulation	• The MPS trajectory interacted with the Central Bank's mandate on financial inclusion
Microfinancing	• The emerging MPS innovation was conceived around local practices of microloan disbursements and repayments for microfinance institutions • The MPS pilot challenged FinCo's practices of engagement
Money transfer	• The MPS trajectory was reconfigured to interact with the practices of peer-to-peer money transfer • MPS differed from (and became complementary to) previous practices of money transfer
Rural-urban migration	• The MPS trajectory interacted with practices of money transfer in relation to rural-urban migration
Mobile services provision	• The MPS trajectory interacted with the local practices of mobile phone use
Banking	• MPS differed from previous practices of banking (costly, exclusive)
Agent-user interactions	• The MPS trajectory was reshaped by local practices of engagement between agents and users, particularly in villages
User improvisation	• The MPS trajectory was redefined through user improvisation

Table 3: Description of Local Trajectories Influencing the MPS Innovation

Local Trajectory	Description
Microfinancing	Microfinance institutions (MFIs) in Kenya offer microloans to local citizens as a way to help finance their activities and enterprises. They also coordinate the ongoing disbursement and repayment of the microloans and facilitate community building and networking. Microfinance was gaining considerable momentum and support from various sectors in Kenya.
Migration	Kenya has experienced extensive movement of people from rural to urban areas as workers relocate to the cities to seek employment and income. These individuals then periodically travel to their rural homes with money to support their families.
Banking	While the Central Bank of Kenya has a strong mandate that focuses on financial inclusion, local banking practices have tended to be restricted to a minority of wealthy, urban-dwellers who are literate, able to afford banking fees and open accounts with large deposits.
Local Enterprise	The Kenyan economy is strongly shaped by a large number of small-scale traders who tend to be resourceful and entrepreneurial. Their business operations are largely informal and practiced through personal connections and cash transactions. Trust relations are foundational to the operation of these local enterprises.

Table 4: Interactions of MPS Innovation Trajectory with Local Trajectories in Kenya

	Dynamics of Separation	Dynamics of Coordination	Dynamics of Diversification	Dynamics of Integration
Similarities	Both the MPS and Microfinance trajectories are focused on supporting financial inclusion; both involve the transfer of small amounts of money	Both the MPS and Migration trajectories involve multiple flows of money across the country, involving rural/urban locations	Both the MPS and the Banking trajectories involve the provision of financial services to Kenyans	Both the MPS and Local Enterprise trajectories involve local transactions based on trust, and both have broad presence in rural/urban locations
Differences	The Microfinance trajectory requires cash exchange via in-person meetings; the MPS trajectory allows remote money transfer via mobile phone system	The Migration trajectory involves infrequent, time-consuming travel to move cash, incurring risk of theft and violence; the MPS trajectory allows money flows through frequent, quick transfer of electronic money via mobile phones	The Banking trajectory serves urban, literate wealthy users, with slow, complex processes at specific times in only a few central branches; the MPS trajectory serves all users with quick, simple mobile processes anywhere/ anytime, alongside visits to agents in multiple locations	The Local Enterprise trajectory entails flexible transactions conducted via informal protocols; the MPS trajectory requires formal user registration and identification, as well as structured protocols for storing, sending, and receiving money
Tensions	Use of MPS reduces the need for in-person meetings, eroding opportunities for the relationship building critical to maintaining the microfinance community	In contrast to the safe and easy use of MPS to transfer money, the physical conveyance of cash from urban to rural areas is risky, lengthy, laborious, and irregular	In contrast to the ease of use and accessibility of MPS for all Kenyans, banking is seen as exclusive, restrictive, hard to use, and as not serving the financial needs of poorer and/or rural Kenyans	In contrast to the familiar use of cash to transact with local enterprises, MPS involves transacting with local enterprises via the unfamiliar transfer of electronic funds
Consequences	MPS pilot is discontinued, and the MPS team explores alternatives based on MPS usage by microfinance users	MPS becomes the primary means of transferring money to families located in the rural areas	Users view MPS as quite different from and considerably more valuable than banking	MPS becomes used for a wide range of payments (e.g., food, travel, wages, fees, shopping)

Table 6: Patterns of Trajectory Dynamics

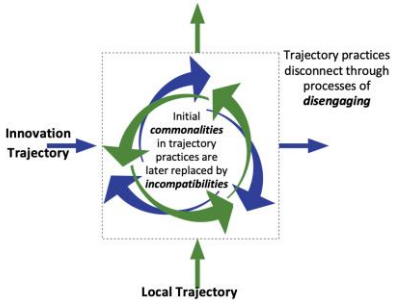
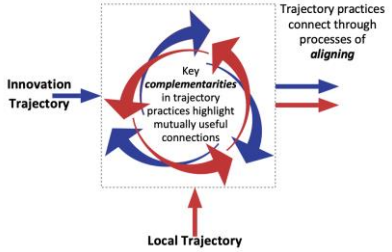
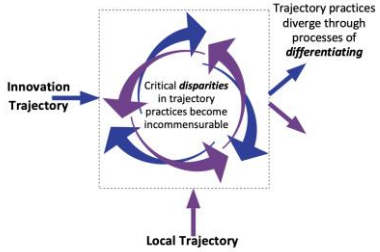
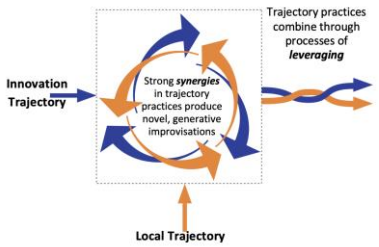
		Dynamics of Separation	Dynamics of Coordination	Dynamics of Diversification	Dynamics of Integration
Trajectory Dynamics					
Interactions	***Focus***	Clear focus on a few common goals	Clear focus on a similar range of goals	Diverse foci on an overlapping set of goals	Multiple foci on common as well as emerging goals
	Extent	Single point of connection established	Multiple points of connection activated	No points of connection taken up	Numerous points of connection mobilized and extended over time
	Breadth	Limited breadth, involving a small set of practices	Moderate breadth, involving a number of practices	Potentially extensive breadth across multiple practices	Extensive breadth, involving a substantial range of practices
	Valence	Gradually becoming negative over time	Positive, and reinforced over time	Negative	Positive, and increasingly generative over time
Tensions		Core commonalities in practices apparent early are overshadowed later by problematic incompatibilities	Key complementarities in practices highlight the value of utilizing the mutually beneficial differences	Critical disparities in practices are evident and are viewed as strikingly discrepant	Strong synergies in practices are visible and readily built on to produce generative improvisations
Processes		Trajectory practices disconnect through processes of disengaging	Trajectory practices connect through processes of aligning	Trajectory practices diverge through processes of differentiating	Trajectory practices combine through processes of leveraging
Consequences for Innovation Outcomes		Offers a possibility to make alternative connections that entail the potential for new services and uptake of the innovation by users	Integrates a steady flow of new users who accelerate growth, promote uptake, and provide momentum for the innovation	Creates visibility for the innovation as potential users become aware of alternative possibilities through comparing the contrasting practices	Generates multiple opportunities for user-led experiments to be integrated into the innovation, providing for enhancement/expansion of use

Table 5: Interactions of the MPS Trajectory and Local Enterprise Trajectory

Date	Use of MPS	Details
May 2008	Petrol	LocalCom signed an agreement with a major energy corporation to enable customers to use MPS at participating petrol stations countrywide
April 2009	Electricity	LocalCom partnered with Kenya Power to allow customers to pay their electricity bills via MPS
September 2009	Water	LocalCom partnered with a water pump manufacturer to allow rural residents to pay for their water through MPS
October 2010	Shopping	LocalCom partnered with several leading supermarket chains to facilitate the payment of goods at supermarkets using MPS
December 2010	Events	LocalCom launched a service to enable MPS customers to book and pay for tickets (e.g., concerts, events, galas, and sports activities) on their mobile phones
January 2011	Schooling	LocalCom launched a new service to allow educational institutions to receive payment for school fees via MPS
March 2011	Shopping	LocalCom partnered with a major department store chain to allow customers to pay for their goods with MPS
July-August 2011	Fundraising	LocalCom participated in a national initiative in response to a famine in Northern Kenya, raising a total of Ksh 167,678,289 (>$1.5 million) via MPS donations

Figure 1: Uptake of MPS Services in Kenya (2007-2012)

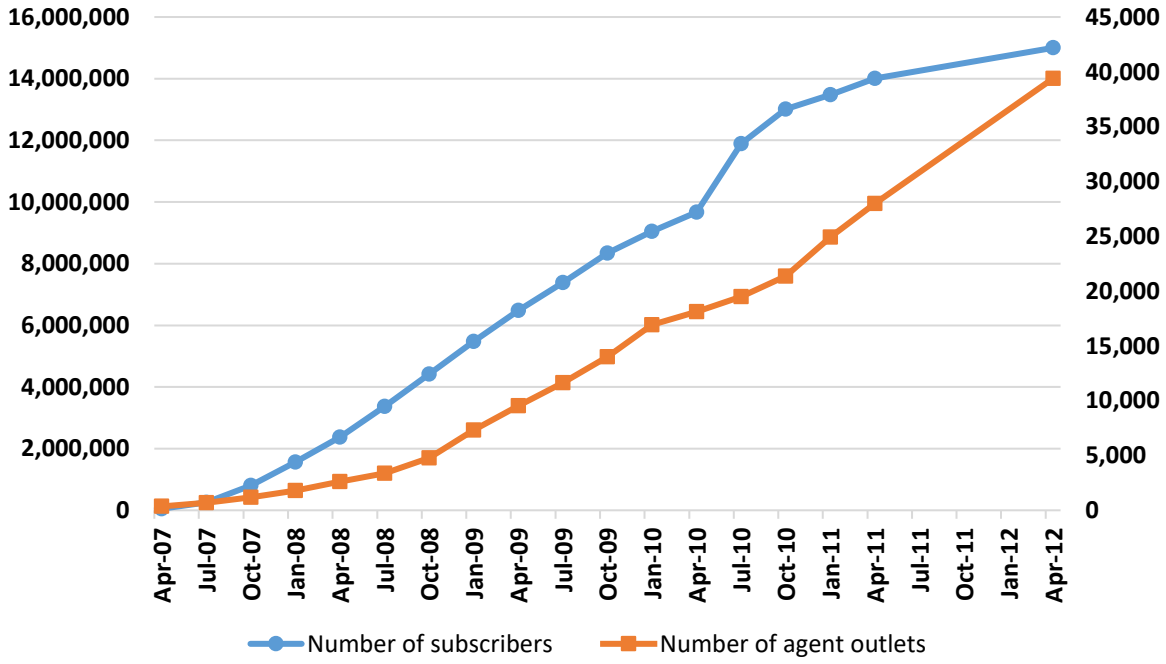


Figure 2: Interactions of MPS Trajectory with Local Trajectories in Kenya

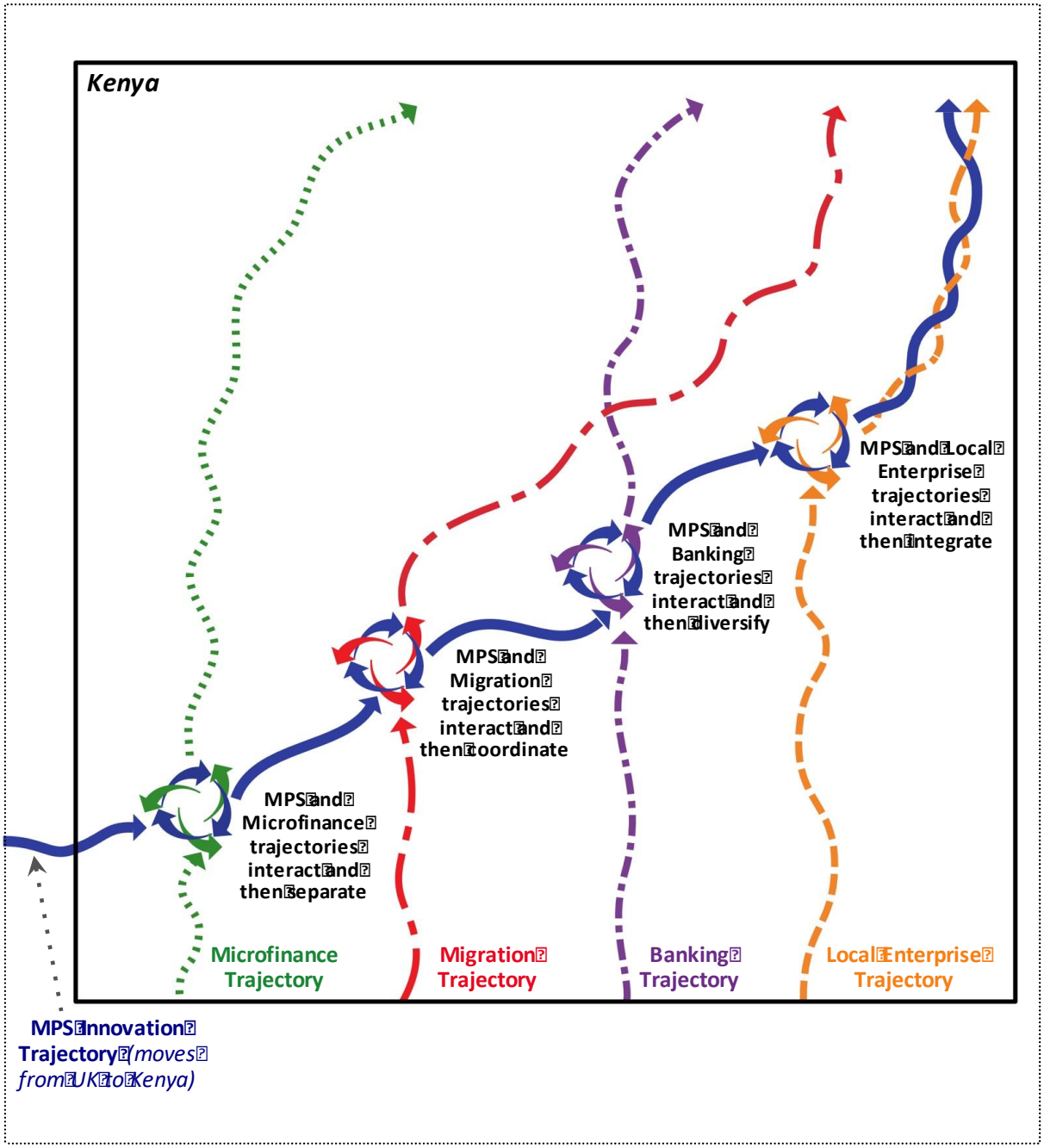


Figure 3: Kenyan Urban Population (% of total population) from 1960 to 2015

(Source: World Bank Open Data — http://data.worldbank.org/)

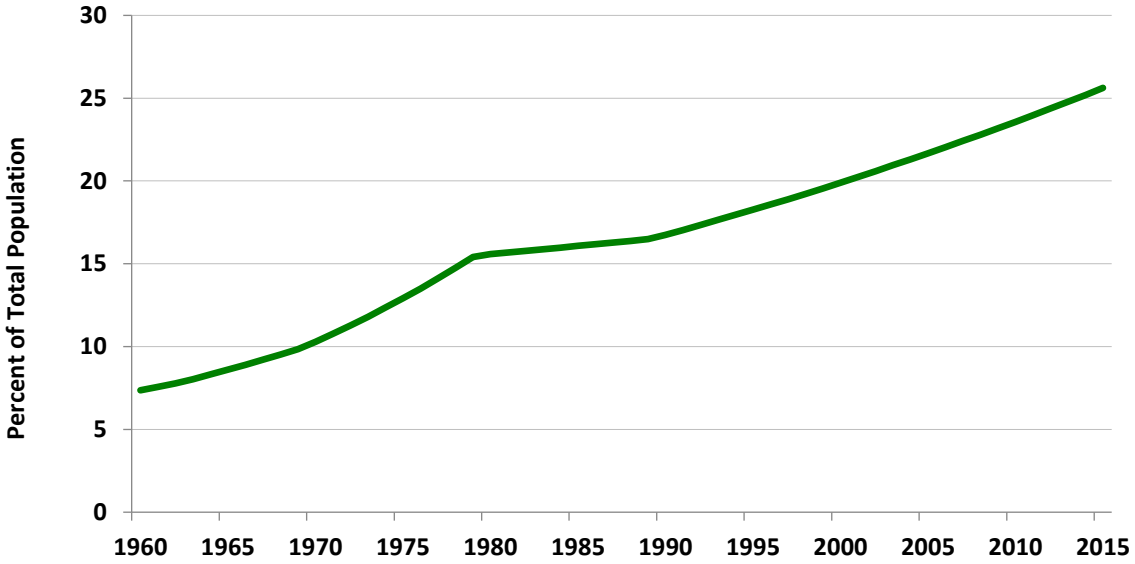


Figure 4a: Experiences in an Urban Area before and after becoming an MPS User

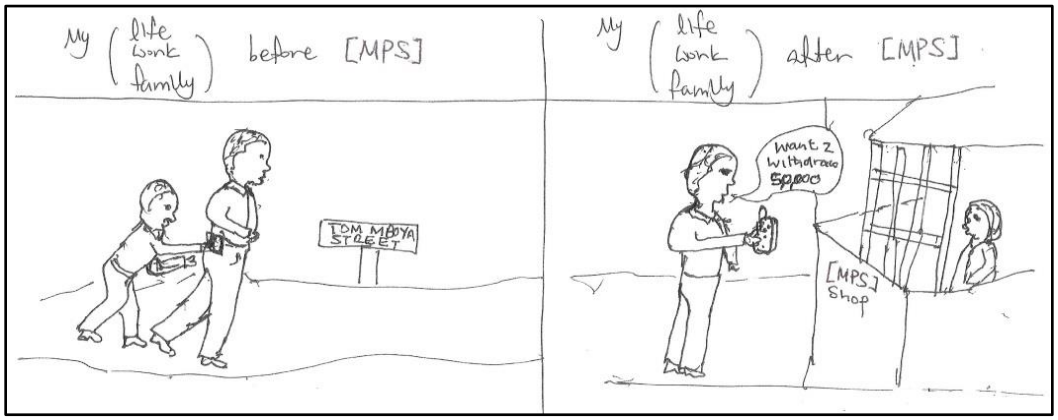


Figure 4b: Experiences in a Rural Area before and after becoming an MPS User

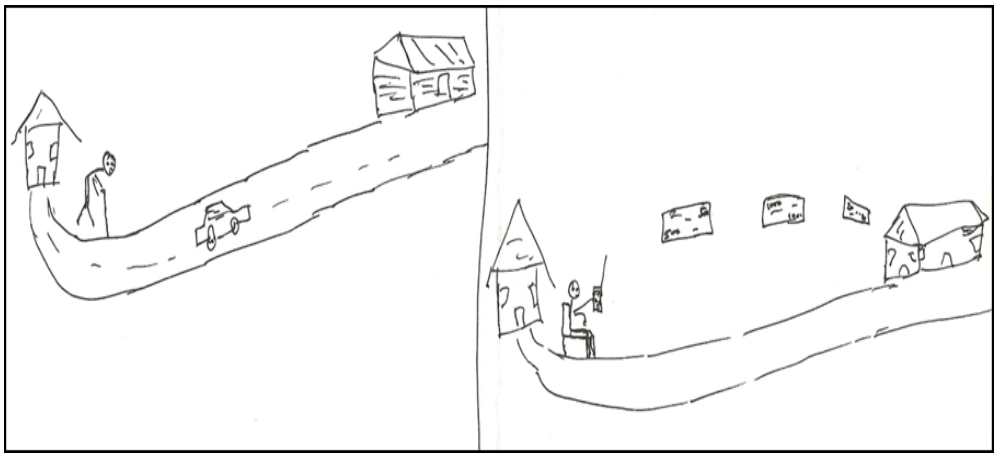


Figure 5: Model of Trajectory Dynamics in Innovation