



Understanding the diffusion and adoption of digital finance innovation in emerging economies: M-PESA money mobile transfer service in Kenya

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Introduction

- The growth of financial digital innovations in sub Saharan African (SSA) countries has been unprecedented.
- According to GSMA (2016), in 2016, out of the half a billion people with mobile money accounts, 277 million people were in SSA.
- Kenya has a thriving mobile commerce transacted using mobile money and is leading in Africa with about 70% of the population using this service (GSMA, 2015).
- Kenya has many mobile money transfer services including M-Pesa, Airtel money, Orange money, Equitel, Mobikash and Tangaza.
 - These services enable cashless transactions between telecommunication operators, local and international banks, businesses and individuals.
- M-Pesa is leading in terms of subscribers with 80% market share (Sunday, 2018).
- M-Pesa has outshined other competitors in the mobile money service since its launch in 2007 and this has continued to puzzle development analysts.
- Scholars interested in emerging innovations diffusion process have provided theoretical and conceptual insights into reasons why technology adoption rates might vary in different economies and contexts.

Mobile money service and Mpesa

- Mobile money service allows people to send or receive money from any location without the need of going to the bank
- The growth of mobile money service is synonymous with the unprecedented penetration rate and adoption of mobile phones in Kenya.
- This may be attributed to the **telecommunication sector reforms** in early 2000's which **encouraged competition** among several mobile operators.
- In 2005, Safaricom & Vodafone UK through M-Pesa pioneered the Kenya's mobile phone enabled money transfer service that was launched in 2007
- M-Pesa service is also accessible to users in other several countries including Tanzania, Congo, Egypt, South Africa, Lesotho, Mozambique, Romania, Albania and India (Vodafone, 2016).
 - However, Kenya remains the largest market for M-Pesa service accounting for nearly **60% of the global M-Pesa user base** (Vodafone 2016 report).

Methodology & analytical framework

- This study sought to understand the digital finance innovation revolution in emerging economies particularly in Kenya
- It used M-PESA as a case study - This platform created new markets by addressing a societal problem that had been neglected by contemporary financial institutions (**enhance financial inclusion**).
- Empirical research is lacking that interrogates **digital finance innovations** from a **functional system perspective** and about real impacts informed by the low income consumers' context
- The narrative informing this case study was supported by **in-depth historical event analysis** of **secondary materials**, **observation of M-Pesa transactions**, **interviews** with selected actors in the financial digital subsector undertaken between October 2017 and May 2018.
- This analysis is applied at the level of **technological innovation system (TIS)**.

Analytical framework: Functional systems approach

- Studies show that **development, diffusion and use of new and emerging technologies** is influenced by **development of a specific innovation system** surrounded by the **technology** in focus (TIS) - (Hekkert et al. 2007; Bergek et al. 2008; Tigabu, 2016; Kebede and Mitsufuji, 2016).
- A **well functioning TIS** facilitates the diffusion and uptake of technologies through fulfillment of **key activities and processes** known as **system functions** (Bergek, et al. 2008). - **see Table 1**
- The framework can be used to interrogate **young** and **mature technologies** - these differ in that certain functions are more relevant than others depending on phase of development
- This framework has been used to interrogate dynamics associated with uptake of renewable technologies in developing countries (e.g. slow uptake of REs in EA by Tigabu, Kebede et al).

In our study, TIS framework is used to discuss the development, diffusion and use of M-Pesa in the Kenyan context.

Table 1: The functional systems

Function	Description	Indicator
F1: Entrepreneurial activities	Involves trials of innovative commercial and/or demonstration experiments	Entry of firms to digital innovation market, launching pilot digital services/projects; experimenting new applications of digital innovation
F2: Knowledge development	Involves learning by doing and searching ; and addressing the social-technical and market related issues about the new technology	Conducting feasibility studies, market research, appraisal and evaluation studies; testing new models
F3: Knowledge diffusion	Involves learning by using and interacting through networks and/or communication of knowledge among actors in networks	Capabilities building (soft and technical) of different actors in the system. This includes seminars, workshops, conducting promotional campaigns
F4: Guidance of the search	Involves activities that affect the visibility and clarity of specific needs among the users of the technology/innovation	Formulating policies, rules, regulations; Visions, Expectations of Government and key actors
F5: Market formation	Involves creation of markets where new technologies have a possibility to grow.	Providing subsidies and other incentives, government procurement programs; standardizations
F6: Resource mobilization - Physical; Human & Financial	Involves mobilizing resources to support the development of the system	R&D budgets, training programs support, financial grants or loans for different aspects of the technology diffusion & use
F7: Creation of legitimacy	Involves advocacy efforts for enhancing support of technology by different stakeholders	Lobbying and advocacy activities

Function 1: Entrepreneurial experimentation

Involves activities that characterize how **entrepreneurs (& other actors)** use their **knowledge, networks** and **resources** to **create new business opportunities** through **experimentation with new technologies**.

- Initial motivation for M-pesa was **provision of micro-financial service** (mobile based payment platform) to the **unbanked** or poor (requirement was just a phone).
- A **prototype** developed and experimented on **500 microfinance** borrowers
 - To withdraw cash or top up mobile wallets - visit to airtime dealers was necessary.
- Piloting stage identified **need for modification of the** service to accommodate growing interest in using the service for other uses (non-loan repayment related).
- **Final product** was **designed to provide generic mobile payment service** (local and international e-money remittances, buying airtime, cash withdrawals from agents etc)

Key triggers for this function - **capital/funding for piloting (DFID)**, role of **innovative lead firms** (Safaricom/Vodafone)

Functions 2&3: Knowledge development & diffusion

Knowledge development: Involves learning by doing and searching (DS); and addressing (A) the social-technical and (B) market related issues about the new technology

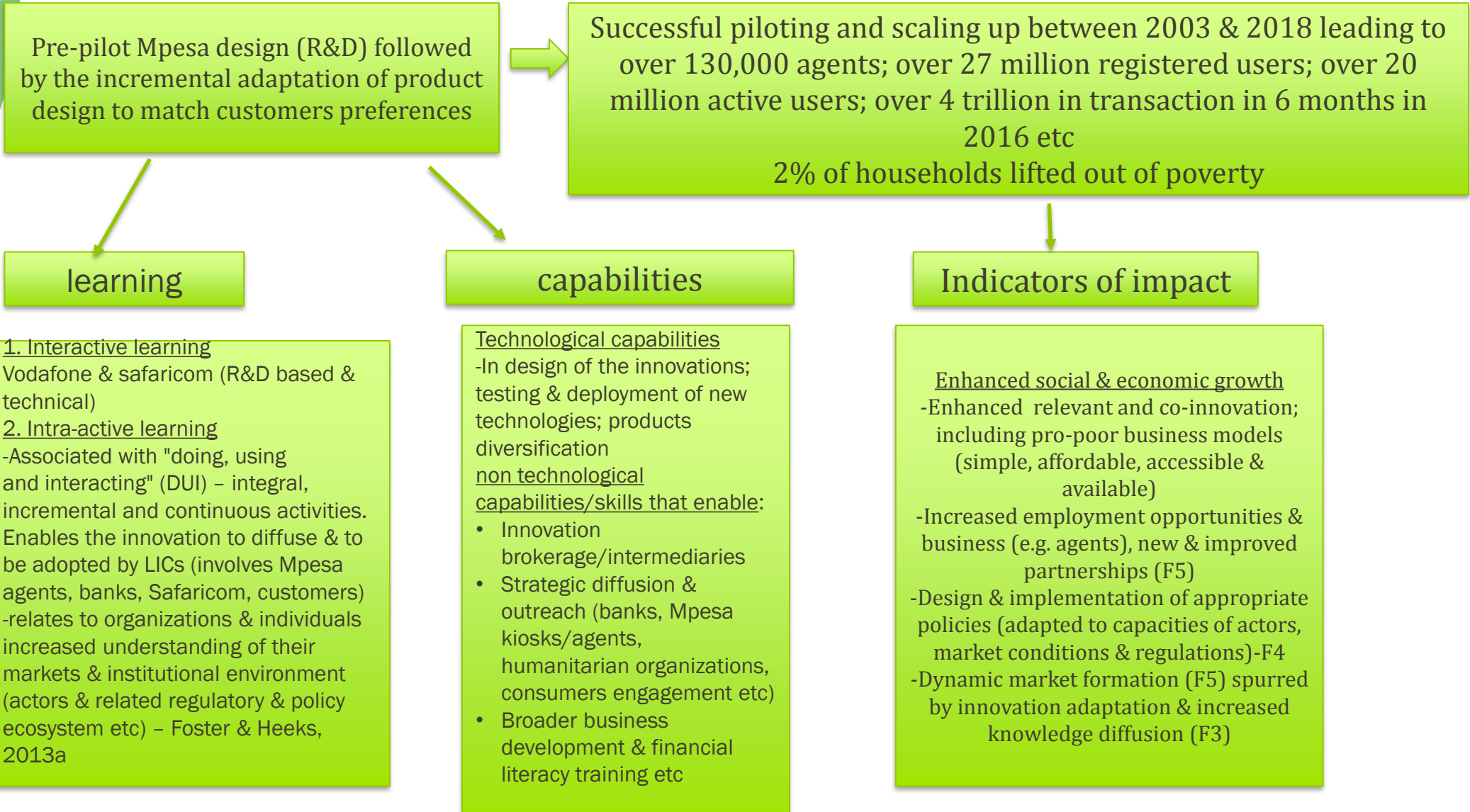
Knowledge diffusion: Involves learning by using and interacting (UI) through networks and/or communication of knowledge among actors in networks

These functions expose events and activities that demonstrate learning from R&D as well as learning from DUI resulting in the dynamism of M-Pesa

- R&D knowledge = products development;
- market research = market innovation
- Products undergoing continuous adaptation & features devt in response to customer needs= multiple functionalities & new or improved products
- learning & capabilities development at multiple scales (see next slide)
- -Integration of multiple actors resulting in process innovation (experiential based - DUI knowledge)

These two functions are highly re-enforced by the other functions (see fig. 1)

Mpesa knowledge development & diffusion infrastructure



Pre-pilot Mpesa design (R&D) followed by the incremental adaptation of product design to match customers preferences

Successful piloting and scaling up between 2003 & 2018 leading to over 130,000 agents; over 27 million registered users; over 20 million active users; over 4 trillion in transaction in 6 months in 2016 etc
2% of households lifted out of poverty

learning

1. Interactive learning
 Vodafone & safaricom (R&D based & technical)
2. Intra-active learning
 -Associated with "doing, using and interacting" (DUI) - integral, incremental and continuous activities. Enables the innovation to diffuse & to be adopted by LICs (involves Mpesa agents, banks, Safaricom, customers) -relates to organizations & individuals increased understanding of their markets & institutional environment (actors & related regulatory & policy ecosystem etc) - Foster & Heeks, 2013a

capabilities

Technological capabilities
 -In design of the innovations; testing & deployment of new technologies; products diversification
non technological capabilities/skills that enable:

- Innovation brokerage/intermediaries
- Strategic diffusion & outreach (banks, Mpesa kiosks/agents, humanitarian organizations, consumers engagement etc)
- Broader business development & financial literacy training etc

Indicators of impact

Enhanced social & economic growth
 -Enhanced relevant and co-innovation; including pro-poor business models (simple, affordable, accessible & available)
 -Increased employment opportunities & business (e.g. agents), new & improved partnerships (F5)
 -Design & implementation of appropriate policies (adapted to capacities of actors, market conditions & regulations)-F4
 -Dynamic market formation (F5) spurred by innovation adaptation & increased knowledge diffusion (F3)

Function 4: Guidance of the search

This involves directing and coordinating the learning mechanism of entrepreneurial experimentation, knowledge development and diffusion.

- A functional TIS depends on enlisting of interested firms and other actors who must be persuaded that a specific venture is profitable.
- this function can be measured by qualitative factors.
 - Ability of lead organization/s to act as boundary spanners
 - Safaricom/lead firm spanned interests of different stakeholders in a risky and uncertain venture = building a vibrant local innovation ecosystem (branding of M-Pesa, building the network of agents etc)
 - CBK with creation of a regulatory infrastructure
 - Extent of regulatory pressure. The M-PESA case demonstrates a dynamic PPP approach to formulation of digital financial regulations (Muthiora, 2015).
 - Beliefs in TIS growth potential (which has been the case with Vodafone-UK, Safaricom & Kenyan entrepreneurs).
 - Articulation of demand or interest by leading customers in the digital innovation.

Function 5: Market formation

Involves **activities** that lead to **creation of markets** where **new technologies** have a possibility to grow

- The formative and expansion phases of M-PESA are characterized by an **expanded market of network actors** at different scales (agents, businesses, individuals etc)
- several qualitative and quantitative indicators of development along this market transition continuum can be tracked.
 - The high adoption of mobile phones by Kenyans,
 - Growing **number of agents** (from 750 at launch to 130,000 in 2017)
 - Later super agents (e.g. banks) signed up **partnerships** with Safaricom to manage e-cash amongst agents
 - Other functionalities have emerged enlisting more actors (supermarkets, more banks, telecom operators etc)

Function 6: Resource mobilization

The innovation scholars have attributed establishment of successful TISs to **mobilization of resources** that include **financial**, **competence** and **human capital**.

- In 2003-Vodafone-UK that partly owns Safaricom had just won a 1 million matched grant from Department for International Development (DFID) supported Financial Deepening Challenge Fund (FDCF).
- This donor support was instrumental in:
 - initial **awareness creation** and **capabilities building** (competence and human capital) amongst different value chain actors. It was also crucial to **establishment** of critical **partnerships & networks**, collection of relevant context specific information (**market research**) and subsequent overall **piloting**.
- In the latter phases of M-PESA development, **human and competence building** targeted **M-PESA agents** and **consumers**.
- The Safaricom capacity building and branding strategy pursued through different avenues including social, voice and print media
- Safaricom has expanded its **competence building portfolio to include seed and venture capital initiative** commanded through its M-PESA platform. For instance, "Safaricom roll out ready business platform" targets SMEs.

Function 7: Creation of legitimacy

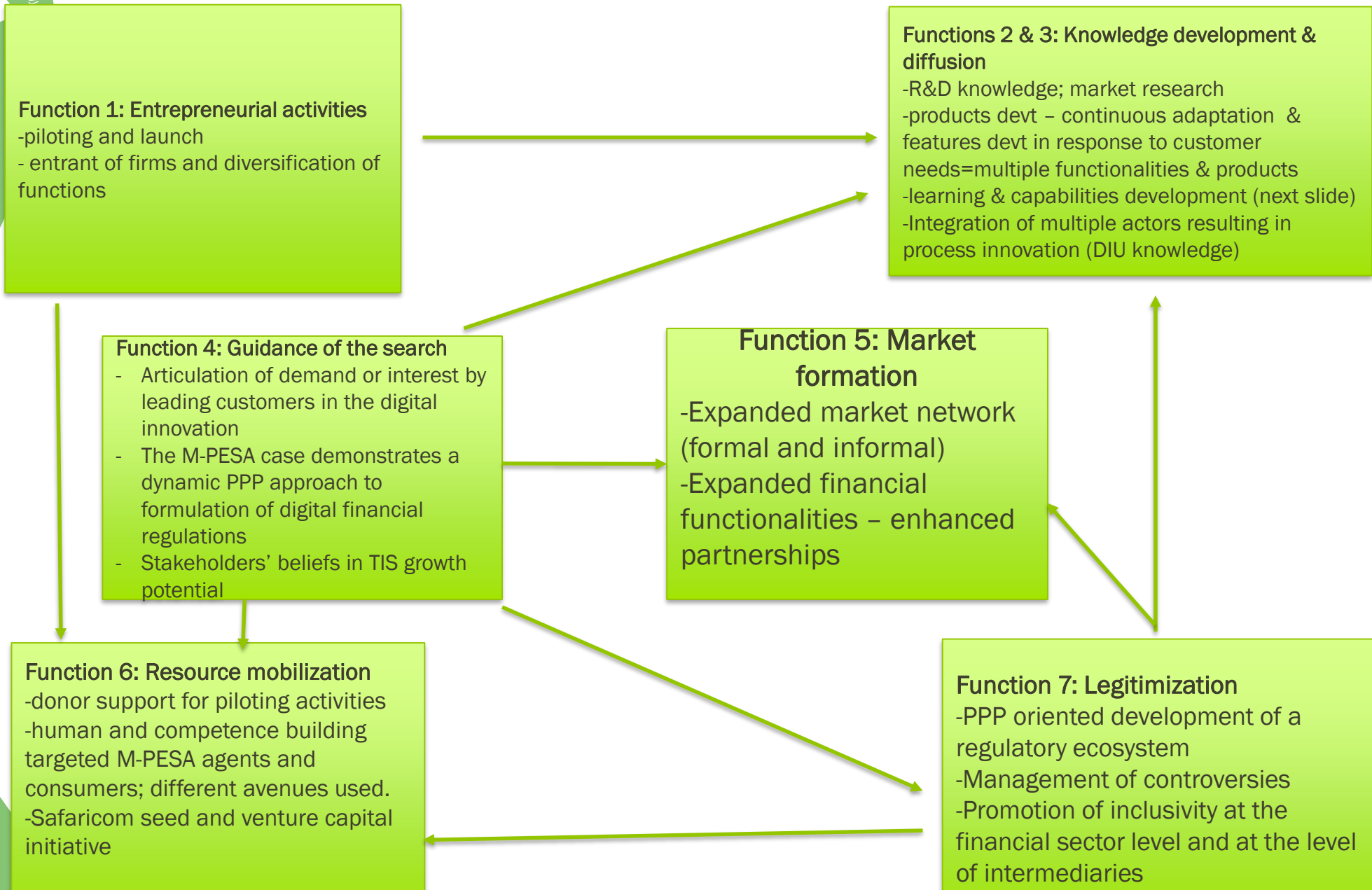
This is a process whereby a new technology receives social acceptance and becomes regulatory and policy compliant

- It involves **advocacy efforts** for enhancing support of technology by different stakeholders (advocacy efforts can be anti-technology).
 - process is orchestrated by **various organizations** and **individuals** in the public and private digital finance sector.
- I. Early formative phase of M-Pesa entailed **PPP oriented development of a regulatory ecosystem** (following an application to CBK by Safaricom, Vodafone and CBA).
 - II. **Management of controversies** (Kenya Bankers Association versus M-Pesa & proactive role of Government)
 - III. **Promotion of inclusivity** at the financial sector level and at the level of intermediaries.

Lessons

- The legitimization process of digital finance innovation is perpetuated by **politics, uncertainty, competition** and **diverse interests**.
- This is where the **facilitative and regulatory functions** of the state require to be defined & balanced; while the different interests of non-state actors should be declared to enhance transparency.

Fig 1: The functional systems of M-Pesa (analysis)



Identifying inducement and blocking mechanisms

Blocking mechanisms (internal or external to the system) tend to affect the other functions leading to failure to attain advanced functionality of a system

Inducement mechanisms support the growth and diffusion of a technology.

- M-PESA - blocking mechanisms were experienced at the formative phase in form of an **anti-technology lobby group** in the **banking sector** that almost killed the M-PESA initiative and **a regulatory vacuum**.
- The regulatory challenge reversed to become an **inducement mechanism** promoting **market formation** and **legitimization**.
- Other **inducement mechanisms** include the **belief in the upward growth of ICT sector** in Kenya and in particular mobile money transfer.
- The over ten years of M-PESA up-scaling and re-design have contributed to significant **learning and capabilities building** that have informed the M-PESA platform upgrading. This is an **inducement mechanism** which can turn to a blocking mechanism if not sustained.

Recommendations: Identifying key policy issues

Policy issues should be informed by mechanisms that **block** or **induce** diffusion or adoption of an innovation.

Aim at providing policy interventions that target "**system failure**" rather than **market** or **structural** failure.

- M-PESA case, inducement mechanisms supersede blocking mechanisms, perhaps the reason why this TIS has been quite successful.
- A few policy issues largely re-enforce the inducement mechanisms more generally.
 - i) As a **social innovation**, there is pessimism about a **sustained profitable** trend that takes into cognizance the important role played by the **informal or chain innovators**; as well as the **poor** it intended to target.
 - ii) **Support inclusive capabilities for sustained demand articulation** -to maximize on productive application of advanced features and functionalities on the M-Pesa TIS. These should target both systems developers and users including low skilled consumers.
 - iii) **Policies for innovation growth**: Government support is crucial at formative phase of young emerging innovations (balanced regulations that support innovation and at the same time encourage competition among different players).
 - iv) **Sustained resource mobilisation** critical for sustained growth.