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## The Regulatory Issues Affecting Mobile Financial Systems: Promises, Challenges, and a Research Agenda

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# Communications of the Association for Information Systems

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## The Regulatory Issues Affecting Mobile Financial Systems: Promises, Challenges, and a Research Agenda

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### Abstract:

Financial regulators have specific financial, social, and economic development goals for regulating mobile financial systems (MFS). We discuss the role of financial regulators, their approaches to regulating MFS, and the social and technical issues that financial regulation presents. We also suggest a research agenda for information systems (IS) that focuses on the socio-technical issues of MFS financial regulation.

**Keywords:** mobile money; mobile financial systems; financial regulations; mobile money divide; financial inclusion.

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## I. INTRODUCTION

This article discusses opportunities for information systems (IS) researchers to advance IS research on mobile financial systems (MFS). MFS is a broad term that refers to a range of financial services that can be offered across the mobile phone. Three of the leading forms of MFS are mobile money transfer, mobile payments, and mobile banking. Currently, more than 150 MFS deployments exist [di Castri, 2013]. The most well-known MFS, M-PESA, started in Kenya in 2007 and had 20 million users at the end of 2011 [Donovan, 2012]. MFSs are expected to improve productivity, efficiency, and security; lower transaction costs; generate employment; stimulate business innovation and growth; and extend financial services to the poor.

Despite the tremendous growth of MFSs, IS research in this area is limited. Academic researchers in the management, social sciences, and information systems fields have conducted very few empirical studies of MFSs. Focus areas include technology, consumer adoption, and social and economic development. However, prior research has neglected environmental factors such as financial regulation. The financial regulation of MFS is a relatively new phenomenon and consensus is still emerging on which drivers are the most important and how they should be measured [Bilodeau, Hoffman and Nikkelen, 2011]. Financial regulatory approaches and their social and economic development goals have implications for the economic viability of MFS business models; how MFSs are designed, deployed, and adopted; and the resulting stability of financial markets on a global scale. Seeing that the mobile channel is growing as a mechanism for the delivery of financial services, it is important that the IS research community develop empirically derived theories for understanding how financial regulation affects this emerging trend.

This article aims to summarize key findings from past MFS research and also suggests promising directions for future IS research through the lens of financial regulation. Our main objective is to inform the broader IS research community on substantive research contributions and concerns. Because we intend to set an agenda that expands current research by reflecting prevailing trends, in the next pages we describe the current state of MFS financial regulation. We give an overview of the MFS value chain from the perspective of a single bank or MFS provider who may partner with each other when financial regulation requires it. We then present the current state of IS research in the MFS area and suggest an IS research agenda influenced by MFS financial regulation issues.

## II. THE FINANCIAL REGULATION OF MFS

The stability of the financial regulatory environment is a critical success factor for MFS providers but can present unique and varied challenges. Businesses are more likely to invest in environments with concrete financial regulation, as such regulation provides reassurance that arbitrary or negative changes to the legal and regulatory framework won't affect their business. However, countries with overly restrictive regulatory frameworks run the risk of creating an environment that stifles innovation and restricts the types of entities that can participate in MFSs. For example, the Reserve Bank of India developed restrictive regulations that required that banks operate MFSs and that payment services incorporate end-to-end encryption [Maikin, 2009]. These requirements increased the barrier for new entrants because only mobile network operators (MNOs) can offer end-to-end encryption and only banks can operate MFSs.

Even though concrete financial regulation may exist, new and novel financial products and services such as MFSs may fall outside regulatory oversight, thus threatening the stability of the financial system. For example, in the developed country context, the United States (U.S.) suffers from confusing regulatory oversight because the use of mobile devices to make payments and purchases falls outside the regulatory boundaries defined by regulators [Crowe, Rysman and Stavins, 2010]. As a result, financial regulations in the U.S. govern bank-owned MFS transactions but not non-banked-owned MFS transactions. At the other end of the spectrum, countries with low levels of regulation may create an environment conducive to investment and innovation but risky to investors and customers. For instance, the Philippines define regulations for mobile banking that allow MNOs to operate as remittance agents without having to partner with a banking institution. This approach reduced the barriers for non-bank entities to enter the MFS marketplace. While rigid regulatory regimes present a constraint, those that are adaptive and flexible facilitate innovation [Duncombe and Boateng, 2009].

Many non-bank organizations that are traditionally outside the scope of financial regulation lead MFS initiatives. This trend is generating concern amongst financial regulators. As shown in Table 1, the regulator's role is to secure the

financial system, maintain a level playing field for new entrants, protect consumer interests, and support a country's socio-economic development objectives [Kshetri and Acharya, 2012; Maikin, 2009].

**Table 1. Financial Regulators' Key Objectives**

Objective	Definition
Financial Stability	Ensure that the safety and soundness of the banking and payments system are not compromised.
Economic Efficiency	Ensure that the efficiency of the financial system as a payments mechanism and intermediation system is maximized and in turn contributes towards overall economic growth.
Financial Integrity	Prevent the financial system from being compromised by criminal or terrorist financing activities.
Consumer Protection	Protect consumers from abuse and loss.
Fair Competition	Facilitate the introduction of new payment instruments and services in a competitive environment.
Transparency	Facilitate an environment that requires payment services to adhere to a high level of transparency about the terms and conditions of service.
Dispute Resolution	Implement mechanisms to facilitate speedy dispute resolution.
Risk Management	Subject MFS to appropriate levels of risk management including compliance with anti-money laundering (AML) and combating the financing of terrorism laws (CFT).
Financial Inclusion	Promote broader access to appropriate, affordable financial services, especially to the poor, unbanked, and under-banked.

Financial inclusion of the unbanked is an important socio-economic development goal for many governments and regulators [Crowe et al., 2010; Dancey, 2013]. Financial inclusion refers to access by all to a full suite of financial services at affordable prices and in a convenient manner with respect and dignity [CFI, 2013]. The full suite of financial services is a group of core financial services that includes basic credit, savings, insurance, and payments services [CFI, 2013]. Financial inclusion assists individuals in graduating from poverty and being more resilient and better prepared for financial shocks [Dancey, 2013]. Overall, financial exclusion creates financial discrimination, illiteracy, and exploitation and is a barrier to poverty elimination [Dancey, 2013].

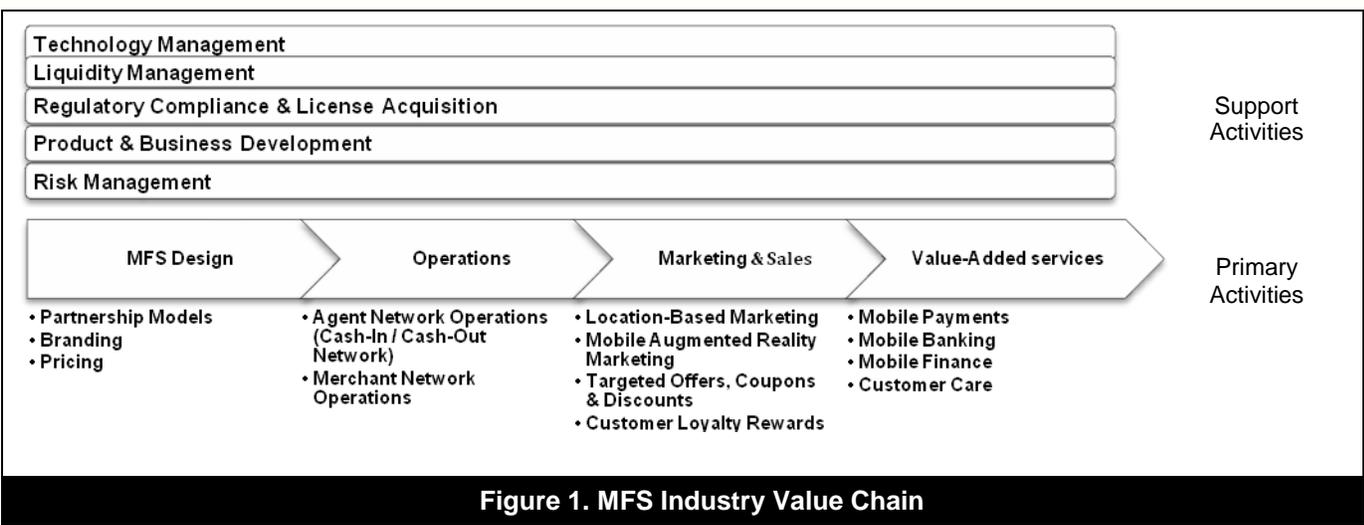
MFS is integral to financial inclusion, particularly in developing countries, for varied reasons [Dancey, 2013; de Sousa, 2010; Johnson and Arnold, 2012; Mendoza and Thelen, 2008; Pandey, Khrishna, Vickers, Menezes and Raghavendra, 2010]. MFS uses pervasive mobile communications infrastructure, provides cheaper services to the consumer than conventional banking provides, attracts new participants, and uses untraditional but highly accessible distribution networks. MFS also cuts operational costs for entities that frequently distribute payments to their customers and stakeholders. These characteristics enable MFSs to reach more customers than conventional banking channels do.

In the next section we present how financial regulatory activities affect the MFS industry value chain.

### III. MFS INDUSTRY VALUE CHAIN ACTIVITIES

Operating MFSs requires carrying out a coordinated set of activities. These activities can be represented in the form of a value chain [Porter, 1985]. Figure 1, though not exhaustive, represents the important parts of the MFS industry value chain from the perspective of a single bank or MFS provider, partnering when financial regulation requires it [Dharmapalan and Lonergan, 2009; Jimenez and Vanguri, 2010]. The purpose of the value chain as depicted is to show the common activities that are affected by financial regulatory requirements for stakeholders participating in the value chain. Not all activities are relevant to all MFS participants, and some entities possess the resources and skills to execute some of the value chain activities more competently than others.





**Figure 1. MFS Industry Value Chain**

**Primary Activities**

The primary value chain activities are design, operations, marketing and sales, and value-added services.

**MFS Design**

The regulatory environment of implementation influences MFS design. Critical factors driving MFS design are the regulatory requirements for partnerships between a bank and a non-bank entity such as a mobile network operator (MNO). Alternatively, a bank or a non-bank can independently operate the MFS. The regulatory requirements that affect the design of partnership models include: who owns the customer; who is legally responsible for customers' deposits; the use of agents; where customers can access cash; whether the MFS supports cross-platform transactions; and whether the MFS is network independent. Bank-operated MFSs include Bank of America (USA) and Barclays Bank (UK). Non-bank operated models include M-PESA (Kenya), WIZZIT (South Africa), and G-CASH (Globe Telecom, Philippines). Existing joint venture models include MTN Mobile (South Africa) and Smart Money (Philippines).

**Operations**

Operations include agent network operations and merchant network operations. In developing countries where banking infrastructure is highly clustered and the setup costs for bank branches and ATMs are high, regulators may authorize businesses that carry cash to act as agents for banks and non-bank MFS providers. Agents may include small businesses and informal merchants. The agent distribution network provides an interface for consumer registration and the conversion of cash and electronic value. Agents perform a range of electronic transactions, including inquiries on account balances, money transfers between accounts, and in some instances, branchless banking capabilities. However, in some regimes, regulators are reluctant to allow agents to engage in deposit taking on behalf of regulated banks.

The merchant network comprises informal and formal merchants. Informal merchants accept payments on the streets or in marketplaces or other types of informal establishments for goods and services. Formal merchants are retailers who may use the MFS to provide point-of-sale integration, target customers with offers, reward customer loyalty, and create business intelligence on customer activity. Other MFS payment applications include event and transportation ticketing and parking.

**Marketing and Sales**

Marketing and sales activities include location-based and mobile augmented reality marketing. Location-based marketing applications detect a customer's location and target them with product and service information, offers, and coupons for goods and services based on their location. Mobile augmented reality marketing places a computer-generated 3D graphic that overlays digital data on the real world in the user's field of vision. The user engages with the content by scanning an augmented reality (AR) code using a mobile application on his or her smartphone. The information about the real world then becomes instantly interactive and easily manipulated. For instance, users can walk into a store; use their mobile devices to scan AR codes; and receive marketing material and personalized offers, product information, and assistance in locating and customizing the product. The customer can then use the MFS to purchase the product.

## Value-Added Services

Value-added services include payments such as peer-to-peer (P2P), government-to-person (G2P), business-to-business (B2B) or customer-to-business (C2B) transfers; finance such as investment, credit, and insurance products; and banking such as savings, bill payments, and account-balance inquiries. Regulators may allow branchless banking where agents provide banking services outside conventional bank branches.

## MFS Value Chain Secondary Activities

The secondary activities include technology management, liquidity management, regulatory compliance and license acquisition, and product and business development [Davidson, 2012].

### Technology Management

Technology management involves transactional platform development and support of the customer handset. MFSs require the development and maintenance of a transactional platform that creates individual accounts for customers and agents; processes movements of value between accounts; and interfaces with handsets, billers, the core mobile platform, and other applications in the mobile ecosystem [Davidson, 2012]. Regulated MFS providers must reassure financial regulators that they have taken appropriate risk-management and consumer-protection measures to protect customers from fraud, abuse, and loss of funds. Thus, MFS providers are faced with several technical challenges to address security vulnerabilities, user authentication, and the completion and security of transactions. To build customers' trust in the MFS, customers must receive mobile payments as soon as they are sent, and MFS providers must be able to account for customers' funds. Thus, designers must take into consideration quality of service (QoS) and network reliability issues to ensure that customers' transactions are securely and quickly processed and transaction information is readily available. These technical issues interact with one another and, if not properly addressed, could create complex regulatory, compliance, and adoption challenges.

To stimulate financial inclusion of the poor into the formal financial system, the regulator may mandate MFS interoperability within the country's boundaries. MFS interoperability facilitates cross-platform transactions between customers even if they have accounts with different MFS providers. Because interoperability among several MFSs provides the capability to connect more customers across disparate providers, banks, networks, services, and agents than that of a single MFS, it extends the reach of the MFS, increases network effects, and facilitates financial inclusion. Therefore, the regulatory regime may task MFS providers with developing MFS technical infrastructure based on open standards to facilitate interoperability.

### Liquidity Management

Liquidity management (also called float management) is the process of ensuring that agents have cash and electronic money when customers ask for it [di Castri, 2013]. Liquidity management takes two forms: management of electronic value in the mobile wallet and cash management. Some agents manage the cash and electronic-value liquidity requirements of a particular group of agents. In some cases, financial regulators oversee the liquidity management activities of agents.

### Regulatory Compliance and Licensing Acquisition

Regulatory compliance and licensing acquisition require obtaining the permission of the national financial regulator to operate the MFS. Where required, the regulator may give permission in the form of a license or a letter of no objection to the MFS provider. Regulators may provide special licenses to non-banks to operate MFSs. These licenses may expressly prohibit deposit insurance and the payment of interest on MFS accounts [Bilodeau et al., 2011]. Other regulators require a bank partnership in order for non-bank institutions to run MFSs. The benefit of a bank partnership is that it is possible for customers' funds to be held in individual bank accounts where they can benefit from interest payments and deposit insurance up to certain limits. For example, Mexican banking regulators created a niche banking license to allow Mexican niche banks to accept customer deposits, implement branchless banking, use agents, and deploy MFSs. In Kenya, M-PESA keeps deposits in a pooled account held by the M-PESA Trust Company Limited at the Commercial Bank of Africa. Interest from these accounts accrues to a charitable foundation and is not used by the company or account holders. In contrast, South Africa's WIZZIT, which partnered with the South African Bank of Athens (SABA), shares the interest generated by its account holders with SABA and pays its customers interest on balances over certain amounts [Rangan and Lee, 2012].

### Product and Business Development

Product and business development involves expanding the range of services MFS facilitates through innovation. Developing these services requires assessing customer needs, product design, partner identification and selection, market sizing, pricing, and financial modeling [Davidson, 2012]. The regulatory environment can either stimulate or inhibit the innovation that typically occurs in the product and business development process.

## Risk Management

Financial regulators engage in risk management activities to minimize the risk of bank failure, fraud, and loss of funds. As part of the risk management procedures, regulators require financial institutions to conform to International Anti Money Laundering / Combating the Financing of Terrorism (AML/CFT) standards. AML/CFT standards require that MFS providers implement know-your-customer (KYC) procedures to undertake adequate customer due diligence on all new accounts and single-payment cash transactions. The KYC procedures' purpose is to identify illicit activities. The KYC process is complicated in developing countries that do not issue government and employee ID's, or where clients do not pay utility bills or have formal addresses. KYC procedures typically require identity verification through a government-issued identification card and physical address verification through the use of a utility bill addressed to the client. The KYC process in developing countries is complicated in countries that do not issue government and employee ID's, or where clients do not pay utility bills or have formal addresses. In these instances, there is no means of address verification by the MFS provider other than physically visiting the client's home. Thus the application of KYC requirements requires some flexibility. One approach is for regulatory frameworks to implement proportional KYC requirements that define transactional limits below which customers can be exempted from KYC requirements or be subjected to a limited set of requirements.

## Additive and Transformational MFS Models

MFS models provide additive or transformational financial services. Additive models are those in which the mobile phone is merely another channel to existing financial services for those who already have them. Additive models help to enhance access to services for existing clients. Transformational models are those in which the financial product linked to the phone is targeted at the unbanked, who would not normally be reached profitably through traditional financial services. Hence, the transformational model is a key facilitator of financial inclusion.

**Table 2. Country MFS Regulation Profile**

	<b>Brazil</b>	<b>India</b>	<b>Kenya</b>	<b>Philippines</b>	<b>South Africa</b>	<b>United States</b>
Service Provider Name	Oi Pago	State Bank Freedom	M-PESA	G-CASHa, Smartmoneyb	WIZZITa, MTN Mobileb	PayPal
Partnership Model	NBO	BO	NBO	NBOa JVb	NBOa JVb	NBO
Primary MFS Models	Trans	Trans	Trans	Trans	Trans	Additive
MFS Adoption Level	Low	Low	High	High	Medium	Low
MNO Role as Banking Agent	Yes	Yes	Yes	Yes	Yes	No
Non-Bank Agent Deployment	Unclear	No	Yes	Yes	Unclear	No
Non-Bank MFS Licensing	Limited	Limited	Yes	Yes	Limited	No
Value in Mobile Wallet Considered Deposit	N/A	No	Sometimes	Yes	Yes	No
Existence of AML/CFT Regulation	Yes	Yes	Yes	Yes	Yes	Yes
Proportional KYC Requirements	Yes	Yes	Yes	Yes	Yes	No
Publicly Defomed Financial Inclusion Strategy	Yes	Yes	Yes	Yes	Yes	No
Regulatory Mandate for MFS Consumer Protection	Yes	Yes	No	Yes	No	No
Interoperability of MFS Payment System	No	Yes	Yes	No	No	No
Mobile G2P Payments	N/A	N/A	Yes	No	No	No

KEY:

NBO – Non-bank operated

BO – Bank operated

JV – Bank / Non-bank partnership

Trans – Transformational Mobile Financial Systems

Whereas MFS models would be largely additive in developed countries such as the U.S., they would be primarily transformational to target the unbanked in developing countries such as Ghana and Kenya. Despite this trend, additive models in developing countries are not unusual and can be found in countries such as Cambodia, Vietnam, and Indonesia. Table 2 abstracts the key regulatory issues identified in our value chain analysis and includes examples of MFSs in countries of the world where these financial regulatory issues apply as of 2011 [Bilodeau et al., 2011].

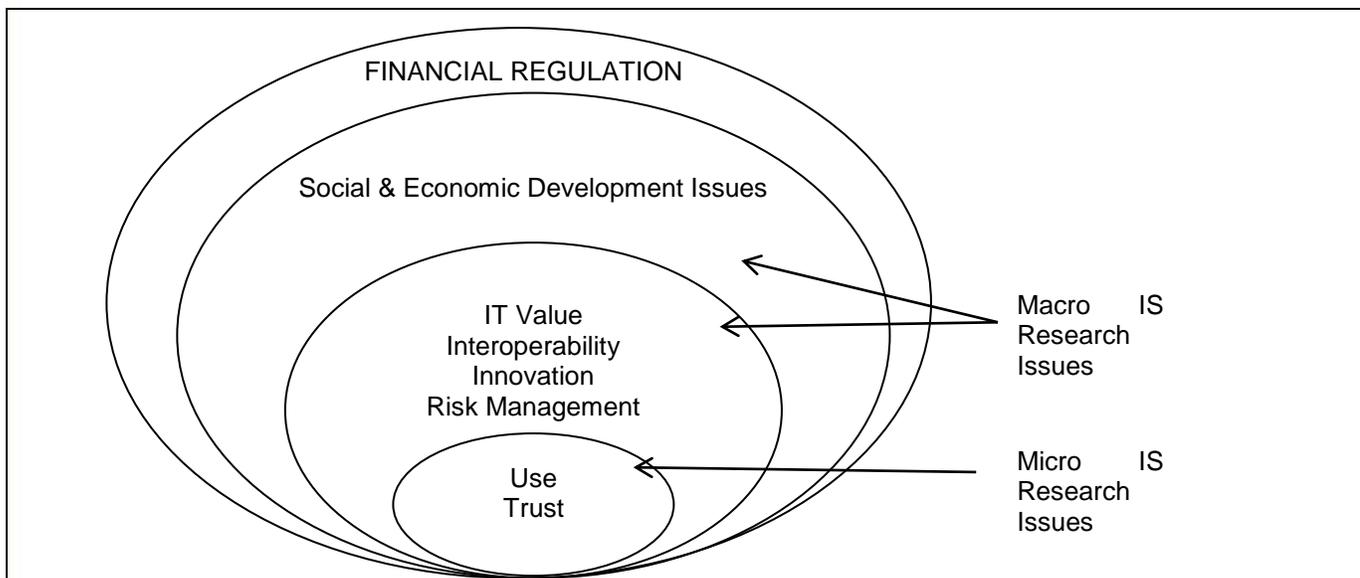
In the following section, we develop an IS research agenda that focuses on the financial regulation of MFSs.

#### IV. AN IS RESEARCH AGENDA FOR THE FINANCIAL REGULATORY ISSUES OF MFS

The idea of developing MFS research agendas in the academic community is not new. Past MFS research agendas focused on technology, consumer aspects, and business models [Dahlberg, Mallat, Ondrus and Zmijewska, 2008]; economic issues such as network externalities, switching costs, and complementary goods [Au and Kauffman, 2008]; competitive and contingency factors [Dahlberg et al., 2008]; and social development issues [Duncombe and Boateng, 2009]. However, the regulatory issues surrounding MFSs received much less attention [Dahlberg et al., 2008]. Though past research made substantial contributions, much of the empirical work surrounding MFS is descriptive and takes place in developing countries where the uptake of MFSs is higher than it is in developed countries. Thus an IS research agenda that addresses the research issues emerging through the financial regulation of MFSs is timely.

An IS research agenda grounded in MFS regulatory issues needs to draw upon the vast IS literature that exists and to engage that literature base in novel and exciting ways. Accordingly, a socio-technical perspective guides our research agenda. The socio-technical perspective addresses the social as well as the technical aspects of IS simultaneously, and urges us to understand how IS shapes and is shaped by social relations, political interests, and local and global contexts [Bostrom and Heinen, 1977; Kling and Lamb, 1999; Orlikowski and Iacono, 2001; Sawyer, Allen and Lee, 2003]. In other words, the IS should not be conceptualized simply as a "tool" that can be readily applied for specific purposes [Orlikowski and Iacono, 2001]. Based on the foregoing, we argue that, to understand MFS, with its complex interrelationships between technological and social processes, a socio-technical perspective is highly appropriate.

To supplement previous MFS frameworks, we focus on two broad theoretical directions that form a part of the intellectual core of IS research [Sidorova, Evangelopoulos, Valacich and Ramakrishnan, 2008]: *macro* research, which deals with organizational and societal issues, and *micro* research, which examines the user's interactions with the IT artifact at the individual level [Sidorova et al., 2008]. As depicted in Figure 2, we propose a set of macro and micro research topics with popular themes such as use, trust, IT value, risk management, interoperability [defined by Sidorova et al., 2008 as EDI and inter-organizational systems], and other themes specific to the MFS context such as innovation and social and economic development issues.



**Figure 2. MFS Research Schematic**

The financial regulation issues identified in Table 2 inform these research themes. Admittedly, the research themes

we propose are broad, and we suggest only a few research opportunities for each topic. We hope that in the future, IS researchers will be able to use this broad research framework to drill down into individual research topics to develop more detailed research agendas. In the next section, we discuss the current state of MFS research in terms of the research schematic in Figure 2 and propose research questions that incorporate the key regulatory issues identified in Table 2.

### Micro IS Research Issues

The micro IS research opportunities focus on the interactions between the MFS and individual users. As outlined in detail in the following paragraphs, we propose research themes related to (1) the individual use of the MFS and (2) user's trust in the MFS.

#### MFS Use

IS use is one of the most critical variables in IS research [Straub, 2012]. A wide range of empirical studies focuses on MFS customer adoption and use. Users in both developed and developing countries adopt MFSs under different contexts and financial regulatory regimes with varying results, thus providing rich and useful contexts for studying new forms of use. MFS researchers have applied theoretical constructs from the IS literature to these new forms of use. Unsurprisingly, most studies apply traditional adoption theoretical models, such as the technology acceptance model (TAM) [Boateng, Hinson, Galadima and Olumide, 2013; Kim, Mirusmonov and Lee, 2010], diffusion of innovations model [Dahlberg et al., 2008; Mallat, 2007], theory of consumer lifecycle [Mallat, 2007], theory of reasoned action (TRA) and theory of planned behavior (TPB) [Beiginia, Besheli, Soluklu and Ahmadi, 2011; Yang, Lu, Gupta, Cao and Zhang, 2012], and the unified theory of acceptance and use of technology model (UTAUT) [Shin, 2009].

The analyzed models often investigate whether the models' theoretical constructs are likely to influence the intention to use and the actual use of the MFS. Factors that affect customers' adoption of MFSs include ease of use, customer satisfaction, customer experience, relative advantage, compatibility, complexity, costs, and network externalities [Mallat, 2007]; switching costs and complementarities [Au and Kauffman, 2008]; trust [Luo, Li, Zhang and Shim, 2010; Mallat, 2007; Shin, 2009; Zhou, 2011; Zhou, 2012]; risks [Luo et al., 2010; Mallat, 2007; Shin, 2009]; behavioral beliefs and social influences [Yang et al., 2012]; personal innovativeness [Kim et al., 2010; Yang et al., 2012]; performance expectancy and self efficacy [Luarn and Lin, 2005; Luo et al., 2010]; and perceived financial cost [Luarn and Lin, 2005]. External factors affecting MFS adoption can be classified into consumer-centric (individual differences) and technology-related (system characteristics) constructs [Kim et al., 2010]. Researchers have identified the differences in factors driving use by early and late adopters of MFSs [Kim et al., 2010; Yang et al., 2012]. Research findings suggest a partial adoption pattern where MFS is adopted and used side by side with traditional payment instruments [Mallat, 2007]. Also, MFS adoption is dynamic, depending on certain situational factors such as a lack of other payment methods, urgency, and the presence of queues [Mallat, 2007]. Barriers to adoption of the MFS include premium pricing, complexity, a lack of critical mass, and perceived risks [Mallat, 2007]. MFS benefits include time- and place-independent payments, remote and ubiquitous access to payment services, the possibility of avoiding queues, and the ability to complement cash payments. [Mallat and Tuunainen, 2007].

Prior research suggests that individuals within informal organizations such as micro, small, and medium enterprises (MSME's) [Higgins, Kendall and Lyon, 2012], and micro-traders use MFSs [Boateng et al., 2013; Higgins et al., 2012] more extensively than regular customers do to execute business transactions. Despite the immense popularity among MSMEs, the barriers to MFS adoption include unfriendly user interfaces to facilitate record keeping and business use and weak dispute resolution processes. More MSMEs would use the MFS if MFS service quality and product features were tailored to MSMEs' needs [Higgins et al., 2012].

Much progress has been made in studying MFS use. However, MFS research reflects the gaps in IS research on use in general [Straub, 2012]. Following the traditional approach to research on IS use, a majority of MFS research merely adapts use measures from previously validated instruments rather than selecting them for their theoretical significance [Straub, 2012]. While it is useful to test previously validated constructs in new environments, more significant research findings can emerge if researchers use a richer, more contextualized set of measures to study MFS use. We thus propose a set of research themes focused on (1) the transformative use of the MFS and (2) understanding MFS use in different regulatory contexts. These research opportunities are summarized in Table 3 and discussed in more detail in the paragraphs that follow.



**Table 3. Sample Research Issues on MFS Use**

Area of Research	Sample Research Opportunities
Individual Use	<ol style="list-style-type: none"> <li>1. What are the factors leading to transformational forms of use of the MFS in different regulatory environments?</li> <li>2. How do regulatory requirements such as AML/CFT and KYC requirements deter MFS adoption and use?</li> </ol>

First, it is acknowledged that not much research exists on transformational forms of use [Straub, 2012]. Since innovative forms of MFS use exist, particularly by those at the bottom of the pyramid (BoP), MFSs provide a relevant venue for building theoretical models of transformational forms of use. Instead of choosing constructs based on their appearance on past empirical studies, this will require choosing constructs for their theoretical value and with the recognition that relevant measures and dimensions of system usage will vary across contexts (Burton-Jones and Straub, 2006; Straub, 2012). For instance, to understand the mobile money divide, IS research could be well served by developing scales for deep structure usage [Burton-Jones and Straub, 2006] in different regulatory contexts that examine how the banked, unbanked and under-banked engage in transformational MFS use. In the developing-country context, where regulatory goals for financial inclusion exist, such rich measures could assess use of the MFS for more efficient financial transactions, access to credit, and savings. Use models should also incorporate the unique characteristics of users who are the targets for financial inclusion. For example, prior research shows that low-income segments in Kenya do not necessarily desire the cheapest products segmented for the “poor” because of the cultural stigmas associated with poverty [Kuriyan, Nafus and Mainwaring, 2012]. Therefore a marketing message based on how MFSs can fulfill aspirations for low-income Kenyans to seemingly cross class boundaries and assume more successful identities may be an important adoption factor [Kuriyan et al., 2012]. However, MFS use models do not consider users’ social aspirations. In the developed country contexts, rich measures could be based on the propensity for MFS users to integrate MFSs into a personalized mobile ecosystem that supports customer payments and rewards and targets users based on their personal attributes. More advanced-use models could distinguish between people who use the MFS occasionally and those people who begin to actually treat their mobile device as a wallet, storing value for everyday needs or for long-term savings [Donner and Tellez, 2008]. Studies of use can also benefit from a better articulation of what is being adopted and what existing behaviors are being replaced [Donner and Tellez, 2008].

Second, barriers to adoption and use are different in developed and developing countries. It is acknowledged that a major problem in facilitating MFS use in developing countries are the barriers presented by AML/CFT and KYC requirements [Bilodeau et al., 2011], which require verification of the customer’s identity and physical address. Moreover, in developed countries it is assumed that AML/CFT and KYC requirements are not barriers to adoption because the majority of the population is banked, and identity and address verification mechanisms are established. Yet rates of MFS adoption in developed countries such as the U.S. are lower than in developing countries. Therefore research is needed to confirm whether AML/CFT requirements are indeed deterrents to customer adoption of MFSs in both developed and developing countries and the best ways to overcome these barriers. Overall, IS use models can contribute to a better understanding of how MFS emerges in different socio-economic contexts, country classifications, and regulatory regimes.

#### Users’ Trust in the MFS

Trust is defined as the belief of the trustor that the trustee will fulfill the trustor’s expectations without taking advantage of the trustor’s vulnerabilities [Chandra, Srivastava and Theng, 2010]. A customer must be able to trust that an MFS provider will not misuse his or her financial information [Pandey et al., 2010]. When these transactions become recorded, a customer’s privacy should not be lost in the sense that the customer’s credit histories, spending patterns, and MFS transactions must be as anonymous as cash transactions [Pandey et al., 2010]. The MFS should be secure, foolproof, and resistant to attacks from hackers and terrorists. Surprisingly, very few research studies conduct empirical examinations on the role of trust in the MFS [Chandra et al., 2010]. Past research studies of trust in the MFS incorporate traditional theoretical models such as TAM [Chandra et al., 2010; Luarn and Lin, 2005], TPB [Luarn and Lin, 2005], the unified theory of acceptance and use of technology model (UTAUT) [Luo et al., 2010], and the elaboration likelihood model (ELM) [Zhou, 2012]. These studies found that trust is a crucial adoption enabler for online transactions, especially for monetary transactions [Chandra et al., 2010]. Dimensions of trust in the MFS include perceived security [Zhou, 2011], perceived ubiquity [Zhou, 2011], perceived ease of use [Zhou, 2011], disposition to trust [Luo et al., 2010], structural assurance [Luo et al., 2010; Zhou, 2012], trust belief [Luo et al., 2010], information quality [Zhou, 2012], service quality [Zhou, 2012], system quality [Zhou, 2012], trust in the mobile service technology [Chandra et al., 2010], trust in the mobile provider [Chandra et al., 2010], reputation [Zhou, 2012], and perceived credibility of the MFS provider [Luarn and Lin, 2005].

Findings suggest that users tend to trust the MFS provider when a structured legal and regulatory environment exists [Luo et al., 2010; Chandra et al., 2010]. This perception is based on the belief that a strong legal and regulatory environment leads to successful, secure, and private processing of transactions by the MFS provider [Luo et al., 2010]. Evidently, the IS research community could contribute to a better understanding of users' trust in the MFS, especially in those regulatory regimes where cybercrime and money laundering activities are increasing [Chatian, Zerzan, Noor and deKoker, 2011]. We thus propose a set of research opportunities focused on (1) the role of regulation in building users' trust, (2) the effect of users' trust and distrust in the MFS, and (3) users' proactiveness in building their own trust in the MFS. These research opportunities are summarized in Table 4 and are discussed in more detail in the paragraphs that follow.

<b>Table 4. Sample Research Issues on Trust</b>	
<b>Area of Research</b>	<b>Sample Research Opportunities</b>
Trust	<ol style="list-style-type: none"> <li>1. What kinds of users perceive financial regulation of the MFS as an important factor for building trust in the MFS?</li> <li>2. What's the role of financial regulation in promoting users' trust and alleviating distrust in the MFS?</li> <li>3. What are the steps that users' take to secure the MFS, protect privacy, minimize risk, and build trust in the MFS in different regulatory regimes?</li> </ol>

First, though it is suggested that financial regulations are important in building users' trust in the MFS, it is unknown for what types of users financial regulations are an important trust-building factor.

Second, researchers could strive to confirm whether highly regulated environments promote higher levels of trust and acceptance in the MFS than do less regulated environments. One approach is to study trust in the MFS through the dualities of trust and distrust. The distinction between trust and distrust are still unresolved issues in the IS literature [Benbasat, Gefen and Pavlou, 2010]. In the buyer-seller relationship, trust is defined as the buyer's willingness to be vulnerable to a seller based on the belief that the seller will transact in a manner consistent with the buyer's expectations [Dimoka, 2010]. Distrust deals with the buyer's unwillingness to be vulnerable to a seller on the basis that the seller will be inept, exhibit reckless behavior, violate obligations, not care about the buyer's welfare, act against the buyer's interests, and even intend to harm the buyer [Dimoka, 2010]. Prior research shows that trust and distrust are distinct constructs that are associated with different neurological processes [Dimoka, 2010]. However, there is very little research on the nature and underlying dimensions of distrust [Benbasat et al., 2010]. There is also very little research on examining the relationship between trust and distrust and testing their relative effects on behavioral and economic outcomes [Dimoka, 2010]. Because MFS is both protected by financial regulations and influenced by fraudulent and criminal activities, it provides a good context for empirically examining the dualities of trust and distrust.

Third, security, privacy, and risk may be factors related to building trust or minimizing distrust in the MFS. IS researchers have used traditional theoretical models such as UTAUT [Luo et al., 2010] to investigate the perceived risk in using the MFS and how it interacts with trust in the MFS. Findings suggest that MFS users who perceive the MFS as low risk will tend to embrace MFSs [Luo et al., 2010]. Yet our understanding of the steps users take to minimize the risk of MFS use is minimal. IS researchers can contribute to this research stream by investigating how users proactively secure the MFS, protect their privacy, and minimize the risk of use in different regulatory regimes. One approach is to examine the roles of mindfulness and mindlessness in the user's decision making processes about security, privacy, risk and trust. Mindfulness implies active consideration of one's options while mindlessness suggests overlearned behavior processes [Fiol and O'Connor, 2003]. The IS community has investigated the roles of mindfulness and mindlessness in innovation [Swanson and Ramiller, 2004], collective mindfulness [Carlo, Lyytinen and Boland, 2012], and reliability [Butler and Gray, 2006], but has not applied these constructs to study users' decision making in the manner we suggest.

### Macro IS Research Issues

In the following sections, we propose macro research themes that deal with organizational and societal IS issues. The research themes we propose deal with IT value, interoperability, risk management, innovation, and social and economic development issues.

#### IT Value

IT value is an important stream of work that deals with the economic impacts of IT and its manifestations, such as profitability [Kohli and Grover, 2008]. IS researchers are just beginning to explore how MFSs create IT value, and so existing research is minimal. Prior research on the IT value of MFSs shows how mobile ticketing technologies that

incorporate MFSs create value through improved revenue management, reduced fare evasion, increased customer convenience, reduced operational costs, improved access to detailed customer information, and increased ability to design price and service differentiation strategies [Li, van Heck and Vervest, 2009]. Researchers also developed value exchange diagrams to depict and analyze how IT value is created in MFS-assisted business settings [Pousttchi, 2008] and an agricultural value chain analysis to show how MFSs provides value to farmers through financial inclusion, increased efficiency, and competitiveness [Pandey et al., 2010].

MFS financial regulations may reduce IT value by presenting significant regulatory costs. Costly regulatory activities include AML/CFT and KYC procedures, agent coordination, and liquidity management. Some regulators require bank/MNO partnerships, which complicate the return in investment for these stakeholders. Justifiably, some controversy exists as to whether IT value from MFSs is achievable for bank/MNO partnerships. Each player has unique competencies in order for the partnership to work well [Lonie and Wagner, 2013], and important synergies in technology, expertise, strategy, products, and distribution are observed in successful partnerships between the bank and MNO [Lonie and Wagner, 2013]. However, evidence suggests that the relationship between a bank and an MNO is not always an easy one [Lonie and Wagner, 2013], and in some countries it is difficult to determine how and when IT value will be created. Financial institutions approach MFSs with caution because of concerns about limited opportunities for revenue, the complexity of revenue sharing agreements with strategic partners, and the belief that mobile payments could cannibalize existing electronic payment services, thus providing limited return on investment [Merritt, 2011]. MNOs have different expectations for IT value, namely the ability to increase revenue from voice services by the addition of data transmissions, particularly in developed countries where mobile markets are reaching saturation levels [Merritt, 2011].

IT value research that considers the broader societal implications of how government adds value to a nation's citizens is also emerging as a central concern. For example, governments are using MFSs to deliver conditional cash transfers for social benefits and other forms of government payments such as salaries and pensions. It is speculated that government-to-person (G2P) cash transfers will stimulate MFS adoption. Yet questions remain as to whether MFS providers can offer financially inclusive services to G2P payment recipients on a profitable basis. It is not clear whether moving G2P cash transfers to mobile will create value to governments. Therefore empirically derived theoretical perspectives that consider how MFSs reduce the cost of G2P cash transfers would provide immense value.

Generally, studies on the business value of MFSs are few. IS research has not yet begun to contribute meaningfully to how MFSs contribute to the business value of involved stakeholders. Therefore the IS community can contribute significantly by giving more insight on the theoretical perspectives of the business value of MFSs in both regulated and non-regulated environments. Theoretical perspectives should demonstrate not only whether MFS stakeholders are able to create value, but how, when, and why. Hence, the following research opportunities we propose focus on the IT value created by MFS stakeholders individually and as they collaborate together. These research opportunities are summarized in Table 5 and described in more detail in the paragraphs that follow.

<b>Area of Research</b>	<b>Sample Research Opportunities</b>
IT Value	<ol style="list-style-type: none"> <li>1. How do MFSs create IT value for different stakeholders in different regulatory environments?</li> <li>2. How can multiple MFS stakeholders add new IT-based value and collectively appropriate it in different regulatory environments?</li> </ol>

First, IS researchers can contribute by shedding light on the IT value of MFS from the perspective of individual stakeholders such as banks, MNOs, and governments.

Second, MFS provides the ideal context for conducting studies on the co-creation of IT value. The co-creation of IT value represents the idea that different companies with different IT resources can join together and create new value that either organization is unlikely to create on its own [Grover and Kohli, 2012]. The IS research community is beginning to focus on the IT-based value co-creation research agenda, examining topics such as the value of open IT innovation alliances [Han et al., 2012], how relational value is co-created through inter-firm relationships in the logistics industry [Rai, Pavlou, Im and Du, 2012], and how IT value is co-created in a platform ecosystem for enterprise software [Ceccagnoli and Forman, 2012]. But gaps remain in explaining the sources and process of IT-based value co-creation, as well as how disparate IT functionality can be brought together to create new IT-based value [Grover and Kohli, 2012]. The MFS context is well suited for the study of the co-creation of IT value, because it requires strategic relationships among banks, MNOs, merchants, agents, and other stakeholders who contribute different IT resources and competencies. These firms join together to use both open and proprietary technology

architectures with the hope of creating profitable products and services. Further, these strategic relationships are established in different regulatory environments with varying costs. Currently, it is unclear who generates value and how the benefits should be distributed. IS research can develop theoretical perspectives that consider how regulation affects the integration of disparate resources, the alignment of IT investments and relationship structures, incentives, bargaining positions, and models to co-create IT-based value [Kohli and Grover, 2008].

### MFS Interoperability

MFS interoperability requires standardization efforts within the MFS industry. These industry standards should specify the technical details and processes for exchanging data between mobile devices, financial institutions, agents, merchants, and other third parties [Crowe et al., 2010]. Research studies on the process of developing MFS standards are in their infancy [Gillis and Pillay, 2012; Lim, 2008]. To date, progress has been made in creating technical solutions to the interoperability problem [Kousaridas, Parissis and Apostolopoulos, 2008]. Though technical solutions are forthcoming, past research indicates that barriers to MFS standardization include many heterogeneous parties operating in a culture of distrust and legal restrictions, which contributes to high negotiation costs [Crowe et al., 2010]. Achieving consensus on MFS standards is complicated by numerous factors, including multiple currencies; geography; language; services providers; regulatory, fiscal, and monetary policies; and technologies [Gillis and Pillay, 2012]. Prior research proposed interoperability solutions that include factors such as sound regulatory and legal frameworks, integrated financial infrastructure, and common payments standards [Gillis and Pillay, 2012].

The free-riding issue is of concern in the case of MFS standardization [Crowe et al., 2010]. An open industry standard would allow any firms that adopted the standards to participate. Because participants expect an industry standard to be publicly available, any private party investing in the development of the MFS standards helps other potential adopters. Thus, there would be issues with appropriability, as it would be difficult to develop imitation-resistant products and services. Even if the industry-wide benefits of MFS interoperability were high, any investing party would be concerned as to whether the individual costs outweigh the benefits. Therefore, issues of how firms will appropriate the benefits of an MFS that is based on interoperable infrastructure are still unresolved.

Though the IS community has made progress in investigating how technology standards are developed in general, very little research focuses on the process of developing and adopting MFS standards. The IS research community can contribute by conducting theoretically based empirical studies to explain the process of developing and adopting MFS interoperable solutions as well as the pros and cons. Therefore, we propose the following research opportunities, which focus on (1) identifying the forces shaping an interoperable MFS infrastructure and (2) identifying the benefits and deterrents to MFS interoperability. These research opportunities are summarized in Table 6 and described in more detail in the paragraphs that follow.

<b>Table 6. Sample Research Issues on MFS Interoperability</b>	
<b>Area of Research</b>	<b>Sample Research Opportunities</b>
MFS Interoperability	<ol style="list-style-type: none"> <li>1. What are the social, institutional, and competitive forces that shape an infrastructure for MFS interoperability?</li> <li>2. What are the deterrents to the adoption of standards for MFS interoperability?</li> <li>3. What are the benefits of MFS interoperability?</li> </ol>

First, the IS research community has examined IS standardization through multiple theoretical lenses, including network effects [Zhu, Kraemer and Gurbaxani, 2006], institutional theory [Damsgaard and Lyytinen, 2001], actor network theory [Damsgaard and Lyytinen, 2001; Graham, Spinardi, Williams and Webster, 1995], complexity science theory [Braa, Hanseth and Arthur, 2007], and collective action theory [Markus, Steinfield and Wigand, 2006]. These studies provide a good foundation for adapting existing theories to the MFS context and developing new theoretical directions. Prior studies acknowledge that standards development and standards diffusion are failure-prone processes, and that successful development won't guarantee successful diffusion [Markus et al., 2006]. Overall, the studies propose theoretical approaches for ensuring the collective participation of representative members of heterogeneous user groups [Braa et al., 2007; Markus et al., 2006] and mechanisms for integrating heterogeneous standards into a complex system of standards [Braa et al., 2007]. MFS provides an ideal context to test past theoretical approaches to ascertain whether they apply to MFSs, as well as to develop new theoretical explanations of how the process of developing and adopting MFS standards is shaped by social, institutional, and competitive forces.

Second, the IS research community can contribute by identifying the deterrents to the adoption of the MFS standards by MFS providers. For instance, prior research suggests that legacy investments from earlier

interconnected technologies may affect the diffusion of new open standards [Markus et al., 2006]. Findings suggest that organizations with existing standards are sensitive to switching costs to the new open standards, while new users are insensitive to switching costs [Zhu et al., 2006]. Thus IS research can investigate whether existing financial institutions are more reluctant to embrace open standards than new participants. Theoretically based investigations are also needed to investigate whether a key barrier to MFS interoperability is the fear that standards adoption will deter the development of innovative products and services. Finally, research is needed to establish how and when the expected benefits of MFS interoperability occur, and how issues of appropriability of the MFS for competitive advantage were overcome.

### Risk Management

Though the risk management of MFSs is of primary concern to financial regulators, it is a research topic that the IS community has neglected. However, the IS research community has focused on risk management in other areas such as project management and information security risk. Financial regulators recognized that MFSs are vulnerable to systemic and operational risk and developed regulations to minimize these risks. Bank systemic risk refers to “the propagation of an agent’s economic distress to other agents that have links with the starting agent through financial transactions” [Rajan, Rochet and Tirole, p. 733, 1996]. Thus bank systemic risk refers to the ripple effect of contagious banking failures within the banking industry. The concept of bank systemic risk is critical for central banks to determine which banks are likely to fail first and should receive capital injections to stop further contagious bank failures during a financial crisis [Hu, D., Zhao, J. L., Hua, Z., and Wong, M. C. S., 2012]. Because both banks and non-banks operate MFSs, the MFSs might be more susceptible to systemic risk than other types of payment systems are. Moreover, agent hierarchies comprising super agents, master agents, and cash agents engage in cash-in and cash-out services and may provide branchless banking capabilities, thus introducing more systemic risk into the financial system than conventional banking does. In most instances, regulators feel more comfortable when non-banks partner with banks, as they believe the regulatory requirements imposed on banks will cover any risk introduced into the financial system [de Sousa, 2010].

In the banking industry, operational risk entails the risk of monetary losses resulting from inadequate or failed internal processes, people, and systems or from external events [Cole, 2001]. Operational risk can take the form of external and internal events. “External events include natural disasters that damage a firm’s physical assets, or electrical or telecommunications failures that disrupt business operations.

The IS research community has not begun to explore systemic and operational risk in the MFS. Evidently, research on systemic and operational risk of MFSs is important, as experts suggest that vulnerability is introduced to the MFS because of the participation of numerous heterogeneous parties, which are sometimes unregulated. We thus propose a set of research opportunities focused on examining (1) the systemic risk of the MFS and (2) the operational risk of the MFS. We summarize these research opportunities in Table 7 and describe them in detail in the paragraphs that follow.

<b>Table 7. Sample Research Issues on Systemic and Operational Risk</b>	
<b>Area of Research</b>	<b>Sample Research Opportunities</b>
Systemic and Operational Risk	<ol style="list-style-type: none"> <li>1. How can systemic risk in the MFS industry be monitored and mitigated?</li> <li>2. What are the types of activities in which MFS organizational users participate to manage operational risk as part of MFS regulatory compliance, and what are the associated outcomes?</li> </ol>

First, the IS research community has not studied systemic risk extensively. Beyond one recent research study that used business intelligence to model and analyze the systemic risk in banking systems [Hu et al., 2012], there is very little IS research on systemic risk. The Hu et al. [2012] study treated banks as a network linked by financial relationships. The researchers developed a network approach to risk management that offered a new approach by which contagious bank failures could be predicted, and capital injection priorities at the individual bank level could be determined in the wake of a financial crisis. Overall, past studies on systemic risk in banking systems consider homogenous participants—banks. The IS research community can contribute to the discourse on systemic risk in the financial industry by considering the heterogeneous participants in MFSs. A socio-technical approach to studying the systemic risk of MFSs can involve developing theories on monitoring and mitigating the systemic risk introduced by banking and non-banking entities involved in MFS schemes using, for example, structuration and institutional theories.

Second, current IS research on operational risk focuses on information security risk management. Researchers have focused on managing the vulnerabilities in technological assets and internal breaches [Bulgurcu and

Cavusoglu, 2010; Halliday, Badenhorst and von Solms, 1996; Spears and Barki, 2010; Straub and Welke, 1998; von Solms and von Solms, 2004]; external threats such as hackers and viruses [Doherty and Fulford, 2005; Whitman, 2004]; and risk management practices, security controls, and regulatory compliance [Spears and Barki, 2010]. Theoretical perspectives include user participation theories [Spears and Barki, 2010] and the theory of planned behavior [Bulgurcu and Cavusoglu, 2010]. Overall, prior research suggests that the regulatory context affects the shape and the outcome of IS operational risk management [Hsu, Backhouse and Silva, 2013]. MFS is perceived as posing distinctive operational risks in comparison to other banking, money transfer, and financial services. These perceived risks derive primarily from money laundering and terrorist funding activities [Chatian, Hernandez-Coss, Borowik and Zerzan, 2008; Vleck, 2011]. Practitioners have identified four risk factors contributing to the money laundering and terrorist funding risks of MFSs as anonymity, elusiveness, rapidity, and poor oversight [Chatian et al., 2008]. They suggest that these risks can be mitigated through regulatory requirements for KYC procedures and identification tools, transaction limits, enhanced customer profiling, monitoring and reporting, management of third party providers, transparent guidelines, clearer licensing, regulation of providers, and effective risk supervision within banks and non-banks [Chatian et al., 2008]. However, empirical research is needed to confirm the speculations made by practitioners as to the source of operational risk in MFSs. We also need theoretical explanations of the operational risk management processes MFS providers engage in and the associated outcomes.

### Innovation

Traditionally, innovation is created and marketed under “closed” settings, in which companies manage all of the processes involved in the innovation life cycle internally [Han et al., 2012]. Traditional innovation processes include companies making internal research and development investments to uncover scientific discoveries that can then be commercialized in the form of new products and services. Companies following the closed model of innovation typically seek legal protection for their intellectual property and know-how in order to prevent their competitors from infringing on proprietary knowledge and exploiting it for their own benefits.

In developing countries, traditional innovation models consider IS innovation in terms of transferring innovations from advanced economies and adapting them to the context of developing countries. In general, traditional innovation models struggle to produce the right products for the low-income consumers of the developing world [Heeks, 2012]. Evidence shows that transfer of developed countries' IS innovations to the developing world produces mixed results [Heeks, 2012]. Design reality gaps exist because of the distance between innovators and users created by geography, culture, psychological, and linguistic differences [Heeks, 2012]. Prior research reveals that in the developing world, inadequate linkages between institutions spearheading innovation inhibit the development and use of indigenous technological innovations [Crane, 1977]. However, success occurs in profitably addressing bottom-of-the-pyramid (BoP) consumers in developing countries when organizations leverage the 4As—availability, affordability, acceptability, and awareness [Anderson and Billou, 2007].

Two emerging models challenge the traditional IS innovation model: open innovation [Chesbrough, 2003; Chesbrough, 2006; Han et al., 2012] and BoP innovation [Heeks, 2012]. The open innovation paradigm relies on outsiders both as a source of ideas and as a means to commercialize them [Boudreau and Lakhani, 2009; Han et al., 2012]. Two models for managing outside innovation include organizing external innovators as a collaborative community or as a competitive market [Boudreau and Lakhani, 2009]. Open innovation can also be used to co-create innovative products and services with customers [Chesbrough, 2011]. Firms participating in the MFS industry commonly use open innovation models. One example of the open innovation paradigm is the Open Handset Alliance formed by a group of leading IS companies, including Google, Samsung, and Intel. The Open Handset Alliance developed the Android suite of mobile infrastructure, platforms, and software applications.

The BoP innovation model considers IS innovation as a process embedded in the local conditions of a developing country [Avgerou, 2008]. Heeks [2012] described six emerging IS innovation models that are successfully delivering new products for low-income markets. These models include the use of innovation intermediaries, collaborative innovation, grassroots innovation, frugal innovation, reverse innovation, and infusion. The overarching theme of these innovation models is that innovation emerges from poor communities rather than from firms or labs. Many such IS-related appropriations and adaptations that occur in poor communities in the developing world are sometimes adapted by the developed world. For instance, even before the advent of mobile money, new applications, such as the use of airtime as currency, that transform cellphones to wallets existed in poor communities [de Sousa, 2010; Heeks, 2012]. However, some regulatory environments forbid this kind of innovation [deSousa, 2010].

Questions remain in the academic community as to whether traditional models of IS innovation can serve BoP markets and what new open and BoP innovation processes are emerging in the MFS context. Therefore we propose the following research opportunities, which are summarized in Table 8 and described in more detail in the paragraphs that follow.



**Table 8. Sample Research Issues on Open and BoP Innovation**

Area of Research	Sample Research Opportunities
Open and BoP Innovation	<ol style="list-style-type: none"> <li>1. How do open MFS innovations occur in different regulatory environments?</li> <li>2. How are MFS innovations transferred from the BoP to the developed world and vice versa?</li> <li>3. What is the role of regulation in inhibiting or stimulating MFS innovation?</li> </ol>

First, organizations struggle with precisely how to open up their product development to the external world [Boudreau and Lakhani, 2009]. To provide answers, prior IS research focused on establishing the preconditions for open innovation [Westergren and Holmström, 2012] and the factors affecting participation in open-source software development communities [Zhang, Hahn and De, 2013]. Findings suggest that there are benefits to firms participating in open innovation initiatives [Han et al., 2012]. For instance, a firm’s market valuation increases when multiple organizations innovate through an Open Innovation Alliance (OIA) [Han et al., 2012]. Further, OIA’s create value for both participating firms and non-participating rivals. Although the importance of understanding and measuring innovation in a multi-organizational environment is emphasized, little progress has been made in this area [Han et al., 2012; Kohli and Grover, 2008]. While the open innovation paradigm is successfully applied in high-tech settings, there is minimal research on adopters of open innovation in other settings [Westergren and Holmström., 2012]. There is also a lack of research on how customers engage in the open innovation process [Chesbrough, 2011; Westergren and Holmström, 2012; Zhang et al., 2013]. Thus research studies on open innovation processes involving strategic alliances and customers in the MFS context can contribute significantly to filling this gap in IS research.

Second, we know very little about BoP innovation in the MFS arena. We do not know how the BoP innovations that occur in the developing world are replicated in the developed world. Ongoing research is also needed to understand MFS innovation in different BoP populations [Spence and Smith, 2012]. IS research could consider how users’ needs and requirements are factored into MFS innovations and the ways in which MFS providers create or market such external innovations. The purpose of such research should be to understand local problematizations; how social preferences and practices shape innovation; how local actors make sense of innovations and accommodate it in their lives; and how such innovations transfer to firms, different country classifications, and regulatory regimes.

Third, there is a shortfall of research that examines the role of governments and regulators in IS innovations at large [King et al., 1994; Bilodeau et al., 2011]. Reports about how financial regulation stifles or stimulates innovation are anecdotal. Experts suggest that the pace of MFS innovation in the developed world such as in the U.S. seems slower than in developing countries [Shy, 2012]. IS research can make valuable contributions by exploring the role of regulation in MFS innovation in different environments. IS researchers can also compare the pace of MFS innovation in the developed and developing worlds and the role of regulation in each instance.

**Social and Economic Development Issues**

A distinctive feature of MFS research is that it gives a great deal of attention to non-business organizational settings and to developing countries. Past MFS research studies describe MFS as a potentially transformative technology with several social and economic benefits for customers at the BoP [Johnson and Arnold, 2012]. Significant differences exist in MFS adoption and use in developing countries versus developed ones, resulting in different socio-economic benefits [Rangan and Lee, 2012]. In developed markets, consumers have a choice among many payment instruments, and MFS is merely another option and not a necessity [Crowe et al., 2010]. In developing countries where access to financial services is limited, MFS is sometimes the only option for the poor to acquire financial services. For the poor, barriers to access to the financial system include the absence of a bank branch within a reasonable distance, high transaction costs and fees, identification requirements, minimum balance requirements, and the need to supply the bank with a physical address [de Sousa, 2010; Rangan and Lee, 2012]. Additionally, the poor have specific financial service needs that are unaffordable when formal financial institutions provide them. These include accepting international and domestic remittances, receiving payments for casual and seasonal employment, storing money safely for short periods, paying bills, and sending and receiving funds quickly and safely. Traditional financial institutions typically do not offer accounts where account holders can maintain low balances without incurring high fees.

MFS provides several benefits to customers at the BoP in developing countries [Boateng et al., 2013; Donner and Tellez, 2008]. MFS provides low-cost financial services to customers, extends the reach of traditional financial services, creates opportunities for small businesses to become agents, provides more micro-financing opportunities, and facilitates efficient and secure money transfers and real-time settling with remote providers for goods and services. Active use of MFS may lead to indirect impacts such as increased family savings rates, increased

incomes, reduction of loss due to theft, resilience to financial shocks, poverty reduction, and improved quality of life [Donner and Tellez, 2008]. For micro-traders and micro-enterprises in developing countries who integrate MFS into their processes, use impacts include economic empowerment; increased income; and improved decision making, communication, and trading processes [Boadi, Boateng, Hinson and Opoku, 2007; Boateng et al., 2013].

Past research used the financial inclusion metric to measure the transformation potential of MFS [Johnson and Arnold, 2012; Kuriyan et al., 2012]. The financial inclusion metric measures access to a full range of financial services rather than to bank accounts or payment services alone [de Sousa, 2010]. Prior research indicates that a financially inclusive market has development impact by increasing the number of poor who have access to the market and its goods and services. Such an inclusive market also contributes to the economic empowerment of the poor and ensures the financial viability of the service providers [Mendoza and Thelen, 2008].

Despite the suggested benefits, controversy exists in the research community as to whether MFS is a transformative technology. To resolve this dilemma, more approaches for measuring the transformative potential of MFSs are needed, as the financial inclusion metric is limited. The financial inclusion metric does not capture the full potential of MFSs as it is restricted to measuring access to a full suite of financial services rather than the occurrence of the wide range of benefits MFSs seem to offer, such as increased income and savings. For instance, using the financial inclusion metric, researchers tried to determine whether M-PESA in Kenya is transformational [Johnson and Arnold, 2012]. The researchers measured access to banking services as a surrogate for financial inclusion. The results showed that the use of M-PESA did not substantially overcome key barriers to access to banking services. However, an analysis of the characteristics of those who used only M-PESA payment services without accessing banking services indicated that the service was able to reach a more diverse range of users than were conventional banking services. The researchers speculated that some of the barriers to financial inclusion may be overcome as the service expands further. Despite the increased access to payment services by members of the population who previously did not have access, the researchers concluded that M-PESA was more of a complementary service to core banking services than a substitute, and evidence of a transformation was still tentative [Johnson and Arnold, 2012].

Doubts also exist in the developed world as to the transformative potential of MFSs. For instance, experts in the U.S. do not expect the service to be successful on a wide scale in the near future [Crowe et al., 2010]. Diffusion barriers include the low percentage of the population comprising the unbanked who would benefit directly from the service. Other barriers included the major investment required by stakeholders to implement near field technology (NFC) and contactless payments, which are viewed as having the most potential in the U.S. Even if the social net benefits were positive, private net benefits for each stakeholder might be negative [Crowe et al., 2010]. Thus MFS providers might not be incentivized to implement MFSs with the scale required for socio-economic transformation to occur.

Though prior research describes the transformative potential of technology use on social and economic development, theoretically grounded empirical evidence of socio-economic benefits in both developed and developing countries is limited [Avgerou, 2008; Duncombe and Boateng, 2009; Venkatesh and Sykes, 2012]. MFS research provides a unique opportunity to contribute to knowledge on the transformative potential of technology use by supplementing current approaches for measuring financial inclusion and transformation with empirically driven theories that are more relevant to the MFS context. Therefore we propose the following research opportunities, which focus on (1) investigating the socio-economic impacts of MFSs and (2) developing constructs for measuring the transformative effects of MFSs. We summarize these research opportunities in Table 9 and describe them in more detail in the paragraphs that follow.

<b>Table 9. Sample Research Issues on the Socio-Economic Impacts of MFS</b>	
<b>Area of Research</b>	<b>Sample Research Opportunities</b>
Socio-economic impacts of MFS	<ol style="list-style-type: none"> <li>1. What are the positive and negative impacts of MFS use in different regulatory environments?</li> <li>2. How does MFS regulation drives financial inclusion and socio-economic transformation?</li> <li>3. How should the transformative effects of MFS be measured?</li> </ol>

First, research on the socio-economic impacts of MFSs focus primarily on the BoP in developing countries. While research exists that examines the benefits of MFSs, none considers the adverse effects [Donner and Tellez, 2008]. IS research can provide a stronger articulation of positive and negative primary, secondary, and tertiary effects [Donner and Tellez, 2008] in both developed and developing country contexts. For example, applying theories used by IS researchers to study the digital divide could help us better understand the socio-economic impacts of MFSs. This approach is justified as the mobile money divide mirrors the digital divide in some respects. Both phenomena

concern the socio-economic inequality of persons with respect to the access to a service. Prior digital divide studies give accounts of the success and failure of digital divide initiatives [Venkatesh and Sykes, 2012]. Theoretical accounts include studies of the continued use intention of government-sponsored Internet service by advantaged and disadvantaged users using the theory of planned behavior [Hsieh, Rai and Keil, 2008], the use of social cognitive theory and computer self-efficacy literature to show how the digital access divide affects the digital capability divide and the digital outcome divide among students [Wei, Teo, Chan and Tan, 2010], diffusion theory to examine how the co-diffusion effects of Internet access and personal computers help bridge the digital divide [Dewan, Ganley and Kraemer, 2009], and whether technology use in a digital divide initiative is related to economic outcomes [Venkatesh and Sykes, 2012]. We surmise that extending the digital divide discourse to MFS research can help provide a stronger theoretical explanation of the socio-economic outcomes of MFS.

Second, the relationship of MFS use to socio-economic growth and transformation implicates processes of change of social and individual behavior that are poorly understood. In particular, prior research focused on describing these effects rather than examining empirically whether change in socio-economic circumstances occurred to such a degree to qualify the MFS as a transformative technology [Johnson and Arnold, 2012]. Further, the few studies that examine the transformation potential of MFSs use the financial inclusion metric as a measure of transformation, which does not capture all the services and benefits of MFSs. Though the financial inclusion metric will remain a critical indicator of the transformative potential of MFSs, the IS community can uncover new measures of transformation. For instance, researchers can determine how customers without bank accounts use the MFS to mimic the full suite of financial services banks offer and determine how to measure this phenomenon as an indicator of transformation. Another recommendation is to apply approaches used to assess digital divide initiatives. For example, prior studies on the digital divide tied economic outcome measures to the expected benefits of using the technology in the farming context by using the annual produce for each head of household in a farming community as a measure of the economic outcome of technology use [Venkatesh and Sykes, 2012]. Similarly, empirical research can focus on how the use of the MFSs is associated with economic outcomes according to the context of use, such as increased savings and income.

Overall, there is a lack of studies that focus on the economic outcomes of technology use, even within IS research that studies digital divide initiatives ([Venkatesh et al. and Sykes, 2012]). Thus IS research can extend the literature base by providing valuable theories of how technology such as MFS is implicated in the dynamics of socio-economic change and transformation.

## V. CONCLUSION

The financial regulator's role is to ensure the stability of the financial system, facilitate financial inclusion, evolve operating and security standards, protect consumers and create a competitive environment. These regulatory requirements present several challenges that are likely to affect the design, deployment, and use of MFS. However, research on financial regulatory issues and their socio-technical implications is a neglected area. In this article, we derived a set of research issues for the IS research community to consider. While IS researchers are initially encouraged to borrow theories from existing disciplines, they must contribute to this emerging literature by offering a unique IS perspective. We hope this paper entices IS researchers to be both avid consumers and diligent contributors to the MFS literature pertaining to financial regulatory issues.

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*Editor's Note:* The following reference list contains hyperlinks to World Wide Web pages. Readers who have the ability to access the Web directly from their word processor, or are reading this paper on the Web, can gain direct access to these linked references. Readers are warned, however, that:

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## APPENDIX – GLOSSARY<sup>1</sup>

**ACH** – The Automated Clearing House (ACH) Network is the backbone of the electronic movement of money and payment-related data. It provides a safe and secure electronic network for direct consumer, business, and government payments. It also facilitates direct deposit via ACH and direct payment via ACH transactions.

**agent** – Also known as cash agent or retail agent. A person or business that is contracted to facilitate transactions for users. The most important of these are cash-in and cash-out (i.e., loading value into the mobile money system and then converting it back out again). Agents may register new customers. Agents usually earn commissions for performing these services. They also often provide front-line customer service such as teaching new users how to initiate transactions on their phone. Typically, agents will conduct other kinds of business in addition to mobile money.

**anti-money laundering/combating the financing of terrorism (AML/CFT)** – A set of rules, typically issued by central banks, that attempt to prevent and detect the use of financial services for money laundering or to finance terrorism. The Financial Action Task Force (FATF) is the global standard setter for AML/CFT rules.

**bottom of the pyramid** – Emerging markets of low-income nations, or the planet's population that lives on less than US\$5 per day.

**branchless banking** – The delivery of financial services outside conventional bank branches, often using agents and relying on information and communications technologies to transmit transaction details. The technologies for branchless banking include card-reading point-of-sale (POS) terminals and mobile phones.

**cash agent** – See **agent**.

**cash in** – The process by which a customer credits his account with cash. This is usually via an agent who takes the cash and credits the customer's mobile money account.

**cash out** – The process by which a customer deducts cash from his mobile money account. This is usually via an agent who gives the customer cash in exchange for a transfer from the customer's mobile money account.

**conditional cash transfers** – regular non-contributory payments of money provided by government or non-governmental organizations to individuals or households, with the objective of decreasing chronic or shock-induced poverty, addressing social risk, and reducing economic vulnerability.

**e-Float / float** – The balance of e-money, physical cash, or money in a bank account that an agent can immediately access to meet customer demands to purchase (cash in) or sell (cash out) electronic money. It can also refer to the total value of all electronic money issued in a mobile money service that is deposited in a bank account.

<sup>1</sup> See Firpo (2009), Davidson (2012) and Burhouse and Osaki (2012).

**e-money** – Short for *electronic money*, it is the electronic alternative to cash. It is monetary value that is stored electronically on receipt of funds and is used for making payment transactions. E-money can be held on cards, devices, or on a server. Examples include pre-paid cards, electronic purses such as M-PESA in Kenya, or web-based services such as PayPal. As such, e-money can serve as an umbrella term for a number of more specific electronic value products and services.

**EMV (Europay/MasterCard/Visa)** – a specification jointly developed by Europay, MasterCard, and Visa in the 1990s to ensure global interoperability for payment cards using chip technology.

**fund isolation** – A regulatory approach for protecting customers' funds in the hands of non-banks. Fund isolation requires that MFS providers insulate funds underlying issued e-money from claims by the MFS provider's creditors. Fund isolation may be achieved by pooling customers' funds in a trust account.

**fund safeguarding** – A regulatory approach for protecting customers' funds in the hands of non-banks. Fund safeguarding requires that non-bank operators maintain funds backing the e-float within prudentially regulated banks or as government securities

**know your customer (KYC)** – Rules related to AML/CFT that require providers to carry out procedures to identify a customer. These procedures may include address and identity verification.

**liquidity** – The ability of an agent to meet customers' demands to purchase (cash in) or sell (cash out) e-money. The key metric used to measure the liquidity of an agent is the sum of their e-money and cash balances (also known as their float balance).

**MNO** – A mobile network operator (MNO) is a company that owns and operates one or more mobile networks.

**retail agent** – See **agent**.

**master agent** – A person or business that purchases e-money from an MNO wholesale and then resells it to agents, who in turn sell it to users. Unlike a super agent, master agents are responsible for managing the cash and electronic value liquidity requirements of a particular group of agents.

**mobile financial services** – Also known as MFS. MFS is a broad term that refers to a range of financial services that can be offered across the mobile phone. Three of the leading forms of MFS are mobile money transfer, mobile payments, and mobile banking.

**mobile money** – See **mobile financial services**.

**mobile payment** – Transactions conducted using a mobile phone and payment instruments that include (a) banking instruments such as cash, bank account, or debit/credit card, and (b) stored value accounts (SVAs) such as transport card, gift card, PayPal, or mobile wallet. Mobile payments exclude transactions that use (a) carrier billing using the telecom's billing system with no integration of the bank's payment infrastructure, or (b) telebanking by using the mobile phone to call the service center via an interactive voice response (IVR) system. However, IVR used in combination with other mobile channels such as Short Message Service (SMS) or Unstructured Structured Service Data (USSD) is included.

**mobile wallet** – An electronic wallet that is stored on a phone. [Daly, 2010] provides the following more specific definition: "mWallet is a data repository that houses consumer data sufficient to facilitate a financial transaction from a mobile handset, and the applicable intelligence to translate an instruction from a consumer through a mobile handset/bearer/application into a message that a financial institution can use to debit or credit bank accounts or payment instruments" (p. 2).

**platform** – The hardware and software that enables the provision of a mobile money service.

**regulator** – In the context of mobile money, this typically refers to the regulator who has supervisory authority over financial institutions within a particular country—usually the central bank or other financial authority.

**stored value** – See **electronic wallet**.

**super agent** – A business, sometimes a bank, that purchases electronic money from an MNO wholesale and then resells it to agents, who in turn sell it to users.

**unbanked** – Customers who do not have a bank account or a transaction account at a formal financial institution.

**under-banked** – Customers who hold a bank account but also rely on alternative financial services providers.

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