How system quality influences mobile BI use: The mediating role of engagement

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ABSTRACT

Despite the recognized value that mobile BI (m-BI) brings to firms, our understanding of the use of m-BI and its determinants are limited. In this study, we suggest that m-BI system quality characteristics may be among the factors that influence m-BI use. Yet, in the information systems (IS) literature there is mixed support for the relationship between system quality and system use at the individual level. Given there is research suggesting that engaged users are an indication of the technology's success, we believe that 'engagement' may be the key to understanding the relationship discrepancy between system quality and use. To address this gap, we conducted a quantitative study of key informants who use m-BI, to understand what the key m-BI capabilities are and other success dimensions perceived as important by users. The results indicate that m-BI system quality attributes affect m-BI use indirectly through engagement, with this finding contributing to understanding of the complexity of IS use in mobile technologies.

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1. Introduction

Firms decide to invest in new information systems (IS) for various reasons, such as the pressure to reduce costs or to produce more without increasing costs, or simply to improve the quality of services or products in order to stay competitive. In firm performance studies, IS had been found to support timely decisions, promote innovation, and offer a means to manage the uncertainty inherent to the business environment (Dewett and Jones, 2001).

IS that possess high quality characteristics, such as flexibility, ease of use, or accessibility, have been shown to perform better and to have higher adoption rates among end users (DeLone and McLean, 2003), and consecutively promote improvements in firm performance. Many studies focusing on IS success suggest system quality is one of the most important elements to consider for organizations as it leads to higher value creation with the system by positively impacting system use (e.g. Petter and McLean, 2009; Sabherwal, Jeyaraj, & Chowa, 2006). Yet, despite the awareness of the criticality of system quality, other studies show that many high-quality systems still fail to deliver the expected results and that no relationship exists between system quality and use (e.g. Klein, 2007; McGill, Hobbs, & Klobas, 2003). This phenomenon calls on researchers to concentrate their efforts on identifying factors that could facilitate the way system quality impacts use, and hence better embed IS into business processes.

Understanding the use of technology is important for both theory and practice. As a main dependent variable in IS value/success studies, exploring use is attracting growing theoretical interest. It is also of growing practical importance because understanding the determinants of IS use helps ensure the effective deployment of IT resources in an organization (Taylor and Todd, 1995). However, there has been mixed empirical support for the determinants of IS use, and more research is needed to understand the processes and forces that shape and alter perceptions of technology use (Petter, DeLone, & McLean, 2008).

Drawing on the fusion view on IS (El Sawy, 2003), where an IS merges with its users and business environment in such a way that it becomes almost impossible to perceive the IS as a standalone tool, studies (e.g. (Orlikowski, 2007, 2010) have steered researchers' attention to the blurring of boundaries between technical and social matters (Orlikowski and Scott, 2008). A key example in this perspective is sociomateriality in which material and social are intertwined and conceptualized as such during entanglement

Table 1
Reliability and validity measures of the research model.

Constructs	Items	Construct reliability and validity				
		Factor loadings	t-value	Cronbach's alpha	Composite reliability	Average variance extracted
Ease of use	SQEU1	0.9552	26.3598	0.902	0.953	0.910
	SQEU2	0.9531	28.2388			
Flexibility	SQF1	0.7908	12.2944	0.756	0.860	0.673
	SQF2	0.8703	15.6702			
	SQF3	0.7970	11.5922			
Attractiveness	SQID1	0.9255	11.5126	0.686	0.859	0.753
	SQID2	0.8059	8.9564			
Use	U1	0.8831	15.5654	0.717	0.876	0.779
	U2	0.8823	15.7149			
Engagement	EG1	0.8224	19.1439	0.867	0.904	0.653
	EG2	0.8333	19.6139			
	EG3	0.7880	16.1875			
	EG4	0.7474	14.4745			
	EG5	0.8467	20.4679			

in practice (Orlikowski, 2007). However, it becomes necessary to untangle social and material to be able to understand what a technology allows a user to do and in what kind of way they are related together (Leonardi and Barley, 2010). Engaging with mobile devices by checking incoming emails and responding to them (Mazmanian, Orlikowski, & Yates, 2005) is one empirical example showing employees' entanglement with mobile technologies (Orlikowski, 2007). The email notifications onto employees' mobile devices captures their attention and consequently engages them to the point where they no longer can draw boundaries between work and non-work activities (Mazmanian et al., 2005; Orlikowski, 2007).

In the IS and business intelligence (BI) literature, BI systems are well recognized as contributing to decision-making, especially when firms operate in highly competitive environments (Popovič, Hackney, Coelho, & Jaklič, 2012). BI systems are most commonly identified as enterprise-wide technological solutions holding quality information in well-designed data stores, connected with business-friendly tools that provide users with timely access, effective analysis, and an insightful presentation of the information generated by enterprise-wide applications, enabling them to make the right decisions or take the right actions (Elbashir, Collier, & Davern, 2008; Popovič, Coelho, & Jaklič, 2009). As core systems within an organization, BI continuously advances to keep up with recent industry changes such as the 'big data' era (Phillips-Wren, Iyer, Kulkarni, & Ariyachandra, 2015) or the rapid growth of mobile computing (Arnott & Pervan, 2014; Hosack, Hall, Paradice, & Courtney, 2012). In the context of mobile enterprise solutions, mobile BI systems have "the potential to significantly support decision-making outside the office by providing critical (near) real-time information to mobile workers" (Brockmann, Stieglitz, Kmieciak, & Diederich, 2012). To respond to the needs of decision-makers, firms have been heavily relying on mobile BI technologies that carry the promise of improving operational and overall firm performance (Brockmann et al., 2012; Brodzinski, Crable, Ariyachandra, & Frolick, 2013; Power, 2013). Mobile BI is a system comprising both technical and organizational elements that present historical and/or real-time information to its users for analysis on mobile devices such as smartphones and tablets (not laptops), to enable effective decision-making and management support, for the overall purpose of increasing firm performance (Peters, Popovič, Isik, & Weigand, 2014). Even though m-BI is considered as a sub-field or sub-market of BI, it is complementary to traditional BI rather than a substitute. This is because m-BI differs from traditional BI in terms of the system characteristics as well as the user experience (Tona and Carlsson, 2013).

Understanding the determinants of BI use has been extensively investigated (Bosilj Vukšić, Pejić Bach, & Popovič, 2013; Hou, 2012; Işık, Jones, & Sidorova, 2013; Popovič et al., 2012). Yet, in the mobile BI field the evidence regarding the determinants of mobile BI use is not so clear. This topic is worth exploring because mobile BI is introducing a new way to deliver information through the new generation of mobile devices. Given the increasing interest in mobile work in the industry, it is surprising to observe that the adoption process of mobile BI is occurring at a slower pace than expected (Brockmann et al., 2012). Therefore, it is beneficial that we understand which determinants of mobile BI use help to ensure the effective deployment of IT resources in an organization.

Mobile BI system quality characteristics may be among the factors that influence mobile BI use. In the IS literature there is mixed support for the relationship between system quality and system use at the individual level. While some studies suggest a positive relationship between system quality and system use (e.g. Hsieh and Wang, 2007; Rai, Lang, & Welker, 2002), other studies offer no support (e.g. Klein, 2007; Straub, Limayem, & Karahanna-Evaristo, 1995). In an m-BI setting, given that (1) users feel engaged when interacting with mobile technologies due to the technical features, such as accessibility and ease of use (Kim, Kim, & Wachter, 2013), and (2) engaged users are an indication of the technology's success (O'Brien and Toms, 2008), we believe that 'engagement' may be the key to advancing the quest to explain the relationship discrepancy between system quality and use. It has previously been suggested that mobile BI influences the focus of attention of decision-makers (Tona and Carlsson, 2014) due to (1) its capability to provide access anytime and anywhere to the answers and issues on which decision-makers need to focus and (2) the fact that it becomes part of the contexts and situations decision-makers find themselves in, because m-BI runs on mobile devices that can be easily carried everywhere. When a mobile BI system provides a positive experience to the user in terms of curiosity, attention, and control, this will likely result in their greater use of that system (Hsu & Lu, 2004; Trevino & Webster, 1992).

Despite increasing recognition of the importance of system quality for BI system use as well as the value that mobile BI systems can bring to firms and their mobile workers, our understanding of how mobile workers' engagement experience links an individual's perceptions regarding mobile BI system use with its key determinants remains limited. To address this gap, we conducted a quantitative research study of key informants within firms who regularly rely on a mobile BI system in their decision-making processes. Our overarching research question was: How does a mobile BI system quality influence mobile BI use, considering the engagement level of users?

Our contribution to the IS success and BI literature is twofold. First, we find that mobile workers view engagement as an important link between mobile BI system quality characteristics (e.g.