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Information system security commitment: A study of external influences on senior management

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ABSTRACT

This paper investigated how senior management is motivated to commit to information system (IS) security. Research shows senior management participation is critical to successful IS security, but has not explained how senior managers are motivated to participate in IS security. Information systems research shows pressures external to the organization have greater influence on senior managers than internal pressures. However, research has not fully examined how external pressures motivate senior management participation in IS security. This study addressed that gap by examining how external pressures motivate senior management participation in ISS through the lens of neo-institutional theory. The research design was survey research. Data collection was through an online survey, and PLS was used for data analysis. Sample size was 167 from a study population of small- and medium-sized enterprises (SMEs) in a mix of industries in the south-central United States. Results supported three of six hypotheses. Mimetic mechanisms were found to influence senior management belief in IS security, and senior management belief in IS security was found to increase senior management participation in IS security. Greater senior management participation in IS security led to greater IS security assimilation in organizations. Three hypotheses were not supported. Correlation was not found between normative influences and senior management belief, normative influences and senior management participation, and coercive influences and senior management participation. This study shows IS security-related mimetic influences have greater impact on senior leaders of SMEs than coercive or normative influences, which may be explained by the absorptive capacity of SMEs. Absorptive capacity refers to the ability of an organization to assimilate a technology. However, absorptive capacity may affect more than just technology assimilation, and may extend to how senior management responds to external influences.

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1. Introduction

Senior management commitment is important to achieving effective information system (IS) security in organizations (Boss

et al., 2009; Bulgurcu et al., 2010a; Da Veiga and Eloff, 2007; Hu et al., 2007; McFadzean et al., 2006). IS security is a well-informed sense of assurance that risks to information resources are in balance with technical, administrative, and behavioral controls (Anderson, 2003; Dhillon and Torkzadeh, 2006).

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Although senior management commitment alone does not guarantee effective risk management, it is a prerequisite for effective development, implementation, and compliance with IS security controls (Boss et al., 2009; McFadzean et al., 2006). Compliance increases the effectiveness of IS security controls (Guo, 2013; Herath and Rao, 2009b). When correctly implemented, common IS security controls reduce risk to information systems and organizations (Harrison and White, 2010). Therefore, organizations can reduce risk to information through effective IS security (Barlow et al., 2013; Bulgurcu et al., 2010a; Harrison and White, 2010; McFadzean et al., 2006; Siponen et al., 2014).

Senior management commitment to IS security can drive organizational change that reduces security risk to information systems and the organization. However, senior managers often lack commitment to IS security (Ahmad et al., 2012; Chang and Ho, 2006; Hsu, 2009; Hu et al., 2007; Smith et al., 2010), but can be motivated to support IS security by internal or external influences (Hu et al., 2007). Research shows external influences motivate senior management commitment to IS security more strongly than internal influences (Hsu, 2009; Hu et al., 2007; Smith et al., 2010). Although IS security research has provided anecdotal evidence showing senior management responds to external influences (Allen, 2005; Holgate and Hardy, 2012; Hsu, 2009; Hu et al., 2007; Patnayakuni and Patnayakuni, 2014; Smith et al., 2010), there remains a gap in empirical research that examines how external influences motivate senior management participation in IS security. This study investigated how external influences motivate senior management commitment to IS security by examining the mediating role of senior management between external influences and IS security assimilation.

2. Background

The literature review has five sections: senior management support for IS security, IS security management, employee compliance with IS security policy and controls, organizational security culture, and motivating senior management to commit to IS security.

2.1. Senior management support for IS security

The value of senior management support to information systems (IS) and information technology (IT) is well studied (Doll, 1985; Garrity, 1963; Jarvenpaa and Blake, 1991; Meador and Keen, 1984; Vanlommel and De Brabander, 1975). Early research on senior management support for IS/IT followed two streams: participation and involvement (Jarvenpaa and Blake, 1991). Participation is defined as the personal activities in IS/IT management, such as planning, development, and implementation of IS/IT (Jarvenpaa and Blake, 1991). Involvement is senior management's psychological state that reflects the degree of importance senior management places on IS/IT (Jarvenpaa and Blake, 1991). Although both senior management participation and involvement contribute to greater IS/IT success in an organization, involvement is the more effective form of support (Jarvenpaa and Blake, 1991).

IS security researchers widely believe senior management commitment is important to achieving effective IS security in

organizations (Chai et al., 2011; Da Veiga and Eloff, 2007; Holgate and Hardy, 2012; Hu et al., 2007; Kankanhalli et al., 2003; McFadzean et al., 2006; Patnayakuni and Patnayakuni, 2014; Werlinger et al., 2009). Hsu et al. (2012) found senior management support to be a key factor in effective IS security assimilation in Korean organizations. Senior management commitment is a prerequisite for effective development, implementation, and compliance with IS security controls (Bernard, 2007; Boss et al., 2009; Bulgurcu et al., 2010a; Cybersecurity Enhancement Act, 2014; Framework for improving critical infrastructure cybersecurity, 2014; Hu et al., 2007; McFadzean et al., 2006).

Senior management commitment is improving in certain sectors, particularly in organizations supporting critical infrastructure and those that share information with business partners (Framework for improving critical infrastructure cybersecurity, 2014; Hahn and Govindarasu, 2011; Holgate and Hardy, 2012; Patnayakuni and Patnayakuni, 2014). External pressures are the key drivers behind senior management commitment in critical infrastructure sectors, such as energy, water, health and financial (Holgate and Hardy, 2012). However, on a broader scope, IS security management continues to be driven from the bottom-up, rather than the top-down (Ahmad et al., 2012). IS security strategic development remains a significant gap across many organizations, and one that requires senior management involvement to address (Ahmad et al., 2012; Seeholzer, 2012). Additionally, it is noted that decision makers need good security situational awareness, or the awareness of the external information system security landscape (Franke and Brynielsson, 2014; Webb et al., 2014).

2.2. IS security management

Effective IS security management is not a standalone activity, but should be founded on a well-developed security strategy (Framework for improving critical infrastructure cybersecurity, 2014; Seeholzer, 2012). IS security strategies should be balanced with and support business strategies (Chang and Yeh, 2006; McFadzean et al., 2011; Nassimbeni et al., 2012). Organizations must be able to assess the effectiveness of IS security and communicate its value to the organization (McFadzean et al., 2011; Nassimbeni et al., 2012; Tang and Liu, 2015).

IS security risk management is used to identify and quantify security risk to information systems, and develop cost-effective controls to mitigate risk to acceptable levels by understanding and costing the unexpected variability from an activity, and selecting and implementing controls to mitigate that variability (Gerber and von Solms, 2005; Othmane et al., 2014; Paquette et al., 2010; Sun et al., 2006). Selecting the most effective controls is a complex task that requires a full understanding of the organization, business processes, and information systems (Ardagna et al., 2015; Chen et al., 2011; Sun et al., 2006).

2.3. Employee compliance with IS security policy and controls

When correctly implemented, common IS security controls reduce risk (Framework for improving critical infrastructure

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