Dimensions of Technology Trustworthiness and Technology Trust Modes

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Narasimha Paravastu
Metropolitan State University, USA

INTRODUCTION

Trust is important in personal as well as business relationships because it reduces perceptions of social complexity, uncertainty and risk (Luhmann, 1979; Molm, Takahashi, & Peterson, 2000). Just as with interpersonal trust, users often perceive factors of uncertainty with technology too, such as security, privacy and performance. Recognizing the importance of trust beyond interpersonal contexts, recent research extended trust to the context of trust in technology artifacts (Kim & Prabhakar, 2004; Mcknight, Carter, Thatcher, & Clay, 2011; Paravastu, Gefen, & Creason, 2014; Wang & Benbasat, 2005, 2007). This article reviews the past research in the area of technology trust and trustworthiness constructs and tries to integrate technology trust constructs and the usefulness and perceived ease of use constructs proposed in Technology Acceptance Model (TAM) (Davis, 1989) that predict technology usage. This article extrapolates and extends interpersonal trust modes to software artifacts and proposes a comprehensive model of technology trust, trustworthiness, and technology trust modes, and discusses the implications of relationships among those constructs.

BACKGROUND

Interpersonal Trust and Technology Trust

Interpersonal trust is defined as the willingness of a party to be vulnerable to the actions of another based on expectation that the trustee will not take advantage of the situation and act in an opportunistic manner, even though the trusting party has no control over the actions of the other (Gefen, 2002; Mayer, Davis, & Schoorman, 1995). Trust reduces of perceptions of risk and complexity by making such simplifying assumptions about the possible actions of the other party (Ba & Pavlou, 2002; Gefen, 2000; Gefen, 2003; Jarvenpaa, Tractinsky, & Vitale, 2000; McKnight, Choudhury, & Kacmar, 2002a; Pavlou & Gefen, 2004). Trust is formed based trustworthiness of the trustee, and external factors that facilitate trust formation known as trust modes.

Ability, benevolence and integrity are the three trustworthiness attributes of the trustee widely accepted in the past research (Gefen, Karahanna, & Straub, 2003; McKnight et al., 2002a). Ability is belief about the trustee's set of skills or competence to fulfill his or her responsibilities in a trust relationship (Mayer et al., 1995; McKnight, Cummings, & Chervany, 1998). Benevolence is the belief that the trusted party will act appropriately to protect the interests of the trustee, without taking advantage of the situation to his or her own benefit (Mayer et al., 1995; McKnight et al., 1998). Integrity is the expectation that the trustee will adhere to the expected moral or ethical standards. (Gefen et al., 2003; Mayer et al., 1995; McKnight et al., 1998).

Calculative based trust, transference based trust, institutional based trust, and knowledge based trust are external factors that enable trust formation, known as the trust modes. Calculative based trust is a scrupulous estimate about the behavior of the parties in a trusting relationship that the other party will fulfill their part of the obligations because violation of trust may not be beneficial to either party (Dasgupta, 1988; Rousseau, Sitkin, Burt, & Camerer, 1998). Transference-based trust is the willingness to trust a person based on a reference of trustworthiness from a trusted referent. (Milliman & Fugate, 1988; Stewart, 2003; Strub & Priest, 1976). Institutional based trust is a belief that expected outcomes, and the remedies for violations are

guaranteed by the structural assurances and situational normality built into the relationship (McKnight et al., 1998; Pavlou & Gefen, 2004). Structural assurances are the institutional guarantee structures built into the relationship such as formal contracts, guarantees, and legal recourse available to ensure success of a transactional exchange. Situational normality is the perception that the relationship is no different from other similar trust exchanges, and the favorable conditions exist in the relationship for successful outcomes (McKnight et al., 1998; Pavlou & Gefen, 2004). Knowledge-based trust is an informed assessment about the probable future behaviors, based on their past interactions (Ba, 2001; Lewicki & Bunker, 1995; Rousseau et al., 1998; Shapiro, Sheppard, & Cheraskin, 1992; Stewart, 2003).

The interpersonal trust, trustworthiness constructs, and trust modes have been tested in multiple contexts (Gefen, 2000; Gefen, 2002; Gefen et al., 2003; Gefen & Straub, 2004; Grabner-Krauter & Kaluscha, 2003; Jarvenpaa et al., 2000; McKnight & Chervany, 2001; McKnight et al., 2002a; McKnight, Choudhury, & Kacmar, 2002b). Grounded in the interpersonal trust theory, several studies have extended the interpersonal trust constructs to other impersonal contexts such as trust in technology, software artifacts, or online recommendation agents that represent humans (Komiak & Benbasat, 2006; Paravastu et al., 2014; Wang & Benbasat, 2005, 2007).

Technology Trust Constructs

The rationale behind extending the trust constructs to the context of technology artifacts is, often people attribute human qualities to inanimate objects, and treat them as social actors (Bloch, 1982; Goldberg & Lewis, 1978; Muir, 1988; Nass & Moon, 2000; Niederland & Sholevar, 1981). This is true of technology artifacts too (Dryer, 1999; Reeves & Nass, 1996). Extrapolating interpersonal trust to the inanimate technology, past research proposed the dimensions of trustworthiness as well as trust modes as it relates to technology.

Wang and Benbasat (2005) proposed ability, benevolence and integrity as the three trusting beliefs about online recommendation agents, which are software entities acting on behalf of a vendor or portal such as yahoo.com or amazon.com. In the context of technology not representing any agent or vendor, further research proposed functionality, helpfulness and reliability as

the trustworthiness factors in the context of using excel as a specific technology (Mcknight et al., 2011), or performance and predictability of an antiviral software artifact (Paravastu et al., 2014). These dimensions of software trustworthiness are identical to the dimensions of interpersonal trustworthiness. Ability(Wang & Benbasat, 2005) dimension of software trustworthiness corresponding to the functionality (Mcknight et al., 2011) or performance (Paravastu et al., 2014) dimensions. Functionality or performance dimension of a software artifact is defined as the users' perceptions of capability of the software artifact to accomplish the purpose for which it was designed (Mcknight et al., 2011; Paravastu,et al., 2014). Integrity dimension of interpersonal trust corresponds to reliability (Mcknight et al., 2011) or predictability (Paravastu et al., 2014) dimension of technology trust. Predictability or reliability is defined as the users' perceptions that a software or technology will do what it is claimed to do reliably and consistently, and not doing anything malicious (Mcknight et al., 2011; Paravastu et al., 2014). Helpfulness (Mcknight et al., 2011) dimension corresponds to the benevolence in interpersonal trust. Helpfulness is defined as the software being able to provide help, when the users need it. However there is also an argument that benevolence is unique to humans who have emotions (Rempel, Holmes, & Zanna, 1985), and software is inanimate, so benevolence as a dimension may not be relevant to technology (Paravastu et al., 2014).

Other dimensions of technology trustworthiness include perceived ease of use and perceived usefulness (Davis, 1989). Perceived Usefulness is the perception of a user about the extent to which a particular technology would contribute to accomplish tasks important to the user. Perceived ease-of-use is the degree to which a person believes that using a particular system would be effortless (Davis, 1989). Perceived usefulness and perceived ease of use are part of the characteristics of software or a technology artifact. These two factors are the users' evaluations of technology's usefulness to their own objectives that need to be accomplished, or it being easy to use. Perceived usefulness differs from the performance dimension of trustworthiness in that, the former is an evaluation of how useful a technology may be to the user, while the latter is an evaluation of how efficient a technology is.

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