A Trust Framework Model for Situational Contexts

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Abstract

Trust is a widely studied and acknowledged concept including a diversity of operationalizations. A trust framework model for situational contexts is presented to communicate a clearer and better understanding of the trust situation studied. The framework model includes the situational trust model, the trust transaction, and the trust equation. The situational trust model relates the trustor, the trustee, the trust object, and the trust environment. The application of the trust model is exemplified to define the trust situation of consumer trust in e-commerce.

1. Introduction

Like love and freedom, trust is one of those essential human values that everyone understands until the question is raised what it is or one is asked to practice it intentionally [43]. The question is how do we understand trust and how can we build trust. The concept of trust has been widely studied by researchers in various disciplines [5], [30], [39], [41] such as philosophy (e. g. [8], [17], [40]), psychology (e. g. [21], [37], [38]), sociology (e. g. [24], [25]), economics (e. g. [7], [27], [46]), and computer science (e.g. [15], [34]). This has led to an extensive variety of different trust definitions [5], [10]. These diverse definitions often reflect the paradigms of the particular academic field of the scholars [13], [30]. However, even within a given field, there is a lack of agreement on a universal definition [21]. Although no general accepted agreement on the definition, characteristics, antecedences, and outcomes of trust exists, the importance of trust is widely recognized by researchers in the various disciplines [3], [20], [45].

A trust framework model is presented to facilitate a clearer and better understanding of the trust situation studied by researchers. The framework model supports scholars in clearly specifying the trust situation as well as enabling an improved comparison, transfer, and utilization of research results.

The theoretical background for the trust framework model is presented in section 2. The section introduces and distinguishes the concepts trust and trustworthiness. Section 2. concludes with a trust typology relating different trust types. In part 3., the trust framework model for situational contexts is addressed. At first, the derivation of the model is outlined before the different elements of the framework model are subsequently presented. Section 4 then applies the trust framework model to consumer trust in e-commerce. The paper ends with some concluding remarks in section 5.

2. Theoretical background

2.1. Trust

Trust has been widely studied by researchers in numerous disciplines, viewing trust from unique disciplinary perspectives and creating various definitions of trust [21]. Researchers operationalize trust differently, depending on the focus and phase of trust studied [2], [30], [39]. Despite the divergence of trust operationalizations across and within the various disciplines, "scholars do appear to agree fundamentally on the meaning of trust [39]." Based on a cross disciplinary meta-analysis, Rousseau et al. [39] defined trust as follows.

"Trust is a psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behavior of another.[39]"

This definition emphasizes that trust is not a behavior or a choice, but an underlying psychological condition that can cause or result from such actions. Rousseau et al. [39] also found that there exists an agreement about the fundamental conditions for trust to arise. The two prerequisites for trust are a confident expectation about an interdependent beneficial outcome while relying on a trustee in a risky and uncertain situation. The first assumption of a confident expectation concerning the possibility of a mutually beneficial outcome refers to a trustor's general belief and the second assumption of risk and uncertainty relates to the underlying situation.

2.2. Trustworthiness

An essential part in the trust building process is the consumer's interpretation of the trustworthiness communicated and signaled by the trustee. The perceived trustworthiness is a significant antecedent of trust [20]. The important distinction to make is that trust does not equal trustworthiness. Considering the possibility of a trustor deciding to trust an untrustworthy trustee, the

existing gap between the two concepts becomes apparent. However, trust and trustworthiness are strongly related [43]. Trust, understood as the willingness of a trustor to be vulnerable upon the behavior of a trustee, is formed and influenced by characteristics of the trustor and of the trustee [27], [43]. Thereby, a trustor's experience and background represent important aspects in building trust. These aspects have both an effect on the general willingness to engage in any transaction with a known or unknown trustee, and on the perception of any trustee's trustworthiness. In any given trust situation, a trustor perceives a certain level of a trustee's trustworthiness. The recognition may occur consciously or subconsciously. Although a trustor is generally free in his or her choice to trust a trustee who might be trustworthy or untrustworthy, the choice is usually determined intuitively by taking the perceived trustee's trustworthiness into consideration. "Trustworthiness means, after all, being worthy of being trusted.[43]"

As examined above trustworthiness is not trust. Whereas trust emanates from the trustor, trustworthiness is a characteristic of the trustee. In the literature, several researchers have identified the following reoccurring characteristics of the trustee: ability, benevolence, and integrity (e. g. [3], [11], [20], [26], [27]). As a set, the three constructs explain a major portion of trustworthiness [27]. The three distinct factors vary independently, but are interrelated and contribute jointly to the trustworthiness of the trustee [20]. In general, the various factors indicating the trustworthiness of the trustee can be observed and analyzed. Although it can be reasoned about the trustworthiness of the trustee, trust is not determined by questions of reason and evidence from a comparably objective perspective. Trust is established by the subjective assessment of the trustor's perception of the trustee, the trust object, and the trust environment.

2.3. Typology of trust

To facilitate the distinction of different trust concepts and thus enable researchers to sort out findings across the range of trust studies, McKnight and Chervany [28]-[31] have proposed an interdisciplinary conceptual typology of trust. The typology presented includes the four trust constructs disposition to trust, institution based trust, trusting beliefs, and trusting intentions. All four constructs imply the two fundamental assumptions of a confident expectation encompassing the possibility of a mutually beneficial outcome and the involvement in a risky and uncertain situation [1], [30]. The first assumption refers to the trustor's general belief in the positive outcome of the decision to trust. The positive outcome is evaluated according to the trustor's expectation. As soon as a person engages in a trust situation, s/he has a general expectation according to the specific situation. The expectation

determines if the following behavior is one originated from trust or distrust. The second assumption relates to the condition of the underlying situation in which a trustor may decide to trust a trustee to perform a certain deed. The need for trust only arises in an uncertain and risky environment [4], [6], [44]. If actions could be undertaken with complete certainty and no risk, trust would not be necessary and the trustor would not be in a vulnerable position [3], [12]. In the following passage, the four trust constructs introduced by McKnight and Chervany are outlined. While presenting the different constructs, the fundamental assumptions underlying all four constructs should be kept in mind – that is having confident expectations in a risky and uncertain situation.
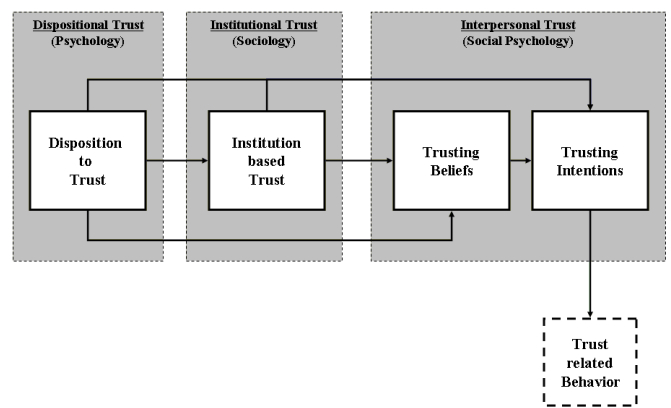

Fig. 1. An interdisciplinary model of trust concepts

The first construct disposition to trust (also called propensity to trust, e. g. [5], [9], [20]) stems from personality psychology. Personality psychologists have conceptualized trust as a belief, expectancy, or feeling deeply rooted in the personality and originating in the individual's psychological development [13], [45]. Disposition to trust is trust viewed as an individual characteristic, considering a trustor's general willingness to trust others. The individual's tendency to be willing to depend on others is an expectancy formed by generalization of the individual's experience with other people [38]. Disposition to trust, as a generalized tendency across situations and persons, influences our interpretation and perception of the situations and the involved persons [30]. In short, consumers have to rely on their general disposition to trust in an unfamiliar situation.

In a more familiar situation, the effect of the general disposition to trust on the trustor decreases and the situation specific construct institution based trust (also called system trust, e. g. [24], [25], [35]) becomes more relevant. Institution based trust is derived from sociology. Sociologists have focused on trust as an institutional phenomenon, concentrating on how institutions, e. g. structures, roles, and regulations, provide assurances in situations of risk and uncertainty, and on the trust indi-

viduals put in those institutions [21], [22]. By institution based trust, McKnight and Chervany [30] refer to the trustor's belief "that favorable conditions are in place that are conducive to situational success in an endeavor or aspect" of the trustor's life. As a trustor becomes more familiar with a specific situation, the importance of institution based trust increases.

In contrast to situation specific institution based trust, trusting beliefs and trusting intentions are defined as person specific [30]. The trust constructs trusting beliefs and trusting intentions originate from social psychology. Social psychologists have focused on interpersonal transactions between individuals including the expectations and willingness of a trustor in a specific situation, the risks associated with assuming and acting on such expectations, and the contextual factors that enhance or inhibit the development and maintenance of trust [21]. McKnight and Chervany [30] specify trusting beliefs as cognitive, affective beliefs about the beneficial characteristics of the trustee. The trustor's beliefs are thereby influenced by the perception of the different trustee's characteristics. By investigating the characteristics of the trustee, researchers deal with the question why a trustor considers a trustee to be trustworthy [27]. The fourth construct trusting intentions is the willingness of a trustor to depend on the trustee without being able to control or influence the trustee [30]. Due to the focus on interpersonal transactions, trusting beliefs and trusting intentions can also be summarized as interpersonal trust [30]. The actual engagement of a trustor in a specific transaction has been termed trusting behavior. Trusting behavior is considered to be a consequence of a trust decision demonstrating the willingness to rely upon the trustee [27], [30].

3. Trust framework model

3.1. Derivation of the trust framework model

Trust defined as "a psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behavior of another [39]" is a basic constituent of social life [25], [43]. In essence, social life equates to the interaction with our fellow citizens. Interacting with other people requires communication – either verbal or non-verbal; as well as communicating with other people necessarily involves interaction [14], [32]. In case of trust, the trustor decides willingly to accept vulnerability by relying on the actions of a trustee [27]. The decision to trust depends primarily on previous experiences formed by interaction and communication. The importance and similarity of communication and trust situation motivated the development of the trust framework model inspired by a communication model. The two models are illustrated by figures 2 and 3. In the following

the communication model will be briefly considered giving a meaning to the concepts data, information, and knowledge by inspecting the communication process introduced by the model. The communication process serves the comprehension of the trust process as well as heightens the awareness of the importance of perception and experience responsible for the formation of a trustor's expectations. Then, the trust framework model will be presented (3.2.) including the trust formation process (3.3.) and the introduction of a dynamic dimension into the framework in form of the trust equation (3.4.).
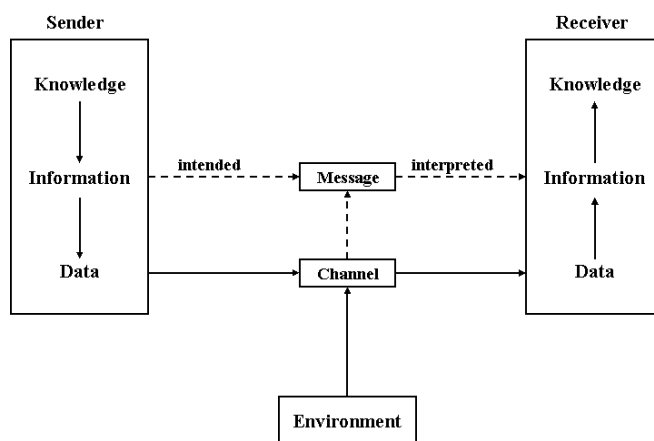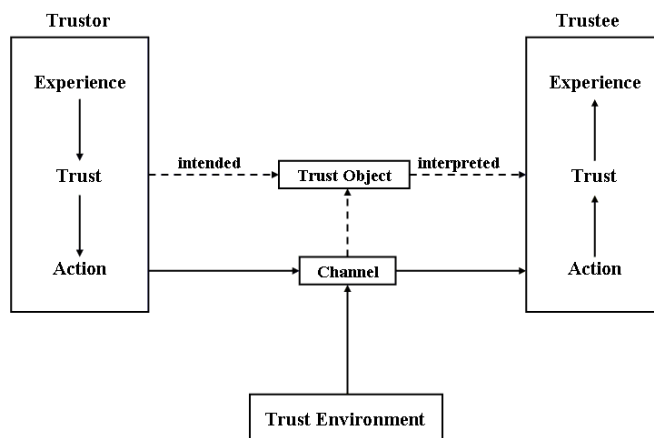

Fig. 2. Communication model

Fig. 3. Trust framework model

For the purpose of a trust framework model, the communication model by Shannon and Weaver [42] was adopted incorporating the sending and receiving process of an individual according to the three tier approach of data, information, and knowledge. The Shannon and Weaver [42] model is one way directed and stems from the domain of information theory. A one way communication model was chosen for the task to best fit the trust situation of a trustor placing trust in the trustee. Following the adopted communication model, communication con-

sists of four major components the sender, the receiver, the message, and the environment. The communication process can generally be distinguished in the three phases sending, transmitting, and receiving. The phases of sending and receiving are concerned with the process of the message formation and comprehension by the sender and the receiver respectively. The knowledge pyramid displayed in figure 4 illustrates the top down formation and bottom up comprehension process relating the three concepts data, information, and knowledge.
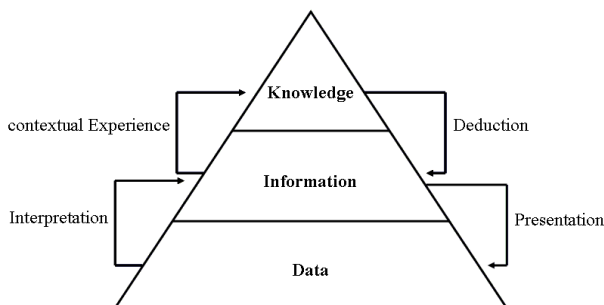

Fig. 4. Knowledge pyramid

The intention of communication is to convey information from a person in the role of a sender to a person in the role of a receiver according to a specific situation [14], [32], [42]. The information to be conveyed from sender to receiver is derived from the deduction of the sender's situational preknowledge. By a transformation process[1], the information is then converted into the intended message. The message is represented by data and bears no meaning itself. Afterwards, the message is sent to the receiver via the chosen communication channel. Relying on his or her situational preknowledge, the receiver interprets the received message data to understand the intended message. The intended information and the interpreted information can vary from each other thereby explaining misunderstanding. Misunderstanding results either from the interpretation of distorted messages caused by noise, originating from the environment or emanates from the divergence of sender's and receiver's situational preknowledge. Accordingly, the resulting information depends on the inference of data and knowledge. In summary, the understanding of a receiver gained over the course of communication relies upon the interpretation of the intended message data according to the situational preknowledge of the receiver.

3.2. Situational trust model

A sender cannot be sure to be understood by the receiver and neither can the receiver be positive to under-

stand the intention of the sender. In a similar way, a trustor cannot be certain if the trust placed in a transaction is respected by the trustee. The trustee in return is unsure about the intentions and expectations of a trustor. The similarity of the communication and trust situation and structure lead to the proposal of the situational trust framework model presented in figure 3. The trust framework model features the components trustor, trustee, trust object, and trust environment. In general, trust has been defined as person specific emanating from the trustor. However, the general possibility of a trustee being a non human system, for example an organization, is thereby not excluded.[2] The trust object refers to the entity that the trust of the trustor revolves around. The intentions assigned to the trust object are the positive expectations of the trustor to be fulfilled by the trustee. Following the structural and situational analogy of trust and communication, it can however be observed that trust as information is neither transmitted nor directly observed. A trustee can only perceive the actions taken by the trustor to interact with the trustee as an indication for the trustor's willingness to trust. As a result, the actions of the trustor and the trustee respectively represent the ground level, the level of interaction of the trust framework model. The central level and focus of the model is trust. The level expresses the desirable way of communicating trust concerning the trust object in contrast to the actual detour of the intention and interpretation process to convey trust from trustor to trustee. The upper level, the level of influence in the trust framework model is experience affecting the trust formation of a trustor and trust perception of a trustee in a specific situation. The situational experience covers several aspects of all involved components in the trust situation. A trust decision is based upon the trustor's perception of and experience with the trustee, the trust object, and the environment. The arrangement of the corresponding elements involved in a trust situation is illustrated in figure 2 and 3. Briefly, a trust situation can be described as follows. A trustor willing to interact with a trustee formulates a trusting intention to engage in a transaction with the trustee [30]. The formed intentions and expectations covering the trustee, the trust object, and the trust environment result into the actions, the trusting behavior taken by the trustor [30].

The trust framework model illustrated in figure 3 is able to express every trust situation through the specification of the different components involved in the specific situation at hand. Basically, every situation of trust can be stated in the following way:

Specific trust is trust placed by a trustor in a trustee concerning a trust object in a trust environment.

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[1] Shannon and Weaver [42] refer to the transformation process as coding or code.

[2] For a discussion of the topic see e. g. [24], [25], [27], [30], [35], and [46].

The incorporation of the trust object and the trust environment extends the grammar of trust formulated by McKnight and Chervany [30] which is articulated in the following basic sentence structure:

The trustor trusts the trustee.

The grammar of trust was introduced to represent the different trust constructs presented in part 2.3. Agreeing with McKnight and Chervany about the influence of the different types of trust concepts for every trust situation, the four trust constructs have been incorporated into the trust equation as shown in section 3.4.

3.3. Trust transaction

The trust situation described in the previous chapter is stimulated by a preceding phase of interaction between the trustor and the trustee. Additionally, the trust situation concludes into a subsequent phase of action completing the trust transaction. Figure 5 shows an ideal sequential flow of a trust transaction implicitly including the preceding phase and the subsequent phase.
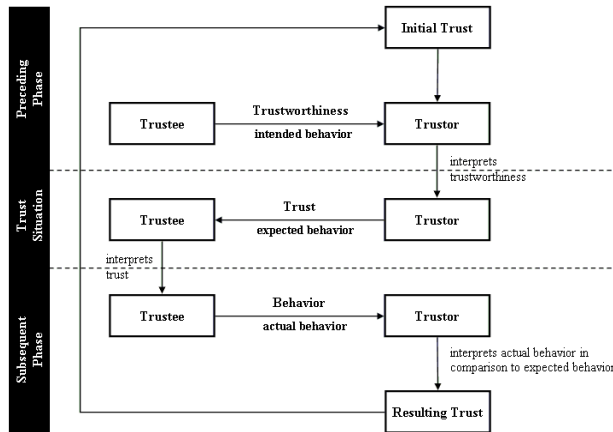

Fig. 5. Trust transaction

In a given trust situation, the trustor bases the trust decision on previous interactions that lead to the formation of the expectations related to the situation at hand. In case of no prior situation specific interaction and communication between the trustor and the trustee, the trustor relies upon former experiences or more generally on the disposition to trust [13], [30]. Prior situational interaction with the trustor however allows the trustee to communicate trustworthiness and clearly express the services offered. So, the trustee can support the reasonable formation of a trustor's expectations as well as the decision to trust. Then, the trust situation follows concluding in a decision to trust or distrust[3]. The subsequent phase is concerned with the behavior of the trustee after encountering the action of the trustor. In

response to a trusting behavior of a trustor, the trustee either tries to fulfill the expectations asked for by the trustor or behaves opportunistically thereby answering the question if the trust placed in the trustee was justified.

3.4. Trust equation

The trust equation complements the trust situation by introducing the dynamic aspect of trust and trust formation to the framework model. Explicitly, the trust equation supplements the single transactional display of any trust situation in figure 3 with the reference of trust formation to prior trust situations. As discussed previously, trust is situation specific and depends on the experience gained over time. Hence, trust can be expressed in its most elemental form as follows.

$$V_{t+1} = v(V_t) = v(s,x,t) \tag{1}$$

The trust **V** of a trustor is formed by the trust decision process **v** according to the given situation **s** and the experience **x** obtained over the time **t**. In the next step, the components of the trust framework model were incorporated into the trust equation transforming the expression into the following.

$$V_{t+1} = v(s,x,t) = v\left(T_{s,x,t}, O_{s,x,t}, E_{s,x,t}\right) \tag{2}$$

In short, the trust **V** of a trustor is determined by the trust function **v** operating on the trustee **T**, the trust object **O**, and the trust environment **E** in accordance to the situation **s** and the previous experience **x** up to the point in time **t**. The integration of the various components into the trust equation represents the behavior of a trustor to evaluate all necessary parts of any given trust situation. Recalling the trust typology presented in part 2., the trust function **v** can be broken down into dispositional trust **d**, institutional trust **i**, and interpersonal trust **p**. Formula (3) illustrates the association between the general trust function and the different type of trust formation. Also pointed out in the formula is the fact that dispositional trust is cross situational [30] and that institutional [30] as well as interpersonal trust are situation specific [21]-[23].

$$v(s,x,t) = d(x,t) + i(s,x,t) + p(s,x,t) \tag{3}$$

By substituting (3) into (4), the complete trust equation can be written as:

$$V_{t+1} = d(E_{x,t}, O_{x,t}, T_{x,t}) + i(E_{s,x,t}, O_{s,x,t}, T_{s,x,t}) + p(E_{s,x,t}, O_{s,x,t}, T_{s,x,t}) \tag{4}$$

The complete trust equation incorporates the typological trust functions operating on the components of the trust framework model according to the assessment of the consumer. As stated in (4), the complete trust equation represents the gradual development of trust over the course of previous transactions. Since the range of the

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[3] For an account on trust and distrust, see e. g. [23], [29], and [38].

functions d, i, and p is not limited to positive values, the trust equation can account for an increasing, a decreasing or a constant level of trust development from t to t+1. The previous experiences made over time in a specific trust situation related to the trustee, the trust object, and the trust environment influence as indicated the formation of a trustor's dispositional trust, institutional trust, and interpersonal trust. The trust equation thereby extends the trust framework model by adding the dynamic aspect of trust development to the trust framework.

4. Applying the trust framework model

In the context of electronic commerce (e-commerce), trust has emerged as one essential concept for the e-commerce acceptance and success [3], [20], [45]. Although a diverse variety of definitions to create an understanding for trust in e-commerce exists [5], [10], the importance of trust is widely recognized by researchers. Considering the business-to-consumer relationship in e-commerce, the fundamental lack of trust has been referred to as an important reason for the hesitant growth of e-commerce and why consumers are reluctant to shop online [12]. As Hoffman et al. [16] state one of the main reasons many consumers have not shopped online is that "consumers simply do not trust most Web providers [e-commerce vendors] enough to engage in 'relationship exchanges' involving money and personal information." In the same way, Patton and Jøsang [34] mention that lack of trust in e-commerce vendors (e-vendors), in e-commerce technology, and in the social, financial, and legal infrastructures of the e-commerce environment, poses a major challenge to the consumer acceptance of e-commerce. Petrovic et al. [36] speak of a paradigm shift in e-commerce from security to trust identifying trust as the "ultimate and decisive" indicator for the consumer's willingness to engage in e-commerce transactions. Although electronic commerce is no longer a new phenomenon, our understanding of the factors and means that influence consumer trust in e-commerce effecting transactions between online companies and consumers is still limited [19], [33]. Therefore, the article presents a definition of consumer trust in e-commerce according to the trust framework model introduced in part 3. Providing a definition of consumer trust in e-commerce exemplifies the use of the trust framework model and creates a better understanding for consumer trust in e-commerce.

As proposed in section 3., specifying the four components of the trust model will generate a clearer understanding of the domain addressed by researchers. By addressing consumer trust in e-commerce, two components of the framework are already specified. The consumer assumes the role of the trustor and the e-commerce setting institutes the trust environment.

Thereby, e-commerce presents the legal, social, and technical surrounding in which the consumer operates. As e-commerce constitutes the environmental setting, the assumptions are made that the surrounding is not the trust object of e-commerce trust and that the consumer is general willing to operate in the e-commerce environment. These assumptions do not however decline the potential influences of the e-commerce surrounding on the consumer trust decision. The meaning of consumer trust in e-commerce to be exemplified by the framework model centers on a typical buying transaction between a consumer and an e-vendor in e-commerce. So the e-vendor assumes the role of the trustee and the buying transaction represents the trust object. By specifying the buying transaction as the trust object, a broad understanding for the domain of consumer trust in e-commerce is presented. For example, the buying transaction incorporates the initial trust placed upon the web site and the trust placed upon the displayed information. Consequently, consumer trust in e-commerce can be defined according to the trust framework model as follows.

Consumer trust is trust placed by a consumer in an e-vendor concerning a buying transaction in the e-commerce environment.

Assuming the presented definition, the trust transaction describes the trust formation process of a consumer over a single interaction with an e-vendor. The initial trust level is based upon previous experiences and represents the consumer's attitudes towards the situation at hand before even interacting with the e-vendor. After entering the web site of the e-vendor, the consumer perceives the information provided by the e-vendor. The consumer has to believe for example that the privacy and security of personal and financial data is warranted by the e-vendor [9] and that the e-vendor has both the ability and the motivation to deliver reliably goods and services of the quality expected by the consumer [17]. The consumer thus assesses the perceived information and interprets the trustworthiness of the e-vendor. As a characteristic of the e-commerce environment, the consumer has to depend exclusively on the information provided on the web site generally without any personal interaction with the e-vendor. This assessment may lead to a trusting behavior that is the consumer purchasing a product online. The trustworthy e-vendor has then to fulfill the liabilities regarding the purchased product. Over the course of the fulfillment process, the consumer interprets the actual behavior of the e-vendor in comparison to the expected behavior resulting in endorsement or diminution of the trust level. Thus, the resulting trust level affects the attitudes and expectations of the consumer for future interactions.

The development of the trust level over time is illustrated by the trust equation. The elementary statement of the trust equation is that consumer trust in a situational

context at a point in time t+1 is based upon the previous trust level at t. The trust equation thus serves two purposes. Firstly, the trust equation formulates the transformation from initial trust to resulting trust. Secondly, the trust equation explicitly relates the elements of the trust framework model to the dynamic aspect of the trust transaction.

5. Conclusion

Trust has been widely studied by researchers in numerous disciplines, viewing trust from unique disciplinary perspectives and creating various definitions of trust. Although no general accepted agreement on the definition exists across and within various disciplines, the importance of trust is widely recognized by scholars. Acknowledging a fundamental agreement on the meaning of trust, a framework model for situational contexts was proposed in section 3. The trust situation in the framework model relates the trustor, the trustee, the trust object, and the trust environment. By specifying the four elements of the trust framework model, a comprehensible meaning for the trust situation at hand can be conceptualized. The trust situation displayed by the framework model of trust is embedded into a preceding and a subsequent phase representing an ideal sequential flow from initial trust to resulting trust. To introduce the dynamic aspect of trust and trust formation, the trust framework model incorporates the trust equation based upon the previous situational experiences of the trustor. Part 4. applied the trust framework model to the domain of consumer trust in e-commerce resulting in a clear definition for the domain addressed. Thereby, the comprehensibility and comparability for consumer trust in e-commerce is improved.

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