Consumer Trust Model in Online Transaction

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ABSTRACT

The problem of online trading is lack of trust. Usually it results into difficulty in online transaction between buyer and seller. Trust is defined as willingness of a person to be vulnerable in a circumstance that he/she cannot control with the positive expectation that the trustee will not take undue advantage of the trustor. This definition was used to model trust for the online transaction environment bearing in mind the contribution of institutional-based trust, trustor- trustee experiences and other factors like ease of use of websites and detailed description of products and service provided by the e-merchant.

Online trust was quantified mathematically by combining both conception and operational construct into one equation. A numerical analysis algorithm called Gauss-Sidel was used to evaluate the online trust value at every attempt at using online transaction. This helps online consumers to make decisions as to whether to transact online or not.

The result of this research work was able to provide a platform for quantifying trust in an online transaction.

General Terms

Trustee, Trustor, Institutional-based .e-vendor/e-merchant, Consumer.

Keywords

Trust, reputation, intended, expected and actual behaviours

1. INTRODUCTION

Commercial activities are as old as man and started peacefully with trade by barter before the introduction of money. Since the introduction of money, commercial activities has taken a higher and wider dimension with different payment methods applied in the brick and mortar environment (offline).

The introduction of the click and mortar environment (online transaction) into commercial activities has further complicated the commercial environment. Online transaction involves higher levels of uncertainty than transaction in a retail store because the transaction happens in a virtual environment and there is no physical assessment before the transaction. Consumers have to make decisions based on what they experience through the interface and what the e-merchant claims about the product and reviews from other consumers' feedbacks. Research demonstrates that trust is a valuable facilitator of many forms of exchange (i.e., Ball et al. 2004; Griffith et al. 2000; Sorrentino et al. 1995; Urban et al. 2000). Particularly, in uncertain environments, trust can reduce uncertainty and risk. Trust as trust becomes critical to the success of online transactions because of the lack of personal contact and social cues (Gefen 2003; Hoffman et al. 1999; Ratnasingham 1998). the definition of trust from . (Mayer et al. 1995; McKnight 2002), define trust in an e-commerce context as "a consumer's willingness to depend on another party and be vulnerable to the actions of the other party during the online transaction process, with the expectation that the other party will perform acceptable practices and will be able to deliver the promised products and services." As a complex high-level construct, trust has been viewed by some researchers as behavioral intentions, beliefs, or a combination of both. To clarify the construct, McKnight and Chervany (2002) provided, and justified, and later McKnight et al. (2002) validated the measures of a tight-fisted interdisciplinary kinds and related trust constructs to e-commerce consumer actions, defining both conceptual-level and operational-level as trust constructs. Trust is decomposed

into a second-order construct, with first-order construct trusting as beliefs. Trusting beliefs, also known as trustworthiness (Doney et al. 1998; Gefen 2002; Jarvenpaa et al. 1999; Mayer et al. 1995), means that one believes that the other party has one or more characteristics(i.e dimensions) beneficial to oneself: integrity (trustee honesty and promise keeping), benevolence (trustee caring and motivation to act in the trustor's interests), ability (capability of the trustee to do what the trustor needs), and predictability (trustor believes trustee's actions are consistent and predictable). Gefen (2002) demonstrated the need to examine trust from a multi-dimensional perspective. This paper believes in dealing with integrity and benevolence in the setting of online transaction, and shows the importance of examining the effects of each dimension individually because different beliefs influence different consumer activity intentions.

The online consumer gives time, cognition and effort to the experience of interacting with the Web Site, and gets an experience enabled by the Web Site that hopefully makes it easy to find needed/wanted products, to checkout quickly and to receive confirmation about all important aspects of the purchase, such as order-confirmation and delivery-tracking. In this regard, the product quality, service quality, and Web Site quality are also intertwined with each other.

2. THE PROPOSED ONLINE TRUST MODEL

An important item for building consumers' trust in online transaction in a trust environment like the internet is the development of an online trust model which will help in turning the attention of offline consumers and internet browsers to online purchasers. Consumer's online trust can be defined as the trust placed by a consumer in an e-vendor/merchant concerning a buying transaction or informational transaction (services) in an electronic commerce (e-commerce) environment, which is risky and uncertain. In this work the expected outcome of the trustor (consumer) can be affected either positively or negatively by two items which are the trustee (e-vendor/merchant) and the trust environment. The uncertainty from the trustee is regarded as endogenous uncertainty while those from the trust environment will be regarded as exogenous uncertainty. Reducing these uncertainties will help a long way in boosting dispositional trust in online transaction which will in turn help in general trust in online transaction. Other contextual factors like website design, perceived ease of use of the website and perceived usefulness will further help draw the attention of more people to try online shopping. This is shown in figure 1

The individual disposition to trust forms the basis of consumer's initial trust in any transaction and starts from the psychological tendency of people to want to depend on others for things (product and services) they cannot produce by themselves. This trusting intention can only be amplified by institution-based trust and trusting beliefs. The e-vendor must ensure that the trust environment (internet) is safe to transact business and that the privacy of the consumer will not be compromised in any way. These ideas must be communicated to the consumer in all fronts to reduce the uncertainties that could arise from the medium of online transaction. This will in no doubt go a long way in increasing the consumer dispositional trust.

The second most important concern is the trustworthiness of the e-vendor the online consumer must also be assured that he/she will not be taken advantage of as a result of his/her inability to control the e-merchant once payment is made. The e-vendor competence, honesty and benevolence in delivering product and service at a reasonable cost are the solution for building online trust in consumer. The experience an online vendor has plays a significant role in the reputation accrued to him/her by the consumer. An experience that results in consumer's satisfaction will increase the positive reputation of the e-merchant and hence will cause a revisit to the online website while a negative or not too positive experience will dampen the moral of an internet browser or an online consumer.

The third important thing that could affect positively or negatively the use of the internet for online transactions are grouped as contextual factors. These are the attractiveness of the website, since this represents the salesperson as well as the front shop of the e-merchant, the perceived ease of use of the fulfilling order, perceived usefulness of the website, the cost of transaction and the complexity of the service or product. These three factors are important to building online trust in business and commerce. The overall effect is that consumer will switch over to online as long as this infrastructure is in place and e-merchant acts in good faith to the request of the consumer.

Figure1.: shows the trust transaction between the trustor and trustee, in which the trustee communicates trustworthiness around the object placed on the internet and expects an action to be provoked in the trustor. To transact online business at every transaction the trustor will compare the actual behaviour to expected behaviour which results in trust, if actual behaviour is positive to prove the trustworthiness of the trustee based on the perceived degree of satisfaction experienced over time by the trustor.

3. METHODOLOGY

3.1 Evaluating online trust

Quantifying trust helps to express in numerical terms or value the trustor's (consumer's) trust on the trustee (e-merchant). When trust is quantifiable trustors (consumers) can make decisions whether to trust or not to trust a particular e-vendor's specific situation. Trust equation also illustrates the dynamic nature of trust in an open environment like the internet. It is important to note that trust is every transaction specific and depend largely on experience gained over time. The general trust equation can be expressed mathematically as

$V_{t+1} = f(V_t) = f(s, e, t)$ (3.1.1)

The trust model was developed by a functional relationship of the trustor's (consumer's) trust and the trustee (e-merchant) such that:

The trust **V** of a trustor was formed by the trust decision process f according to the given situation **s** and the experience **e** obtained over transaction at time **t** where V is the Trust of a trustor

$t = \{0,1,2,3,4,5\ldots..n)$

V_t is the initial trust value at time t = 0,

V_{t+1} is the new trust

Equation (2) expresses the new trust of a trustor as a trust of consumer being determined by trust function f *operating on T,O,E*

$V_{t+1} = f(s,e,t) = f(T_{s,e,t}, O_{s,e,t}, E_{s,e,,t})$ (3.1.2)

Where T is the trustee, O is the trust object (online transaction) and E is the trust environment (internet)

The trust function f *was then broken down* into the three trust factor d,i,p stated thus:

$f(s,e,t) = d(s,e,t) + i(s,e,t) + p(s,e,t)$ (3.1.3)

Where d is the disposition to trust, i is the institution based trust and p is the interpersonal trust (trust between trustor and the trustee)Substituting equation (3) to (4) gives:

$V_{t+1} = d(Ts,e,t , Os,e,t, Es,e,t) + i(Ts,e,t, Os,e,t, Es,e,t) + p(Ts,e,t, Os,e.t, Es,e,t)$ (3.1.4)

This shows how trust is gradually built; Interpersonal trust was also expressed in terms of perceived degree of consumer satisfaction D_k as seen by the trustor for every *k* transaction with a particular trustee. Interpersonal Trust was obtained mathematically as:

$$p = \frac{\sum_{k=1}^{n} D_k}{n} \qquad D \in (0, 1) \qquad (3.1.5)$$

The above equation (3.1.5) is used to measure trust of the trustor at every transaction, based on perceived degree of satisfaction at the end each of transaction. This interpersonal trust equation is used to quantify trust.

At the end of every successful transaction a question is posed online to the trustor to rate the current transaction based on his/her experience, where he/she needs to select from any of the options D={disagree, strongly disagree, undecided, agree, strongly agree} using these values at every selection {0.2, 0.4, 0.6, 0.8, 1.0} for all trustors, where the initial trust is constant value 0.1.

The evaluation set V = *{no trust,* distrust but not certain, trust but not certain, trust*}* correspond to the intervals U= *{*(0<x≤0.25), (0.25<x≤0.5), (0.5<x≤0.75), (0.75<x≤ 1.)*}*, respectively.If the evaluation of the trustor falls between the intervals in U where x∈U and trust is defined by set V.

Numerical method for quantifying online trust

The general equation for online trust presented in equation (3.1.5) helps decompose trust into a two-level (second-order) construct namely conceptual-level and operational-level trust constructs. It also shows that at the conceptual-level (initial) trust is affected by three factors: individual disposition to trust, institution-based trust, and cognitive-based trust. At the operational-level, trust is affected by previous online experience in addition to the initial trust developed. Since experience is obtained over time through, repeated online transaction. This equation can be solved iteratively using the numerical method (Gauss-Sidel,). The Gauss Sidel iterative numerical algorithm is employed in the computation of the different trust level for each situation, experience and time. The result shows the trust values at time t =0 and the trust value for any other attempt made to transaction online.

3.2 Gauss-sidel algorithm for calculating online trust

Step 1: Start

step 2: Read dispositional trust value V_t at t=0

Step 3: Represent the general trust equation appropriately with computer arithmetic operator

Step 4a: Loop over till value of t equals desired trust level value

Step 4b: During loop replace new trust values as previous value to compute new value

Step 5: If $V_{t+1} + V_t$ 0<0.75 then trust decreases (Negative trust)

Step 6: If $V_{t+1} + V_t \geq 0.75$ then trust increases (Positive trust)

Step 7: If $V_{t+1} = V_t$ then trust remains constant it means no transaction yet

:end

4. RESULT

Since Interpersonal trust was also expressed in terms of perceived degree of consumer satisfaction D_k, transaction with a particular trustee. Below are the outputs of transaction carried out, using equation this $p = \frac{\sum_{k=1}^{n} D_k}{n}$ D ∈ (0, 1) to quantify the trust which consumer have in online transaction, and various rating derives from the model increases or decreases depending on the level trustworthiness of the e-merchant/vendor which consumer experience over time . figure 3 to 6 show some of the output derives from the result

Fig3: Distrust but not certain

As the rating increases the trust also increases, where as trust decreases as the rating decreases. This leads to the rating of the e-vendor demonstrating distrust and is not certain of what to do by the consumer.

Fig 4: Trust but not certain

With rating of 0.62 it shows the level of trust of consumer that is not certain about the online transaction.

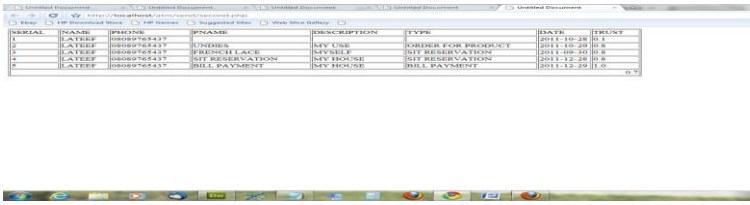

Fig5: Trust but not certain,The rating here shows some trust but is also mixed with uncertainty.

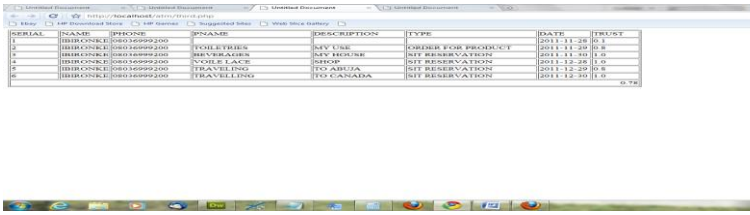

Fig6: Trust

The above rating of 0.78 shows full trust of the online vendor which was not the case in the eailer shows ratings.

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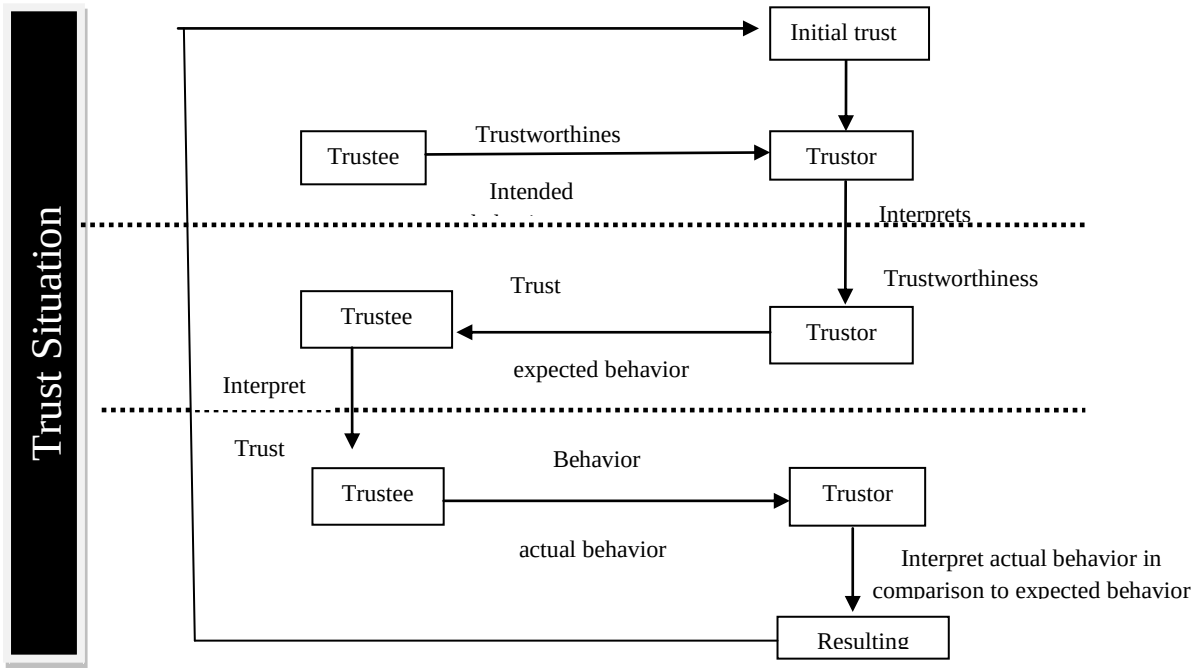

Figure1. Trust transaction

5. CONCLUSION

All the fears of the consumers stated above have been taken care of by the online trust model developed in the methodology. The proposed online model, demonstrated that by reducing the perceived risk of the consumer on the online environment/infrastructures (internet) and perceived risk of the consumer in the online vendor to honor transaction to the last detail will go a long way in increasing consumers' interest in online transaction. The proposed model was also used in designing the website. The other contextual factor in the proposed online model advocated for an online transaction form filling that is as simple as possible without losing the important details. The perceived usefulness and ease of use of online transaction form will further enhance consumers' interest in the use of online transaction. The three security (confidentiality, integrity and availability) attribute needed for safe online transact has been ensured by the institutional-based trust. There is no doubt that the best of products and services in any area of human Endeavour can best be found by surfing the net.

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