The Measurement and Validation of Trust in E-Commerce Relationships

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Abstract— E-commerce -the purchase of goods and services over the internet's world wide web is a broad term. It covers all electronically conducted business activities, operations and transaction processing. Therefore, trust becomes the foremost concern in e-commerce relationships. E-commerce has been a boon to it industry . Business and consumers must be prevented from the fraud and misuse of this technology. How can a customer know that the site is trustworthy or not? To ease this approach the paper tells to judge the e-commerce site to be trustworthy or not. Observations has shown that most of trust attributes are placed in "homepage", "contact us" and "privacy policy" pages. This paper searches and identifies five such trust attributes. Furthermore, validation of these e-commerce trust attributes can be done. Authenticity of trust attributes should must be done.

Keywords— e-commerce, trust , validation, security, authenticity, cyber crime.

I. INTRODUCTION

E-commerce is important in such interrelated areas as business-to-business, customer-to-business,and intra-business, all relying on each other for supplies, distribution, services, and technology. E-commerce links companies, customers, suppliers, employees, and distributors. E-commerce changes the way business is done. An e-commerce transaction is unlike traditional commerce whereby consumers could not touch the target products, feel the shopping environment, contact salespersons for face-to face enquiries, and take immediate possession upon purchasing[1]. To achieve the customer's trust is a vital task for the seller in order to secure an e-commerce transaction. As a result many people have foccussed upon trust issues in e-commerce including researchers. Some of them have conducted studies on factors that influence consumer trust of e-commerce websites. These factors are defined by the researchers with various definitions like trust influencers[2], antecedents of trust[3] and trust attributes [4] and each of them would have their own point of view. Hui Cao et al [5] targetted at trust management issue in P2P environment, particularly facing e-commerce applications conducts an in-depth analysis and proposes a new trust mechanism based on iterest vector. Bin mu et al [6] aims to get initial trust value of direct trust and recommender trust, by calculating correlation coefficient. Wenbao et al [7] said evaluation of trustworthiness of participating entities is an important method to stimulate collaboration in open networks. E-commerce requires mutual trust among a vendor, a customer, and all transaction intermediaries [8]. A website that has a high trust level should contain meaningful keywords related to the e-commerce domain such as return policy, payment option, and security [9]. A number of trust factors were identified, such as assurances, references, certifications from third parties, and gurantees of privacy and security [10]. In this paper we are focussing on the measurement of trust in an e-commerce site through trust attributes and their management. According to the online questionnaires administered by Che-Hussin et al. [11], there are five trust attributes that sholuld be placed on the first page of e-commerce website to gain the trust of consumers. Table 1 shows the five trust attributes.

Table 1: Top Five trust attributes adopted from Che-Hussin et al. [11]

Rank	Trust attributes
1.	Company Telephone Number(CTN)
2.	Company Address(CA)
3.	Company E-mail Address (CEA)
4.	Privacy Policy(PP)
5.	Third Party for secure transaction(e.g Verisign) (TPST)

Company Telephone Number-   Based on the attributes of above table, company telephone number is the most important attribute that will encourage the trust of customers towards an e-commerce website. The buyer can call the customer care executives for all the enquiries from the confirmation of the order to the delivery of the order, and return of the product if needed. Since there is no face to face interaction between the buyer and the seller, buyer may doubt for the realness. Contacting the customer is a must but e-mails are not enough. A customer, who doesn't check e-mails frequently, waiting the product to be delivered yesterday but have a notification in the inbox saying "there is a problem

with the order", is not a good experience. Also, a 2009 comScore study found that 22 percent of shopping cart abandonments were due to unreachable customer service, where purchasers wanted to ask questions about checking out but couldn't. Putting a toll-free contact number on the website, may improve the conversions dramatically.

Company Address- An entity such as a company which sells, buys and indulges in any kind of transaction with users is required to have a physical address. For instance, a company sells goods, it may not have a physical address or a sales outlet , but it still needs to keep the inventory. The suppliers also need to pick and drop the goods. Thus a company should must have an address. Furthermore the company address should not be fake. A company should must provide the address in its "homepage", "contact us" and "privacy policy" pages clearly.

Company E-mail address- E-mail is an important aspect of e-commerce. E-mail is a key channel of communication between companies and customers. In addition, all the transactions are being recorded in the e-mail address. When a customer orders for products, from the confirmation of the order to the financial transaction, everything is being e-mailed to the customer. This is the most common way of interaction between the seller and the buyer. In case, customer finds any difficulty during the transaction, he can simply look up for e-mail address of the company and make inquiries. On the other end, e-commerce sites have a dedicated set of employees to respond to customer needs.

Privacy policy- "Our commitment to your privacy". E-commerce is committed to protect your privacy. That is why Privacy Policy is adopted. A privacy policy is one of the most important documents on any website. It features company's views and procedures and the information to be collected from visitors. Privacy policy is technically a legal document. Privacy policy should tell about the organization. Visitors possess a right to know what information is being collected. It may be obvious that collecting personal details by asking them to complete a form. It should be made clear to the user. Company should store up their personal information in a safe and secure environment. It is important to be as transparent as possible. Users should be allowed to make queries any time. Privacy Policy should feature both Company Email Address (CEA) as well as Company Address (CA) where a user can correspond with. For example, many affiliate websites indulged in sales, will need to share certain information with their shippers or suppliers, privacy policy should clearly state it. Many people are concerned with identity theft today, it should be made sure if any of their financial information or other identifying information will be stored and how it will be stored. If privacy policy states that any information will not be shared with any person for any reason, it could be an opening the door for some real trouble. It never pays to lie for any reason and lying on privacy policy is just as offensive. Not holding true to one's privacy policy could leave open for lawsuits or even criminal action. Privacy policy should be honest to boost customer trust.

Third Party Secure Transaction(TPST) – Consumers are worried about privacy and protection of personal information such as credit card numbers, social security numbers, and prior buying history. Assurance services assures for the verification of transactions of e-commerce. Standards have been established by the American Institute of CPAs . These services guarantees the reliability and accuracy of transactions. It resolves if the data is secure and protected from any misuse. The web-trust evaluates the security, privacy, and sound business practices of Web sites, providing independent third party verification. E-commerce websites exhibits the digitally identified seal on their sites. The web Trust seal promises consumers that they are "safe" online. The seal is rescindable if the business at any time acts against the Web Trust criteria. Verisign promotes secure sotware distribution over the internet.
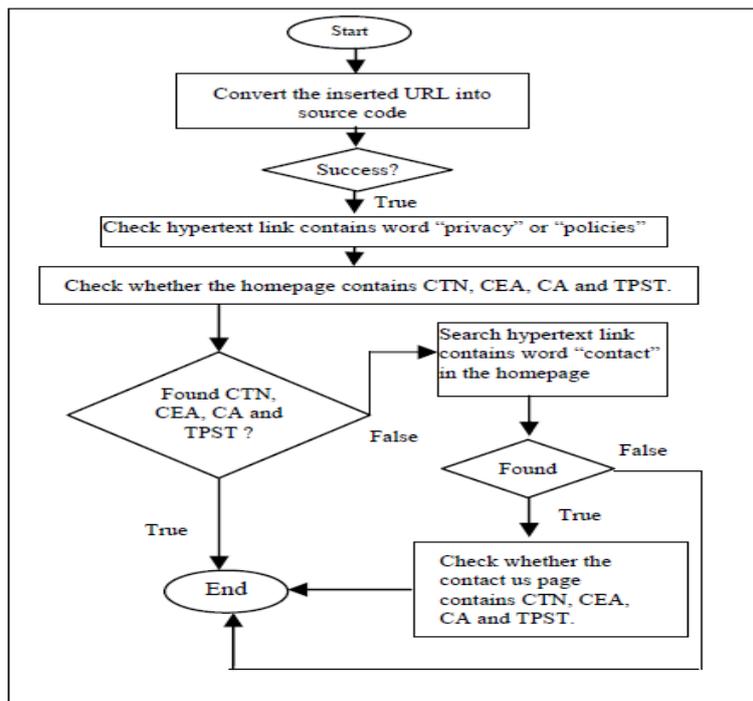

Figure 1- Traditional search algorithm

Traditional approach - Muhammad Rushdi Rusli et al[2] surveyed 40 sites of United Kingdom(UK), United States(US) and Malaysia. It was observed that most of the trusted attributes were located on "home page" and "contact us" pages. The flow of the steps in traditional algorithm to search the five trusted attributes has been shown above in figure 1.

II. Proposed approach

We discussed varioius trust attributes that encourages consumer's trust towards e-commerce websites in order to establish the transaction. These attributes must be present on "homepage" , "contact us" and "privacy policy" pages. An algorithm has been given in order to search these five attributes. The following aglorithm converts the url into a source code. After success ,first of all, it searches for the word "privacy" or "policies". Once it discovers these two words ,it traces ctn, cea, ca, tpst. Further it confirms its validity. If it is valid, then it adds the site to the list of trusted e-commerce websites list. If it is found to be invalid, it reports to the cyber crie investigation cell. The algorithm repeats the same prcedure for "contact us" page. Either this algorithm leads to adding the site to the list of trusted e-commerce sites or report to the cyber crime investigation cell.

Proposed search algorithm-
1.Convert the inserted url into source code.
2.If success
  2.1 True
  Check hypertext link contains word "privacy" or "policies"
  2.2 False
  go to step 1
 3.Check whether the homepage contains ctn,cea,ca and tpst
 4.Found ctn,cea,ca and tpst?
  4.1 If true
  Check validity of found element
    4.1.1 Valid?
    4.1.1.1 If true
    Add to trusted e-commerce websites list.
    Go to end
    4.1.1.1If false
    Report to cyber crime investigation cell
    Go to end
 4.2 False
 Search hypertext link contains word "contact" in the homepage.
    4.2.1 Found?
      4.2.1.1 If true
      Check whether the contact us page contains ctn,cea,ca,tpst.
      Go to step 4
      4.2.1.2 If false
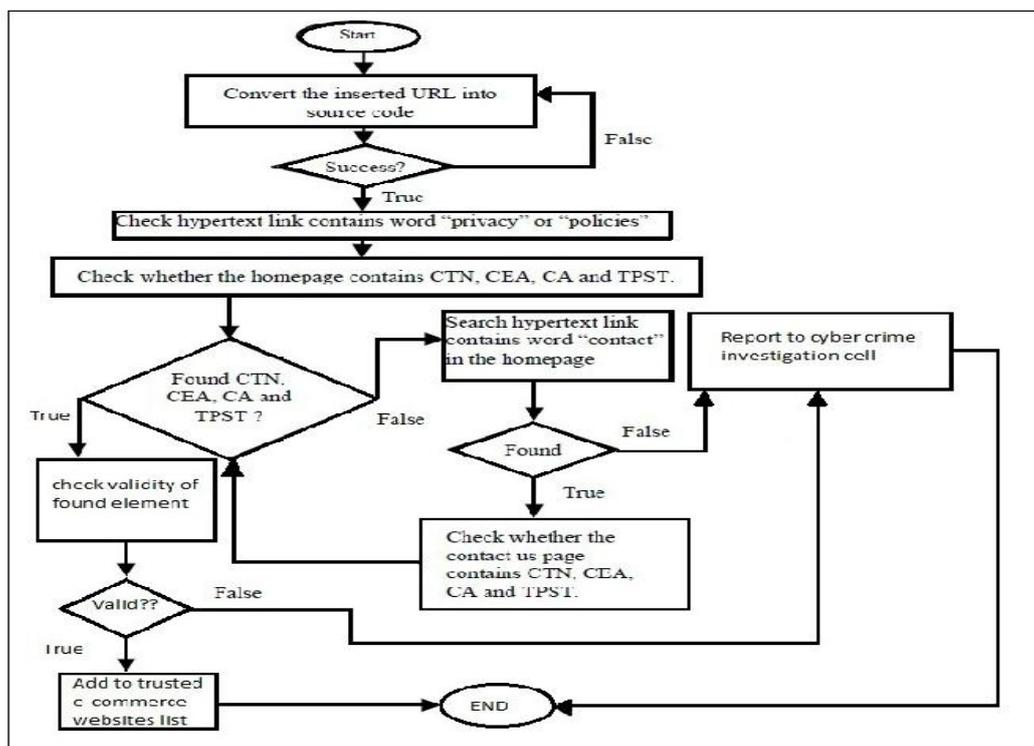   Report to cyber crime investigation cell
      Go to end

Figure 2- flowchart for searching trust attributes.

The above algorithm coins another term **cyber crime investigation cell.** Cyber crime investigation cell deasl with cyber crimes such as hacking, cyber stalking, denial of service attack, virus dissemination, software piracy, credit card fraud, net extortion, phishing, etc. Any fake information on internet is a cyber crime. That means, if the company is providing any fake information , it can be sued. All we need is just to report the nearest cyber crime investigation cell branch.

Validity algorithm - the highlight of this paper is the validity algorithm. This algorithm checks if the tust attributes found by the search algorithm are valid or not. First of all, it searches for company telephone number and its address. It matches the area code of given telephone number and given company address. Then it checks for its authencity. It further proceeds to check if the company e-mail address is authentic or not. If e-mail address is valid ten it hunts for the tpst e.g verisign. If all these trust attributes are found to be valid, only then the e-commerce site is added to the list of trusted e-commerce sites otherwise a report to cyber crime branch is generated. Below is the algorithm.

Algorithm 2
1. Find ctn & ca
2. If ctn & ca found?
    2.1 if ctn &ca found?
    2.1.1 if false?
    Report to crime branch
    Go to step 9.
        2.1.2 if true?
        Go to step 3
3. Match area code of ctn &ca.
4. Success?
    4.1 if false
    Report to crime branch
    Go to step 9.
    4.2 if true?
    Check for authenticity
        4.2.1 If false?
        Report to crime branch
        Go to step 9.
        4.2.2 If true?
        Goto step 5
5. Find cea
6. Authentic?
    6.1 If false?
    Report to crime branch
    Go to step 9.
    6.2 If true?
    Go to step 7
7. Find tpst
8. Success?
    8.1 If false
    Report to crime branch
    Go to step 9.
    8.2 If true
    Add to list of trusted websites
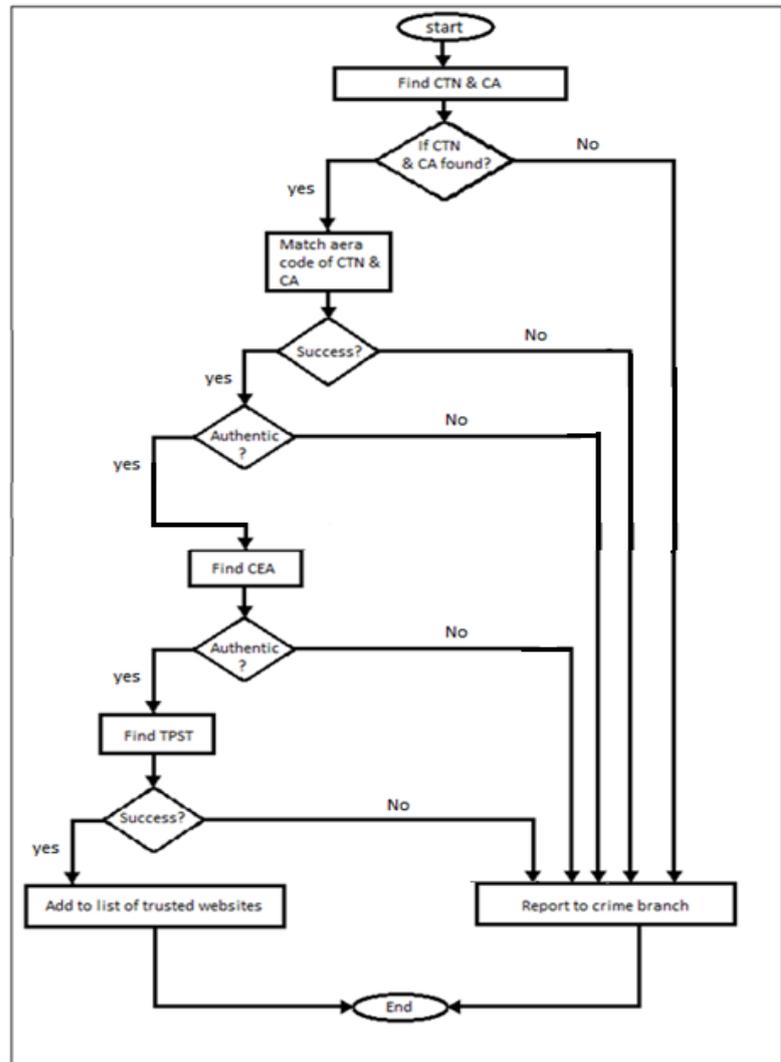   Go to step 9.
9. End

Figure 2: valdity flowchart.

III.Conclusion

Trust is an important attribute of human nature. All the interactions are based on trust. Trust must be present between a seller and buyer, without it no interaction and transaction is possible. Buyer relies on seller for the purchase of goods. Traditional marketing has been changed by e-commerce nowadays. An e-commerce site should must be reliable. Studies show some important trust attributes to be measured to ensure the trustworthiness of e-commerce websites. Thus five most important trust attributes have been identified. Traditional approach and proposed approach has been given in the paper. Furthermore,this paper presents a validity algorithm that checks for the authenticity of the trust attributes. Table 2 shows the comparision of the existing algorithm and proposed algorithm.

Table 2- comparision of existing and proposed algorithm.

Existing algorithm	Proposed algorithm
1)If url is not converted to source code the program gets stalled and doesn't try for the conversion again.	1)It tries again if url is not converted to source code.
2)It looks for various trust metrics but does not check authenticity of any of them.	2)Authenticity check is included.
3)It does not check if the details are valid.	3)It has a separate validity module in itself.
4)It does not take action for untrusted websites	4)It reports suspicious websites to cyber-crime investigation cell.
5)It finds a trust matrix or it doesn't, in both these cases it doesn't take any actions and just ends.	5)It takes proper actions in both cases.
6)It is simple but does not serve the entire purpose.	6)It is a little complex and takes in consideration the maximum cases.
7)It does not define any module separately.	7)It defines the validity module separately.

References
[1]   L-T. Huang, K-L. Yin and C.-K Farn, "The Influence of Consumers' consciousness of institutional factors on initial trust building", Proceedings of the 5th WSEAS International Conference on Telecommunications and Informatics, Instambul, Turkey(2006)
[2]   K.Jones, L.N.K Leonard, C.K Riemenschneider,Trust Influences on the Web,Journal of Organisational Computing and Electronic Commerce 19(2009)
[3]   H.Gill, K.Boies,J.E.Fingegan and J.McNally, Antecedents of Trust: Establishing a Boundary Condition for the Relation between Prosperity to Trust and Intention to Trust, Journal of Business and Psychology,19(2005)
[4]   A.R.Che-Hussin, L.Macaulay and K. Keeling, The Importance Ranking of Trust Attributes in Ecommerce Website,11th Pacific-Asia Conference on Information Systems(2007)
[5]   Hui Cao, Zheng Qin, A trust Evaluation Model for P2P E-Commerce Systems,International Conference Intelligence and Security(2008)
[6]   Bin Mu, Shijin Yuan , A method for Evaluating Initial Trust Value of Direct Trust and Recommender Trust, International Conference On Computer Design And Application (2010).
[7]   Wenbao Jiang , Shaoxu Guo, Wenliang Chen, A Trust Evaluation Moodel And Algorithm Based On Network Behaviour Detection, Proceedings of IC-BNMT (2010).
[8]   Daniel W. Manchala, E-Commerce Trust Metrics and Models, IEEE internet computing march.april (2000).
[9]   Banatus Soiraya, Anirach Mingkhwan, Choochart Haruechaiyasak, E-Commerce Web Site Trust Assessment Based on Text Analysis, International Journal of Business and Information.
[10]   Yinan Yang, Lawrie Brown, Ed Lewis, and Jan Newmarch, W3 Trust-Profiling Framework(W3TF) to Assess Trust and Transitivity of Trust of Web-Based Services in a Heterogenous Web Environment, Springer-verlag Berlin Heidelberg (2006).
[11]   A.R. Che-Hussin, L. Macaulay and K.Keeling, The Importance Ranking of Trust Attributes in E-Commerce Website , 11th Pacific-Asia Conference on Information Systems(2007).
[12]   Muhammad Rushdi Rusli, Ab. Razaak Che-Hussin, Halina Mohamed Dalhan, Assessing Trust in E-Commerce Website based on Ranking of Trust Attributes, WSEAS Transactions on Business and Economics,April 2010.