Building a Trust Model for Generating and Validating Assurance Keys between Consumers in E-Commerce

Sharfi M. Abbass
Computer science and information system, Universiti Teknologi Malaysia, Johor, Malaysia & Majmaah University, Majmaah, KSA

Othman Bin Ibrahim
Computer science and information system, Universiti Teknologi Malaysia, Johor, Malaysia

M. S. Farag
Computer science, Azhar University, Cairo, Egypt & Universiti Teknologi Malaysia, Johor, Malaysia

ABSTRACT

This study investigates trust building among members of virtual communities (VC) as an effective way in E-Commerce from the consumer-to-consumer (C2C) perspective. So it reviews studies in E-Commerce, which focus on trust building in the other party. It also reviews websites operating in the same area, the most common of which is eBay; it relies on trust in the other party in the payment method of PayPal, which accepts credit cards. However, this method has a number of limitations, including that fact that online registration does not verify if the user is the owner of the card; thus, it renders the consumer entirely untrustworthy. As a result, this paper attempts to provide a more trusted method that ensures to identity the other party by building a database of trusted third parties (TTP), based a new algorithm for generating and validating assurance keys (AK's) to all consumers in the world. The AK is saved as the name of the image of the consumer in the database image-DB file of the TTP, and using the AK in the verification of the consumer when making a sale or purchase.

General Terms

Computer Science, Trust in E-Commerce, Security.

Keywords

Assurance keys (AK's), consumer to consumer (C2C) , E-Commerce , trusted third party (TTP), building trust.

1. INTRODUCTION

Despite the growing importance of E-Commerce, still there are a number of major barriers to increase the trust in E-Commerce, as a number of consumers have a lack of intent to purchase, so there is a need to strengthen consumers' intentions to buy online. All electronic transactions in E-Commerce need to trust the other party, so there are many studies [1-4], that investigated the importance of trust, drawing on the general assumption that trust is a precondition for successful business because consumers are reluctant to purchase unless there is trust in the seller [5-8]. Maybe consumers' trust is more important in E-Commerce than traditional commerce, because the properties of electronic transactions takes place throughout the day and seven days a week, and the payment before delivery may be recognized in most transactions, this causes concern for the consumers of the delivery and matches the required specifications in the item being sold [7]. In contrast to traditional transactions in which trust depends on personal relationships and being face-to-face [9], this makes the latter method of payment more successful. So providing the same structure across the Internet will be the key to success. Studies have shown that exchange relations based on trust are the key to capital [10].

Most of these studies have focused on one side, the relationship between business to consumer (B2C), despite this there is great interest in relations such as C2C, business to business (B2B), and the traditional trade-based shop known as the commercial and site specific which deals with consumer durables and non-permanents. So the transfer of the idea is of traditional commerce to E-Commerce such as B2C, but B2B are mostly large companies with branches and agents and limited in number compared with the number of individual consumers.

The E-Commerce between consumers C2C is more successful than the B2C and B2B commerce and grows rapidly [11] for several reasons, namely:

i. Provides online transaction platform for buyers, sellers and individuals so they can sell their auction on the Internet.

ii. Ease of interaction between users.

iii. You do not have the constraints of time and place.

In this paper we proposed a model to increase the trust in E-Commerce depending on proposing a new algorithm for generating AK's to all consumers in the world and so these AK's will be used in the online verification stage when making a sale or purchase. We will save the image of the consumer by its AK in the database image-DB file of the TTP.

The paper is organized as follows: Section 2 introduces the literature review (previous studies); section 3 presents the proposed model and the hypotheses rules; section 4 presents our methodology; section 5 introduces suggestions for future research and section 6 gives conclusions.

2. LITERATURE REVIEW

The literature review falls into two main parts: part one focuses on models, in this part we will discuss the models of the trust that touched upon the relationship of consumers with each other, and then review the features and limitations of each of them. Part two focuses on websites, in this part we will discuss the websites that work in the field of C2C, and review the features and limitations of each site.

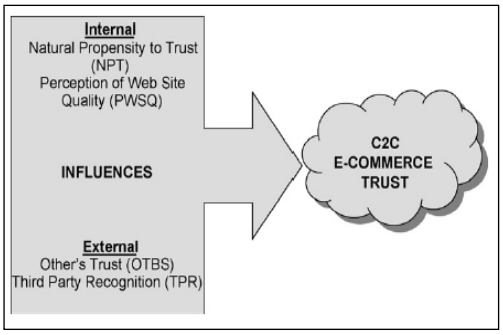
2.1 Part one: Models

2.1.1 Kiku Jones Model [12]

This study assumed that the trust in electronic commerce between C2C relies on three areas, internal factors, external factors and third-party guarantor.

The study concluded that the third party has a major impact on E-Commerce, therefore consumers should focus on quality. Third-party guarantor is in order to improve trust in the hearts of consumers to improve the volume of transactions.

Fig 1: C2C Trust Model (Kiku Jones, 2008).



2.1.1.1 Features

Provided trust by the third party and provided quality leads to encourage consumers in the practice of buying and selling via the Internet.

2.1.1.2 Limitations

i. Sample used the academic subjects of students at a university in USA, but results may vary according to student groups.

ii. Buyers and sellers in the C2C were assessed together in this study as the number of buyers exceeds the number of vendors in this sample. Perhaps different results when we separate categories for each other.

iii. The majority of respondents used the online commerce in general and not C2C ways; this reflects more trust in business dealings on the Internet than C2C.

iv. Guarantees in this study are based on credit cards.

v. Depends on the quality of websites, to provide any protection system, with high efficiency.

2.1.2 Dimitrios Lekkas Model [13]

The concept of trust and the Information Society, Trust can develop through two different ways: First, between the two parties that know each other well, and is based on an extended relationship between them. The second way refers to the general sense of trust that one has in the general social structures of their community.

In the information society the paper identified that the four types of trust are:

i. Calculus-based Trust: The most common, and usually at the beginning of the trust relationship. The best known of this type of trust as a result of precise calculations based on financial criteria [14].

ii. Information-based trust: It is based on gathering as much information as possible in order to predict the behaviour of other entities to reduce the uncertainties and risk reduction potential, and thus the existence of a relationship of trust can be developed.

iii. Transitiveness-based trust: This class is working on building a strong relationship of trust by a third party; it saves property and is trusted by both sides [15].

iv. Trust against the social system: Trust derived from the participation rights in the social system, details of all parties involved, for example:

A typical example of this case is the monetary system and the bank transactions.

2.1.2.1 Dimitrios Lekkas Model Trust Architectures

Is to create a relationship of trust between the parties and to ensure that dealers are using specific techniques, and often by TTP, which works to build trust in which to save the property. The study [13], has defined three categories of architectures, namely:

The simplest cases, of the establishment of a relationship of trust between individual end-users, is forming a web of trust, without involving other intermediate trusted parties, an example of this case is the PGP technology [16]. The second case is the establishment of a trust relationship between an entity and its home TTP, which consequently implies the transition of trust between all the entities of the TTP security domain. The last case is the architecture where multiple TTPs are involved. These TTPs are establishing trust relationships among each other and they are providing the necessary transitivity mechanisms to their users to build their relationships (ibid.).

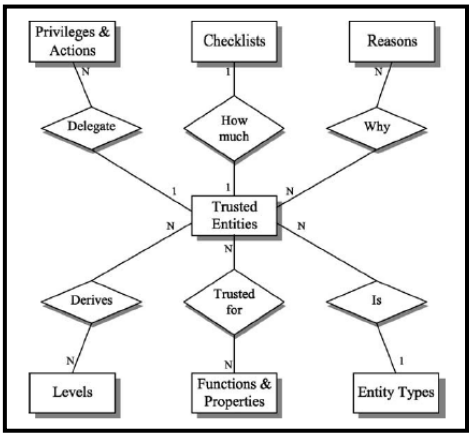


Fig 2: Simplified database entity-relationship diagram trust (Dimitrios. Lekkas, 2003)

2.1.2.2. Features

i. The study concluded that the empowerment of the PK in the electronic market is still in its first steps. To reach the full potential offered by the TTP it must be set up to build trust and encourage trust in electronic transactions to achieve the goal.

ii. The concept of trust in the TTP expresses the trust of the client in the properties of subjective and objective specifics.

iii. The paper proposes the database schema that may be realized on the client side to enable the party to rely completely on trust relationships and to manage it. Factors that negatively affect the trust or positivity are then examined from two perspectives.

The first perspective overviews the properties of the quality of services and the second relates to the rules and procedures set forth in the policy and provides evidence that TTP agree to them.

iv. You must provide evidence that TTP compatibility of the policy is qualified as the most important terms and conditions relating to the management of the key, the accuracy of identity verification, and compliance to the public prosecution, and physical security, and continuity plan and limitations on liability.

It is certain that future work will focus on a unifying framework for the establishment, management and evaluation of trust, because this is a prerequisite for the development of PKI.

2.1.2.3 Limitations

i. Trust that arises between two people may be risky, and they may not have control of the transaction or may not follow and adhere to the policies and practices of the mechanism of TTPs.

ii. To restrict the space of trust is essential in building trust through TTPs certificates. The rules that restrict the sequence of trust can be included in the approved areas for certificates or CPS, which are enacted and the ratification of this framework and controls have several different goals such as:

   a. Restrict the length of the loop and the trust by setting the upper limit of the steps required and this may be regarded as the transition to the TTPs.

   b. Restrict the areas of safety. The TTP may identify other areas, represent the trust needed and thus restrict the relations of trust users to specific security standards and this requires the commitment of all users of these controls.

   c. Restriction on competition policy. Issuing a certificate based on a specific policy and based on data from TTP, which sets the guidelines and conditions for this procedure and that includes identification before issuing the certificate and the means to ensure quality performance and distinguish users who are granted this certificate must be the text on the controls as the trust is not based on any policies inconsistent with these rules.

2.1.3 Dehua HE Model [11]

Despite the increasing importance of E-Commerce, there is a major barrier, a lack of intent to purchase, so there is a need to strengthen consumers' intentions to buy online. This paper assumes that the reasons influencing the purchase intention are five:

i. Ease of use of the site.

ii. To look at the extent of use of the site.

iii. Seller specialized (high-efficiency).

iv. Recommendations of a third party.

v. Position of vendors towards customers.

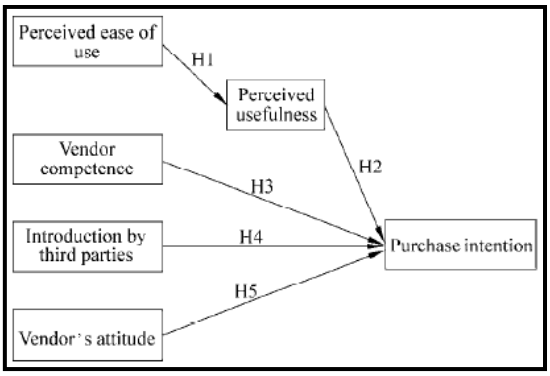


Fig 3: Model for factors influencing consumers' purchase intention in C2C (Dehua HE 2008)

2.1.3.1 Features

Identify the most important obstacles of buying online, to increase the intention to purchase.

2.1.3.2 Limitations

Is a study to determine the factors affecting the intention to purchase, and did not develop a mechanism to address these factors.

2.1.4 eBay Model [17]

eBay is a leading company in this field and created one of the first trusted online commercial communities, whereby the transactional exchange between sellers and buyers is regulated by the evaluations and recommendations of each. [18].

Like most Internet-enabled business systems, eBay depends on scalability, high performance, high availability and security. It needs to be able to handle large volumes of requests generated by the Internet community and must be able to respond to these requests in a timely fashion.[17].

2.1.4.1. Features

eBay is considered a third party. Provides an on-site quality system to establish a system of protection. Build trust in consumers by PayPal.

eBay differs from other websites as follows:

i. Not dedicated to a particular product, but it can sell any product except those prohibited items shown on the site.

ii. Does not have any spatial restrictions, which means trading is not limited to a specific state, unlike other sites.

iii. Method of payment is PayPal, which is more secure than other methods of electronic payment.

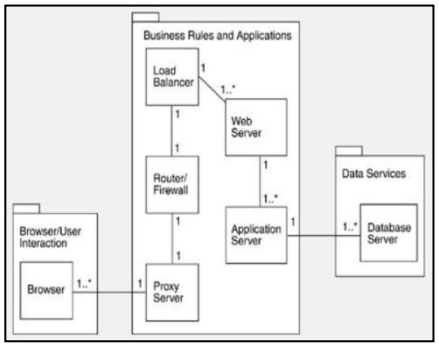


Fig 4: Subsystems in the eBay Architecture

(Mohammad Usman Ahmed)

2.1.4.2 Limitations

Although the eBay model solved most of the weakness points in the previous models, still there are some weaknesses in this model that include:

i. Seller starts recording data online, thus, it is possible to enter incorrect data, such as alias, unknown e-mail, mobile number, which is not registered in the name of a specific corresponding consumer. Thus, the buyer's identity could not be proved.

ii. There is no clear mechanism to reduce the supply of the product or placebo purchase order and to identify the product specifications (the seriousness of purchase).

2.1.5 Credit Cards Model

eBay uses a system for verification from the other party by PayPal, which in turn depends on the registered credit card to verify from the consumer .

Several credit card companies generate their own unique numbers. Almost all credit card companies use the same method for generating card numbers [19].

Table 1: Acceptable Values for Some of the Major Credit Cards. .

Card Type	Prefix	Length
American Express	34, 37	15
MasterCard	51-55	16
VISA	4	13, 16

For example, this is the ABA (American Banker's Association) model to generate card number in Fig. 5

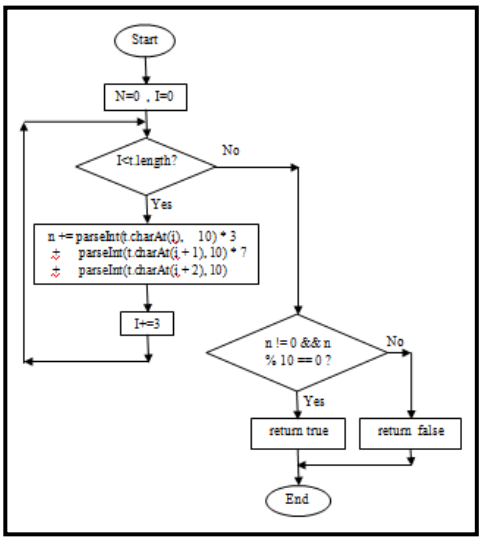


Fig. 5: ABA Model to Generate Card Number

2.2 Part two: Websites

Previous models have been applied in practice and spread to recent E-Commerce sites between C2C. Some of these sites work on display and sale in a specialized field such as cars or real estate. There are sites that work on the presentation of several different products while other sites work on display services, e.g.

2.2.1 Mudah Website [20]

Malaysia is one of the advanced countries in the field of technology and so like many countries has a website (Mudah.my) for E-Commerce, which allows the purchases and sales for small and medium businesses and homes, which is E-Commerce between individuals, this website has more than 5.2 million visitors a month, and is one of the most visited websites in Malaysia.

PRO Niaga offers special services for professional advertisers, and has more than 84,000 interfaces of stores and helps small and medium enterprises and home based businesses to advertise their products and services on the Internet. So Mudah.my is considered the largest online marketplace in Malaysia.

2.2.2 Haraj Website [21]

This is a Saudi (KSA) website that is dedicated to cars, electronics and real estate. The website receives a commission of 1% from the seller after the transaction is completed.

2.2.3 Autotrader Website [22]

This site is in Britain; it is specialized in buying and selling cars. AutoTrader.com has been extremely successful in applying SAS to manage and report voluminous business information since April 1999, and successfully rose to each new levels.

2.2.4 Witkey Website [23]

E-commerce websites between C2C are mostly focused on the buying and selling of products of various kinds in order to return the material, but in the last few years have appeared very different types of websites, said to be C2C An example of this type of website is Witkey, working on the sale and purchase of products property such as designs logos,

translation of articles and writing documents. Witkey is a typical website in China and has grown rapidly in the past few years, which led to interest in VC in this matter.

2.2.5 eBay Website

eBay is the world's online marketplace; a place for buyers and sellers to come together and trade almost anything [24].

2.2.5.1 Background on eBay

eBay, Inc. is possibly the most successful Web based enterprise in existence. Its name is universally known and is synonymous with the auction model of Internet selling. eBay was pivotal in helping to facilitate buying and selling between individuals and businesses. The industry leader also created one of the first trusted online commercial communities, whereby the transactional exchange between sellers and buyers is regulated by the evaluations and recommendations of each [18].

2.2.5.2 eBay and Other Websites

eBay is different from other E-Commerce sites in the following respects:

i. It is not dedicated to a particular product, but it can sell any product except those prohibited items, which are explained on the site.

ii. Does not have any special restrictions concerning the country of operation compared to other websites.

iii. Method of payment is PayPal, which is more secure than other methods of electronic payment.

2.2.5.3 How eBay Works [24]

i. A seller lists an item on eBay, almost anything from antiques to cars, books to sporting goods. The seller chooses to accept only bids for the item (an auction-type listing) or to offer the Buy It Now option, which allows buyers to purchase the item right away at a fixed price.

ii. In an online auction, the bidding opens at a price the seller specifies and remains on eBay for a certain number of days. Buyers then place bids on the item. When the listing ends, the buyer with the highest bid wins.

iii. In a Buy It Now listing, the first buyer willing to pay the seller's price gets the item.

3. RESEARCH MODEL AND HYPOTHESES

According to previous studies in the literature review and our model in paper [25], we present our proposed model Fig. 6, to develop trust in the E-Commerce between the C2C and that in turn leads to the establishment of lasting relationships of trust between consumers and then works to expand the consumer base.

The idea of this model is bases on several steps namely:

i. Consumers start up in the TTP and save their data in the database of TTP, and then gives AK, as well as to store the image in the database with AK.

ii. Verification of the consumer (seller, buyer) before any electronic transaction, whether to view or purchase will be undertaken by online verification (OV) using AK.

iii. After verifying the consumer by AK and making sure it does not exist in the blacklist (BL), it allows them to practise the process electronically.

iv. Payment method depends on the account number registered in the TTP. Transfer is made directly to the seller's account whether from the buyer's account registered on TTP or any other method selected by the buyer. A copy of the payment receipt is sent to the TTP.

v. A lasting relationship to build a trusting community: If the purchase was made from the seller, a lasting trust-based relationship can be established between the buyer and the seller for future transactions.

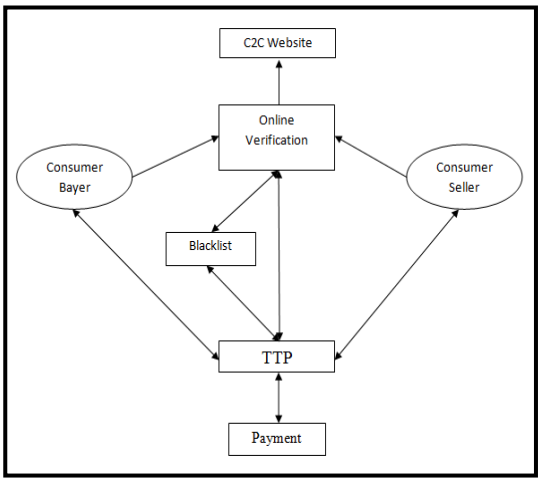


Fig 6: A Model for Developing Trust in E-Commerce Between C2C

This model is to develop trust in the E-Commerce between the C2C and that in turn leads to the establishment of lasting relationships of trust between consumers and then works to expand the consumer base.

The TTP inspects goods before they are sent to the buyer, and if there be any fraud in the specification, data is sent to the seller BL. In the event that the buyer uses the option to request payment upon receipt of payment of freight charges and the percentage of commission for TTP, and if the buyer did not adhere to the previous fees to pay the remaining amount, it sends its data to the BL.

4. METHODOLOGY

The methodology falls into two main parts: part one focuses on a proposed algorithm for generating and validating of AK's numbers.

The second part focuses on a partial explanation for the login of new users and explains the work of the TTP.

4.1 Proposed Algorithm for Generating and Validating of AK's Numbers:

4.1.1 AKs Database

We generate AK's of length 20-digits, by generating basic numbers of 16-digits, preceded by the continent code shown in Table 2, within the range specified for each continent shown in Table 3, and the country code within the range of numbers specified for each country shown in Table 4.

Table 2: Continent Names and Proposed Codes.

Continent Name	Continent Code
Africa	1
Asia	2
Australia	3
Europe	4
North America	5
South America	6

Table 3: The range of people in each continent and the range of each country in Africa.

Continent Name	Continent Code	Number of countries to be generated	Range of Countries	Range of people in continents
Africa	1	53	001—150	1 to 150,000,000,000
Asia	2	59	151—300	150,000,000,001 to 300,000,000,000
Australia	3	33	301—450	300,000,000,001 to 450,000,000,000
Europe	4	53	451—600	450,000,000,001 to 600,000,000,000
North America	5	45	601—750	600,000,000,001 to 750,000,000,000
South America	6	14	750—900	750,000,000,001 to 900,000,000,000

Table 4: Countries of Africa (Range of people in Africa Continent from 1 to 150,000,000,000)

Content Code	Country Name	Country Code	Range of people
1	South Africa	001	1 to 2,000,000,000
1	Egypt	002	2,000,000,001 to 4,000,000,000
	. . .		
1	São Tomé and Príncipe	052	106,000,000,001 to 108,000,000,000

Table No. 4 is considered a database for Africa and also this table includes other continents, taking in consideration the numbers and ranges of continents as shown in table No.

4.1.2 Assurance Key Parts

The AK consists of five parts as in Fig. 7, the first part C1, of 1-digit used for the continent code, the second part C2, of 3-digits used for the country code, the third part (AK-1) and fifth part (AK-2) are random numbers, each one of them contains 6-digits for each consumer and the fourth part (AK-V) of 4-digits used for validation the AK deciding if it's in our numbers system or not.

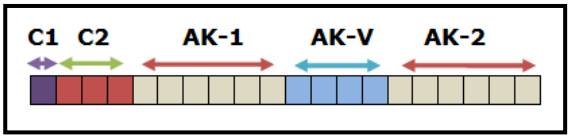


Fig 7: Assurance key parts

Generating C1: The Continent code, in the range of 1…6.

Generating C2: The country code, all countries having a specified code lie in the range as in the section 4.1.1 (Table 4).

4.1.3 Generating AK-1 and AK-2

Generating both parts without repetition and adjust all the generated random numbers to be 12-digits, as in the following algorithm:

1. Read the number of random numbers that need to be generated(amount).
2. Read the minimum value of the range(MIN).
3. Read the maximum value of the range(MAX).
4. Define the range, it must be at least equal to the amount.range=(MAX-MIN)+1;
5. Generate a uniqe random number inside the specified range, about storing the generated numbers into array to check if the number exists in the array or not before storing in the array at each generation step.

6. Store the generated numbers into array
7. Function to compute the length of generated numbers.
8. Complete the length of generated numbers by zeros from left to be equal in length, 12-digits.

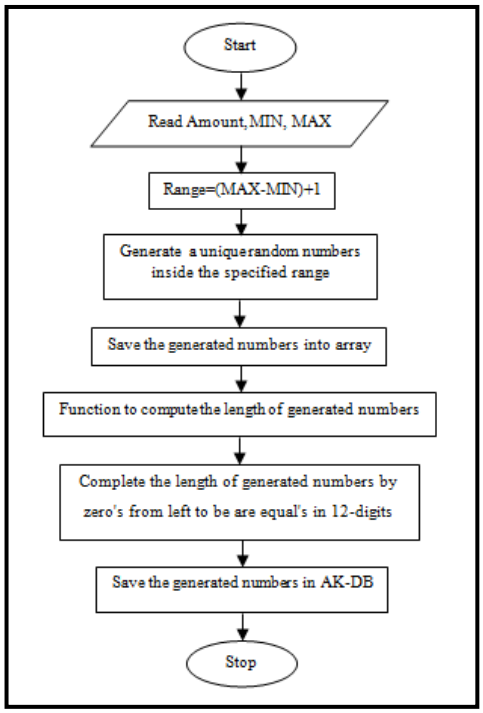


Fig 8: Proposed Algorithm for Generating AK-2 and AK-2

4.1.4 Generating the Validation Part (AK-V)

The validation part, is a random number of 4-digits which is divisible by 3, and put between the two parts AK-1 and AK-2, which decides if the AK belongs to our system or not.

Its algorithm as in the case of AK-1 and AK-2, after generating the number must be checked (its remainder on the number 3 must equal zero).

At this point in our algorithm, we have a database file with a series of unique random numbers in a specified range, all of 16-digits.

4.1.5 Validation of AK

When TTP receive AK, it saves it in an array and reads the number stored from position 10 to 13.

If the remainder of division of this number is 3 equals zero then this number belongs to our system numbers.

If the remainder is not equal to zero then this number does not belong to our system numbers.

If the number belongs to our system numbers then we check it with our AK-DB.

The pseudo-code for AK validation:

Save AK in array to check the validation part from position 10 to 13 in the array:

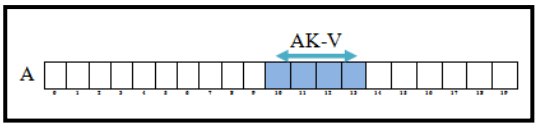


Fig 9: AK-V Validation

```
For i= 0 to 19 do

Begin

A[i]=AK div 10^(19-i)

AK= AK mod 10^(19-i)

End

AK-V = A[10]*1000 + A[11]*100 + A[12]*10 +
A[13]

If (AK-V mod 3) = 0 then

 compare AK with AK-DB

Else

Print ( invalid AK , try again )
```

4.1.6 Validation Using the Two Parts C1 and C2 in AK

After storing the AK into an array A, and deciding that AK belongs to our system numbers using the validation part (AK-V), we can enforce our work by validating another two parts C1 and C2. The algorithm of validation is as follows:

```
1- The Continent code C1 =A[0]

2- The country code C2 = A[1]*100 + A[2]*10 +
A[3]

3- Check IF C1 lie in the range 1..6 THEN

 CASE C1=1 :

 Check IF C2 lie in the range 1..150 THEN valid
ELSE Not valid Break;

 CASE C1=2 :

 Check IF C2 lie in the range 151..300 THEN
valid ELSE Not valid Break;

                        .

                        .

                        .

 CASE C1=6 :

 Check IF C2 lie in the range 751..900 THEN
valid ELSE Not valid Break;

 END
```

4.1.7 The Features of our Model

Our proposed AKs differs from the unique number of the credit card as follows:

i. All consumers have an AK number that depends on the continent and the country where the number belongs to the consumer, through which to identify the nationality of the consumer and the continent where he belongs.

ii. The number is checked at the three stages: First, the comparison between the symbol of the continent and the country code (if the number matches the country and the continent). Second, use the four

boxes (10-13) to verify if these numbers are divisible by three, as shown in the section 4.1.5 Fig. 9. Third: if the random numbers (12 box) are from within the specified range of this state (as shown in the Table 4).

iii. The consumer cannot have more than one AK.

4.2 Our Model Methodology

4.2.1 Our Model Access

The consumer begins to enter the website; if the consumer is already registered then the consumer can log in. However, if the consumer is new (not registered before), then they start by completing the registration form that includes nationality, the national number, mobile number, date of birth and address, and their image to be uploaded from a file or webcam. Then the national number and mobile number are encrypted so that data can be sent to the TTP as shown in Fig. 10.

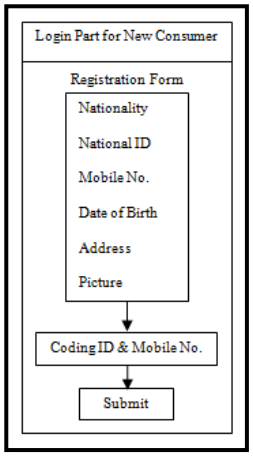


Fig 10: Login Part for New Consumers

TTP receives the data (Fig. 11), and decrypts the national number and mobile number, and then validates the data by reference to a Governmental body (e.g. civil affairs) and considers TTP. If data are not matching, a message will be sent to the consumer's mobile number, informing that the data is invalid and to try another one. However, if the data is valid, it will be saved in a database peculiar to registration form named App-Fr-DB file, and then given an AK, which is taken from AK-DB files that have been generated from Proposed Algorithm as in Fig. 8. TTP saves its data in App-Fr-DB file where the image is saved in image-DB file by its AK number. A message will be sent to the consumer 's mobile phone with AK number to be used in verification of the consumer when making a sale or purchase.

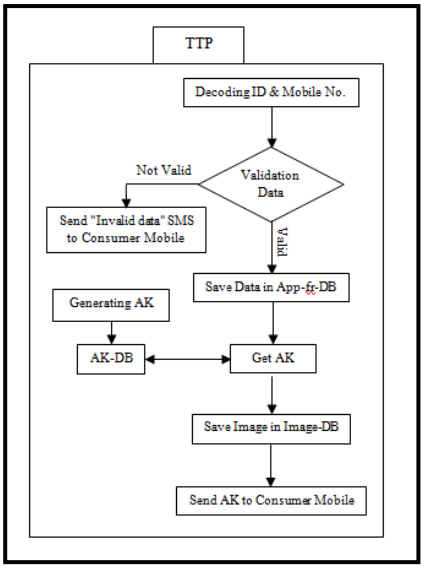


Fig 11: Trusted Third Party Model

4.2.2 The Result of Our Model

To test our model we designed a program to read one million numbers of the random component of (20 box) to determine the proportion of the numbers that can be achieved where all the conditions form AKS, and we repeated this process 10 times, and then we extracted the average per account. Then we introduced random numbers according to the length of the numbers in each card as shown in Table 1, to determine the proportion of the numbers that can be achieved where all the terms of each card in terms of the prefix and the length of the number and the equation of verification [26] used is in the cards shown in the Table (1). And we repeated this process 10 times for each type of card, and then we extracted the average expense ratios for each card and compared with the results we reached in the generation of AKS. The results were as shown in Table 5.

Table 5: The results of testing AKs with test credit cards.

	Test1	Test2	Test3	Test4	Test5	Test6	Test7	Test8	Test9	Test10	Avarage	Persent
American Expre	100085	100040	100503	99727	99815	100180	100427	100185	100125	100249	100134	10.013
MasterCard	99975	100268	100443	99879	100264	100495	99994	99778	99969	99915	100098	10.01
VISA (Length 13	100300	100221	100206	99704	100002	99887	100243	99520	100656	100551	100130	10.013
VISA (Length 16	100067	100150	100091	99717	100116	99824	100041	99917	100134	99742	99980	9.998
AKs Sysytem	488	486	481	426	476	494	447	531	456	488	477.3	0.0477

This table shows the difference between our AKs model, which depends on the verification described in paragraph (4.1.7) and the credit cards models described above. Our results are best at about 19 times.

5. FUTURE WORK

In future work we will try increasing the trust by increasing the authentication during the login stage, using an online verification model depending on the image of the consumer (face recognition), and all login data (AK and image) of the consumer will be coded before submitting.

6. CONCLUSION

This paper aims to identify the features and limitations, of a number of models employed in the field of E-Commerce pertaining to trust building between consumers. It was found that the eBay model addressed most of the limitations in previous models. However, it still has its own limitations concerning the online registration process that does not verify the user's ownership of the card. We presented a model to address this limitation by proposing a new algorithm for generating a series of unique random AK's numbers for all the consumers in the world. It saves the image of the consumer in the database of AK-DB file by its AK, and sends SMS to the consumer by AK.

7. ACKNOWLEDGMENTS

We are so grateful to Dr. El-Sadig Yahya Abdalla and Mr. Ahmed Yassin Ahmed for their great efforts concerning revision and proofreading of our paper.

8. REFERENCES

[1] YANG Q., HUANG L., XU Yunjie . Role of Trust Transfer in E-Commerce Acceptance. 2008. TSINGHUA SCIENCE AND TECHNOLOGY, ISSN 1007-0214 04/26 pp279-286, Volume 13, Number 3, June 2008.

[2] Thompson S.H. , Jing L. Consumer trust in E-Commerce in the United States, Singapore and China. Omega 35 (2007) 22 – 38. Elsevier Ltd.

[3] David G., Detmar W. S. Consumer trust in B2C E-Commerce and the importance of social presence: experiments in e-Products and e-Services. Volume 32, Issue 6, December 2004, Pages 407-424. Elsevier Ltd.

[4] Brian J. C, Theerasak Th., Han Y. Trust and E-Commerce: a study of consumer perceptions. Electronic Commerce Research and Applications 2 (2003), pp. 203–215.

[5] D. Gefen, Reflections on the dimensions of trust and trustworthiness among online consumers, ACM SIGMIS Database 33 (3) (2002) 38–53.

[6] S.L. Jarvenpaa, N. Tractinsky, L. Saarinen, M. Vitale, Consumer trust in an Internet store: a cross-cultural validation, Journal of Computer Mediated Communication 5 (2) (1999).

[7] D.J. Kim,Y.I. Song, S.B. Braynov,H.R. Rao,Amulti-dimensional trust formation model in B-to-C e-commerce: a conceptual framework and content analyses of academia/practitioner perspective, Decision Support Systems 40 (2) (2005) 143–165.

[8] G.L. Urban, F. Sultan, W.J. Qualls, Placing trust at the center of your Internet strategy, Sloan Management Review 42 (1) (2000) 39–48.

[9] P. Grabosky, The nature of trust online, The Age, 2001, pp. 1–12.

[10] R.C. Mayer, J.H. Davis, F.D. Schoorman, An integrative model of organizational trust, Academy of Management Review 20 (3) (1995) 709–734.

[11] Dehua HE , Yaobin LU, ZHOU Deyi , Empirical Study of Consumers' Purchase Intentions in C2C Electronic Commerce , ISSN 1007-0214 05/26 pp287-292 Volume 13, Number 3, June 2008.

[12] Kiku Jones , Lori N.K. Leonard, Trust in consumer-to-consumer electronic commerce, Volume 45, Issue 2, March 2008, Pages 88-95.

[13] Dimitrios Lekkas. Establishing and managing trust within the public key infrastructure, Computer Communications 26 (2003) 1815–1825.

[14] S. Ba, Establishing online trust through a community responsibility system, Decision Support Systems 31 (2001) 323–336.

[15] A. Fernandes, Risking trust in a public key infrastructure: old techniques of managing risk applied to new technology, Decision Support Systems 31 (2001) 303–322.

[16] Ph. Zimmermann, Pretty Good Privacy—Public Key Encryption for the Masses, PGP User's Guide, PGP Version 2.6.1, vols. 1 and 2, MIT Press, Cambridge, MA, 1995.

[17] Mohammad Usman Ahmed, www.cs.mcgill.ca/~mahmed26/eBay_Architecture_Study.pdf.

[18] David S. Marshak, eBay Creates Technology Architecture for the Future , Patricia Seybold Group 2003, http://www.softwaresecretweapons.com/jspwiki/resources/presentations/Sun_eBay6-2_forWeb.pdf

[19] www.brainjar.com/js/validation/default2.asp

[20] www.mudah.my/about/index. htm?ca=9_s

[21] http://www.haraj.com.sa/

[22] http://www.tradermediagroup.com/about-us/introduction.aspxhttp://witkey.taskcn.com

[23] Yaobin Lu , Ling Zhao , Bin Wang, "From virtual community members to C2C e-commerce buyers: Trust in virtual communities and its effect on consumers' purchase intention" Electronic Commerce Research and Applications 9 (2010) 346–360

[24] http://pages.ebay.com/help/account/questions/about-ebay.html

[25] Sharfi Mustafa Abbass, Othman Bin Ibrahim and M. S. Farag, Building trust in the infrastructure for electronic commerce between the Consumer-to-Consumer in developing countries, Computer Technology and Application 2011 Vol.2(4): 319-323.