Modelling of Multi-Dimensional Loyalty in Electronic Commerce

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THESIS SUBMITTED IN FULFILLMENT OF THE REQUIREMENT FOR THE DEGREE OF PHILOSOPHY DOCTORATE

DEPARTMENT OF INFORMATION SYSTEM

FACULTY OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

UNIVERSITY OF MALAYA

KUALA LUMPUR

2014

UNIVERSITI MALAYA

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Abstract

Advances in web-based oriented technologies and services are taking place with a considerable speed around the world. New technologies have significantly influenced trade, and converted traditional commerce to e-Commerce. Modern commerce enables people to conduct business in their offices or at homes, with minimal time, cost, error, and maximum efficiency. Customer trust, satisfaction and loyalty play vital roles in the success or failure of e-Commerce. It is also clear that loyal customers are one of the most important assets of firms, which results in long-term benefits. In this research, three problems were addressed. Firstly, companies easily lose their e-Customers in the competitive environment of today's business (Internet). Secondly, gaining loyal customers takes a long time, and is high in cost. Thirdly, there are inactive and non-profitable customers in the database of online companies; converting inactive and non-profitable customers to active and profitable customers by increasing their trust, satisfaction and loyalty. These three basic problems encourage us to study the nature of e-Loyalty formation in e-Commerce.

The main aim of this study is to answer the question of how firms can increase Electronic Trust (e-Trust), Electronic Satisfaction (e-Satisfaction) and Electronic Loyalty (e-Loyalty) among their e-Customers. A review of literature and interviews with experts in this domain revealed that e-Satisfaction and e-Trust are two important factors that influence e-Loyalty. The significant aspect of this research is derived from the inclusion of a comprehensive conceptual framework with different aspects of technology, organization, and customers (three main entities in e-Commerce). Nine hypotheses display the relationships between technological, organizational, and customer factors with e-Satisfaction and e-Trust, which is significantly influence e-Loyalty. The data for this study were collected from e-Customers of the largest retail company in Iran in 2011, and statistical analyses were used to validate and ensure the reliability of the proposed model. The results showed the relationship between technological, organizational and customer factors with e-Satisfaction, e-Trust, and finally, e-Loyalty. The findings also revealed the fact that technological factor has the most effect on e-Satisfaction, e-Trust and e-Loyalty. Furthermore, Artificial Neural Fuzzy Interface System (ANFIS) was utilized to estimate e-Loyalty based on e-Satisfaction and e-Trust as assessment of the results. The outcomes showed a slight

difference between the prediction of ANFIS and e-Loyalty data. The results of both methods (statistical analysis and ANFIS) confirm the reliability of the model. This research sheds some light on the formation of e-Loyalty in e-Commerce and can be useful for academics and practitioners.

Abstrak

Kemajuan dalam teknologi dan perkhidmatan yang berorientasi berasaskan web sedang berlaku dengan pesat di seluruh dunia .Teknologi baru telah mempengaruhi perdagangan dengan begitu ketara sekali dan telah menukar perdagangan tradisional kepada e-dagang. Perniagaan moden membolehkan orang ramai untuk menjalankan urusan perniagaan mereka di pejabat atau pun di rumah dengan masa yang minimum, kos, ralat dan kecekapan maksimum. Kepercayaan pelanggan, kepuasan dan kesetiaan memainkan peranan yang penting dalam kejayaan dan kegagalan e-dagang. Ini juga jelas menunjukkan bahawa pelanggan setia merupakan salah satu aset syarikat yang penting kerana aset ini dapat memperoleh keuntungan dalam jangka masa panjang. Kami mendapati tiga masalah dalam isu ini: Pertama, persekitaran perniagaan yang kompetitif pada masa kini (Internet) yang menyebabkan syarikat mudah kehilangan e-Customers. Kedua, mendapatkan pelanggan yang setia akan mengambil masa yang lama serta melibatkan kos yang tinggi. Akhir sekali, pelanggan tidak aktif dan tidak memberikan keuntungan hanya boleh diubah dengan cara meningkatkan kepercayaan, kepuasan dan kesetiaan mereka. Ketiga- tiga masalah tersebut telah menggalakkan kami untuk mengkaji norma e-Loyalty di dalam konteks e- commerce.

Tujuan utama kajian ini adalah untuk menjawab persoalan berikut: Bagaimana sesebuah syarikat dapat meningkatkan kepercayaan elektronik (e-Trust), kepuasan elektronik (e-Satisfaction) dan kesetiaan elektronik (e-Loyalty) di kalangan pelanggan mereka. Kupasan dari literature review dan temubual bersama pakar dalam bidang ini telah membuktikan bahawa e-Satisfaction dan e-Trust adalah dua faktor yang penting untuk mempengaruhi e-Loyalty. Aspek yang penting dalam kajian ini adalah berikutan dengan kaitan rangka kerja konsep (conceptual framework) yang komprehensif dengan aspek teknologi, organisasi dan pengguna yang berbeza (tiga entiti utama e-Commerce).

sembilan hipotesis menunjukkan bahawa faktor teknologi, organisasi dan pelanggan dengan e-Satisfaction dan e-Trust masing- masing mempunyai hubungan yang signifikan dengan e-Loyalty. Data bagi kajian ini telah dikumpul daripada e-Customer dari syarikat perniagaan runcit terbesar di Iran pada tahun 2011. Analisis statistik telah digunakan untuk mengesahkan dan memastikan kesahihan model yang telah dikemukakan. Hasil kajian menunjukkan bahawa faktor teknologikal paling memberikan kesan kepada e-Satisfaction, e-Trust dan e-Loyalty. Tambahan pula Artificial Neural Fuzzy Interface (ANFIS) telah digunakan untuk menganggarkan e-

Loyalty berdasarkan e- satisfaction dan e-Trust sebagai penilaian terhadap hasil keputusan.

Hasilnya telah menunjukkan perbezaan yang amat kecil di antara ramalan ANFIS dan data e-Loyalty. Keputusan bagi dua kaedah (statistical analisis dan ANFIS) mengesahkam kesahihan model. Kajian ini menunjukan adanya pembentukan e-Loyalty dalam e-Commerce dan sangat berguna kepada akademik and para pengamal.

ACKNOWLEDGEMENTS

I would like to express my appreciation to the people who supported me during my graduate studies at the University of Malaya.

First of all, my parents who were supportive and provided the foundations to make this possible. They are in an age where I should be supporting them, instead they encouraged me on my studies and I owe them everything.

I would also like to thank my thesis supervisor Dr. Maizatul Akmar Ismail, who guided me and entrusted me with the research and thesis writing process. It was an honour to have the chance to work with her, and I admire her dedication to her students. Definitely, without her guidance and help, I could not finish my research.

I would like to also thank the professors and students who participated in the study. Their assistance made this whole work possible.

Finally, a special thanks to all international students from other countries, and those who volunteered with me in UM. They brought enthusiasm in my life and thousands of wonderful memories.

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List of Abbreviations

Artificial Fuzzy Neural Network	AFNN
Balance Theory	BT
Behavioural Intention	BI
Communication Theory	CT
Confirmatory Factor Analysis	CFA
Customer Relation Management	CRM
Decision Support System	DSS
Dependent Variable	DV
Discriminant Analysis	DA
Electronic Business	EB
Electronic Commerce	e-Commerce
Electronic Customer	e-Customer
Electronic Loyalty	e-Loyalty
Electronic Satisfaction	e-Satisfaction
Electronic Transaction	ET
Electronic Trust	e-Trust
End User Computing	EUC
Exchange Theory	ET
Exploratory Data Analysis	EDA
Exploratory Factor Analysis	EFA
External Driver	ED
External Impediment	EI
Factor Analysis	FA
Human system Interaction	HIS
Independent Variable	IV
Individualism	IDV
Intention to Use	IUSE
Internal Driver	ID
Internal Impediment	II
Information System	IS
Long Tem Orientation	LTO

Masculinity	MAS
Mean End Chain Theory	MECT
Neural Networks	NN
Natural Propensity to Trust	NPT
Ordinal Regression	OR
Other's Trust to Buyer or seller	OTBS
Partial Least Squares	PLS
Perceived Ease Of Use	PEOU
Perceived Usefulness	PU
Perceived Website Quality	PWSQ
Power Distance	PDI
Principle Component Analysis	PCA
Principle of Least Effort	PLE
Refah Chain Stores	RCS
Reputation Theory	RT
Satisfaction and Service Quality	SERVQUAL
Small and Medium Size Enterprise	SME
Software Development Life Cycle	SDLC
Structural Equation Model	SEM
Subjective Norm	SN
Technology Acceptance Model	TAM
Theory of Institution	TOI
Theory of Planned Behaviour	TOPB
Theory of Reason Action	TORA
Third Party Recognition	TPR
Trust Relation Attitude	TRA
Uncertainty Avoidance	UAI
Variance Information Factor	VIF

Chapter 1 Overview of the Research

1.1 Introduction

Modern or online commerce is the result of new technologies, which influences all buying and selling processes on the Internet. This new phenomenon leads to the expansion of the company activities, exploring new business opportunities during the late 1990s.

Recently, e-Commerce has experienced a renaissance; factors such as obstacles in the markets, business processing time, cost and errors have been reduced in online and modern commerce. Some of the advantages of new technologies include being able to select a wide spectrum of goods and services, purchasing items online from their homes in less time and without error and mistake. In order to create a strong relationship between customers and companies, the customers' information plays a vital role. However, investigations show that there are a lot of errors and faults involved in the past in terms of relationship between customers and companies (Ferguson et al., 2010); companies should look back and learn from these mistakes. No business forms without trust and customers will not comeback without satisfaction from their previous purchases (Chen, 2012).

Customer trust, satisfaction and loyalty relate to the psychological aspects of human that have attracted experts' attention in the recent years. E-loyalty is one of the important topics in e-Commerce that leads to long-term benefits and are considered as an important asset for firms. Companies need to spend a lot of money and time in order to gain new loyal customers (Safa and Ismail, 2013). In this study, a conceptual framework is presented that shows e-Loyalty formation based on e-Satisfaction and e-Trust. The nature of collecting factors encouraged us to classify these items into organizational,

customer, and technological groups that are three main entities in e-Commerce. Validity and reliability of the model were probed by statistical analysis and artificial neural networks approach.

1.2 Key Concepts

1.2.1 e-Commerce

e-Commerce is a process where the order is placed, and the choice of payment, whether online or via a delivery channel, is made by the customer. However Cummings and LeMaire (2006, p.10), summarized e-Commerce's definition based on their study as "*a system which helps customers to complete the transaction over the Internet*". This transaction covers the whole process, starting from placing an order to monitoring delivery. Another definition that (MacGregor and Vrazalic, 2004, p.132) refers to is provided by Raymond (2001) as:

"*A telecommunication network which maintain business relationships, share business information and conduct business transactions*".

1.2.2 e-Loyalty

Frequent buying behaviour in a particular piece of time coming from favourable attitudes toward the subject is defined as loyalty (Ribbink et al., 2004). Loyalty encompasses behavioural and attitudinal aspects. Jacoby and Chestnut (1978) discussed and mixed these two aspects of loyalty, merely focused on repeat buying in their study and criticized the behavioural aspect of loyalty. Fake loyalty has to be distinguished from the concept of loyalty (i.e., false loyalty), where loyalty behaviour is based on inertia, and not based on any commitment at all (Dick and Basu, 1994). Real loyalty includes attitudinal and behavioural preferences towards the retailer. It is not easily distracted by a more attractive alternative, especially in the case of real loyal customer, as they have developed a commitment and attachment towards the retailer. True loyalty is indicative of a future intention to purchase, the unlikelihood of switching to other

retailers, willingness to pay more, and the hopes of gaining higher benefits from the word-of-mouth effect (Lam et al., 2003). In a simple word, e-Loyalty is a repeat purchasing behaviour, originating from the commitment and customer's favourable attitude toward an online seller.

1.2.3 e-Satisfaction

e-Satisfaction is the result of an evaluation of the online retailer and the enjoyment of fulfilment over previous transaction experience. Satisfaction is psychological state resulting when the emotion surrounding disconfirmed expectations is coupled with a consumer's prior feelings about the consumer experience. From this perspective, satisfaction may be best understood as an ongoing evaluation of the surprise inherent in a product acquisition and/or consumption experience (Zavareh et al., 2012).

1.2.4 e-Trust

e-Trust is a belief that the seller will not take advantage of the customer's vulnerability, along with the reliable words of the merchant (Anderson and Srinivasan, 2003). Trust is an attitude, which is neither subjective nor objective, and does not simply involve mechanical influences from the environment since it has to be learned. Viewing trust as a psychological state implies that people vary in terms of when and how much they are willing to trust. Such willingness to trust, is based on people's estimation of the probability that those trusted will reciprocate the trust(Beldad et al., 2010).

1.3 Background

e-Commerce has attracted the attention of private and government sections in Iran in the recent years due to its potential for overcoming on time and place. Government supports companies to use e-Commerce in their business activities. e-

Commerce started with electronic transaction in Iran in 1990s. Technologies such as DSL helped them to use Internet in their business. Now, a vast number of Iranian people are using Internet and the number is growing daily (Elahi and Hassanzadeh, 2009). Seminars, conferences and workshops have been held by the Iranian governmental and non-governmental organisations to promote awareness of the social effects of e-Commerce. In view of that it could be claimed that Iran is providing the infrastructure to enable e-Commerce to expand. A draft of e-Commerce law provided by a committee and was debated in the Parliament as well as in Economic, Legal and Industrial and Mines Commissions. The main issue of the draft that was a Model Law on United Nation Commission on International Trade Law was ratified in 1996. Finally, in 2004, Parliament of Iran passed the Electronic Commerce Act. The Act commenced operation on 22 January 2004. With the passage of the Act, Iran made significant progress towards its e-Commerce legislation. Now, this Act is called the Electronic Commerce Law of the Islamic Republic of Iran. The Act was passed to remove concerns about uncertainties over e-Commerce and to clarify some of ambiguities in Iranian legal system. However, there are some obstacles that need to attention in this domain. Besides Law and infrastructure, there are other aspects such as trust, satisfaction and loyalty that should be considered to develop e-Commerce in Iran.

Trust is defined as a perception of desire to depend on someone or something for security. Some experts believe that satisfaction and trust form each other, which is a dynamic process built over a certain period of time, contributes to satisfaction beyond the effects of economic outcome (Corbitt et al., 2003).

Loyalty either leads to constant growth and profit, or is a valuable asset for the firm . In previous marketing literature, satisfaction has historically been identified as an important concept that determines the development of loyalty (Jaiswal et al., 2010). On the other hand, several studies claimed that more than fifty percent of satisfied

customers will suddenly switch to other retailers, emphasizing a satisfaction-loyalty link. Customers would seek more satisfaction, and would easily leave for a suitable alternative, despite them being satisfied with a seller (Evanschitzkya et al., 2004). Sasser et al. (1995) also noted that merely satisfying customers…is not enough to keep them loyal. Trust was determined to play a critical role in the development of loyalty that fills this void in studies regarding satisfaction.

The close relation between trust, satisfaction and loyalty, and their respective importance has also been a critical topic in the research of retailing (Park and Kim, 2003; Yang and Peterson, 2004). Gaining long-time customer commitment, and decreasing the cost of acquiring new customers are the results of e-Loyalty, therefore increases profitability for the online retailer (Reichheld et al., 2000a). Reichheld et al. also believe that loyal customers are those who are willing to pay premium prices to online retailers with whom they have an established relationship. In previous researches, e-Trust is considered as a relational characteristic, while e-Satisfaction is regarded as a transaction specific characteristic, which has been determined to influence e-Loyalty. Gummerus et al. (2004) emphasized the impact of e-Satisfaction on e-Loyalty and believed that a satisfied customer is more likely to create loyalty and also possess the interest to create e-Trust and e-Satisfaction. (Chang and Chen, 2009) believe that there is a strong relationship between customer interface quality, switching cost, satisfaction, and e-Loyalty. Customer interface not only provides a direct, low cost communication media between an e-store and customers, but also evaluates whether Web-based services are achieving their intended goals, namely personalizing their services and establishing a competitive advantage based on an understanding of customer access behaviour.

1.4 Problem Statements

This research has attempted to shed light on three main problems, which in turn, influences companies' profitability in online environment:

Firstly, the most valuable asset for every firm is loyal customers (Ribbink et al., 2004), but companies easily lose them in new competitive environment i.e. Internet.

Secondly, by looking at the database of online companies, we realized that some customers visit the website of e-Commerce companies and register their respective information. However, they never buy anything, or if they do, they only buy a few of their needs online. These people have a great potential of benefit for companies. Converting non-profitable or inactive customers to profitable and active customers (by increasing the customers' e-Satisfaction, e-Trust and e-Loyalty) results in long-term benefits for every company.

Gaining new loyal customers in online environment requires the allocation of significant amount of time and money (Audrain-Pontevia et al., 2013; Jeon, 2009). Understanding e-Satisfaction, e-Trust and e-Loyalty formation helps managements to reduce time and cost in this domain. On the other hand, expanding businesses by developing agencies needs to spend bulk of money and several years, but retaining previous customers via the creation of e-Satisfaction, e-Trust and e-Loyalty requires less investment compared to expanding a business.

Customer loyalty leads to long-term profitability, and has been mentioned important in previous studies (Chen, 2012). Some experts believe that acquiring a new loyal customer requires high cost and three years to cultivate (Ranganathan and Ganapathy, 2002). Consequently, it is crucial for online companies to create a loyal customer based relationship, as well as to monitor the profitability of them (Reinartz and Kumar, 2002).

In addition, there are significant number of researches that have taken into account various aspects in e-Commerce for forming e-Loyalty, e-Satisfaction and e-Trust. However, few have explored the critical factors in the formation of e-Loyalty, based on e-Satisfaction and e-Trust (Hernández et al., 2010). Previous studies only focused on a particular facet of e-Commerce such as system quality, information quality, security, organization policy etc. due to variety of researches view. This research seeks to address the technological, organizational, and customer factors that influence e-Satisfaction, e-Trust, and finally, e-Loyalty, since these are three main entities in e-Commerce, without them e-Commerce cannot form.

1.5 Objectives of Study

The objectives are closely related to the research problem. The objectives of a research summarize what is to be achieved by the research and show focus of the research. This study aims to achieve the following objectives:

1. To determine the critical factors of e-Satisfaction, e-Trust, and e-Loyalty in e-Commerce.
2. To investigate the role of technological, organizational, and customer factors in the formation of e-Satisfaction, e-Trust, and e-Loyalty.
3. To develop a multi-dimensional conceptual framework model based on e-Satisfaction, e-Trust and e-Loyalty.
4. To evaluate the model with Artificial Neural Network and statistical approaches.

1.6 Research Questions

Customers, who register via firms' websites do not buy anything, may buy a few goods or services during a year, or they do not return for purchasing. This is part of the reason why it is important to be aware of how to convert customers to loyal customers

in the context of e-Commerce. Researchers should pay attention to the fact that in traditional commerce, customers and sellers can meet each other and talk. In this situation, creating trust and satisfaction is simpler than faceless interaction, which is represented by e-Commerce (Kim et al., 2011). This research focuses on customer satisfaction, trust and loyalty formation in e-Commerce. In order to realize different aspects in this domain, these questions should be answered:

1) What are the critical factors in e-Satisfaction, e-Trust, and e-Loyalty formation?

The factors were collected from literature review and interview with experts were taken into account in forming the research conceptual framework.

Looking at these factors allows us to delve deeper into their respective nature and effect, and will allow the factors to be categorized into technological, organizational and customer groups. Based on literature review, these three groups are e-Commerce entities.

2) How can the factors that influence e-Satisfaction, e-Trust and e-Loyalty be comprehensively classified?

Looking deeper into the variables that were collected, confirms the fact that some of them are related to technology, and some of them are related to organization and customer aspects. For instance, items such as system quality, information quality, and security of information are related to technological factor, and items such as fast response to customer inquiries, rewards and discounts, clear shopping process, money back guarantee are related to the organizational aspect. Other items like perceived of hardware and software reliability, customer experience in e-Commerce and perceived risk are related to the customer aspect. Technology, organization and customer are three main entities in e-Commerce (Kim et al. 2005, Shaw, 1999). Classification of items allows experts and managements pay attention to effective factors in e-Commerce in the early stage of e-Commerce development. Improvement of e-

Commerce based assessment of these factors in their current activities is another advantage of this classification.

3) How e-Loyalty, e-Trust and e-Satisfaction are formed based on technological, organizational and customer factors.

Critical factors in e-Trust and e-Satisfaction have extremely important roles in the formation of e-Loyalty. The literature review and interviews with experts were applied in the determination of critical factors.

4) How can the model be evaluated?

Statistical analysis is under consideration such as: type of data (nominal, ordinal and scale), distribution of data (normal or abnormal), and type of variables (independent or dependent). Different models of regression analysis show the effect of independent variables on the depending variables, based on the aforementioned criteria. Different Artificial Neural Networks types can also show this effect without taking into account the aforementioned conditions and based on learning process. In this research, the results of these two methods will be compared in order to evaluate the model.

1.7 Purpose of the Study

The main purpose of this study is to propose a comprehensive conceptual framework for e-Loyalty formation that contains e-Satisfaction and e-Trust. The model encompasses technological, organizational, and customer factors that influence e-Trust, e-Satisfaction, and e-Loyalty. Creating e-Loyalty is a complex process. In this research, e-Loyalty is broken down into critical factors in e-Commerce, presented in a model.

1.8 Data Collection and Sampling

The samples were collected from e-Customers of the largest retail company in Iran. Refah Chain Stores (RCS) is a well-known company, which started in retail from 1995, and now has over 160 branches across the country. Refah goods encompass a

wide range of products in the lines of home appliances and electronics, clothing and textiles and stationeries, food and beverages, fresh produce, hygiene and cosmetics, all in quality value and competitive prices. Online sales are provided for those customers who prefer to shop, compare, and decide to purchase. Refah's motto is "Lower Prices and Better Quality". Back to school and Iranian New Year "Norooz" are when they offer special sales, in September and February respectively. The discounts and valuable gifts are some of the advantages of these sales for loyal customers.

1.9 Significance of Research

Providing an e-Loyalty formation model for online companies that buy and sell through the Internet in order to increase their benefits is one of the significant aspects of this research. The conceptual model provides suggestions on how top-level managements can improve the trust, satisfaction and loyalty among their customers for the purpose of gaining more competitive advantages. This study serves to highlight ways to increase online customers to the leaders of online companies.

Formation of customer loyalty in an online environment (e-Loyalty) is a complex process (Cyr et al. (2007). In this research, e-Loyalty has been broken down into critical factors. Classification of critical factors helps executive managers provide reliable policies and strategic plans for different parts of their company in order to improve overall efficiency in an online marketplace.

Satisfaction, trust, and loyalty in the traditional and modern trade (e-Commerce) have different aspects. Faceless interaction, no human touch, and no social interaction are the most important characteristics in e-Commerce, which influences e-Trust, e-Satisfaction and e-Loyalty (Kim et al., 2011). In this research, different aspects of these three issues are taken into consideration.

Another significant aspect of this research is derived from the inclusion of diverse dimensions of technology, organization and customer factors, which forms e-Satisfaction, e-Trust and e-Loyalty. Technology, organization, and customers are the three main entities in e-Commerce.

1.10 Research Methodology

Critical factors that influence e-Satisfaction, e-Trust and e-Loyalty were extracted from a review of literature and interviews with experts. Classification of independent variables was based on the effects that they have on e-Satisfaction and e-Trust. The variables are related to technology, organization, and customer that are three main entities in e-Commerce. Based on this classification, the conceptual framework was formed. A prototype was designed and developed according to the framework. Data were collected by questionnaire using the Likert scale. The participants were randomly selected from the online customers of Refah Chain Stores Company in Iran, in the year 2010. Different methods in statistics were applied for data analysis. In addition to the statistical analysis, Artificial Neural Fuzzy Interface System was utilized to assess the model. Figure 1-1 details the research methodology.

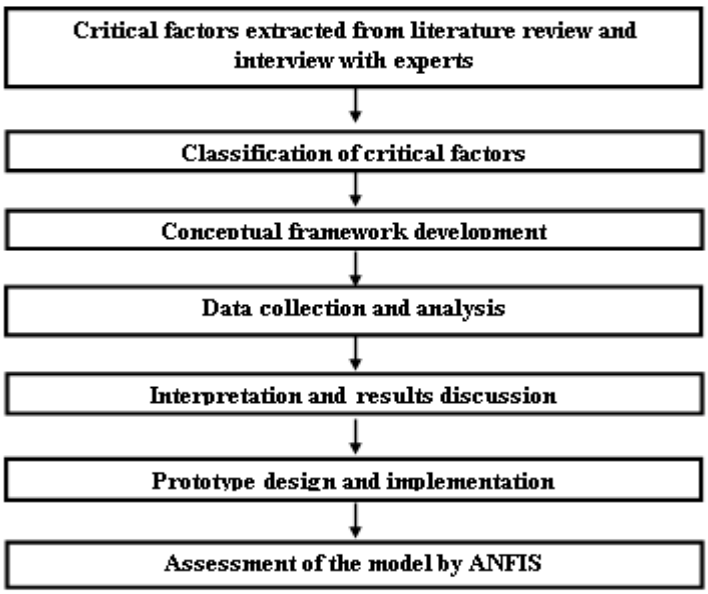


Figure 1-1: Research methodology

IBM SPSS 20 was used for data analysis and the below tests were applied in data analyses:

Standard Error of Skewness and Standard Error of Kurtosis tests were used for the normalization test of data distribution.

Reliability indicates the stability of measure over a diversity of conditions (Nunally, 1978). The amount of inaccuracies that were made by any measure was determined by Cronbach's Alpha test, based on inter-item scores and the overall measures. There are no particular standards for interpreting Cronbach's Alpha. Brown proposes a minimum value of 0.8 for tests, which measure attitudes or values (Brown, 1983). Generally speaking, Nunally claims that the acceptable level of exploratory study is 0.7 and above.

The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy test is used for data suitability. The results will show whether the structure and data are suitable for factor analysis. Bartlett's test also was used to confirm the possibility of creating a new structure with these data. The results of the factor analysis revealed that the variables and structure are indeed suitable for factor analysis.

Regression analysis will be applied for factors that are in technology, organization, and customer classification, based on the relation between these factors with e-Satisfaction and e-Trust, and in the next step, e-Satisfaction and e-Trust with e-Loyalty. The data analyses are briefly summarized as follows:

1) Critical factors have been extracted from literature review and interview with experts.
2) The factors were classified based on their nature. For example, system quality relates to the technological aspects, fast response to customer inquiries relates to organization policy and customer experience in e-Commerce refers to customer aspect.

3) Kurtosis and Skewness have been applied for the purpose of normalization of data distribution.

4) Cronbach Alpha was applied to determine the reliability of the questionnaire.

5) KMO and Bartlet tests have been used to determine data accuracy and suitability for factor analysis.

6) Regression analysis describes the relationship between independent variables and dependent variable in the model.

1.11 Thesis Structure

General overview of the major subject explains e-Commerce, e-Trust, e-Satisfaction and e-Loyalty, its background, problem statements, purpose of study, research objectives and questions, the significance of research, and research methodology; all of which is presented in chapter one. The literature review covers all aspects of research, such as critical success factors in e-Commerce, e-Trust, e-Satisfaction, e-Loyalty, while the applications of neural network in commerce are presented in chapter two. Research methodology, research framework with its theoretical background, description of statistical analysis and assessment of the model with neural network are in chapter three. The results of statistical analysis and the outcome of artificial neural network for assessment of the framework were presented in chapter four. Prototype development, implementation and its data analysis are discussed in chapter five. Finally, conclusion is in chapter six. Table 1-1 shows the structure of the thesis.

Table 1-1: Thesis structure

Chapter Description	Chapter No.
Overview of the research	Chapter 1
Literature review	Chapter 2
Research methodology	Chapter 3
Statistical analysis and assessment of the model	Chapter 4
Prototype development and assessment	Chapter 5
Results and conclusion	Chapter 6

Chapter 2 Literature Review

2.1 Introduction

e-Commerce has grown significantly, due to the respective developments in the Internet and network technology. Company managements realized that they should shift their business activities to e-Commerce in order to gain more business advantages. In addition, customers should trust the companies, and e-Customers should be satisfied from their dealings with them (Chen, 2012). In this line, e-Trust and e-Satisfaction are crucial with respect to a successful e-Commerce experience. e-Commerce has gained popularity over old traditional methods, due to its advantages. However, when e-Commerce is used in the society, e-Trust and e-Satisfaction have become a vital issue for both the customers and sellers.

The formation of e-Loyalty is a comprehensive and complex process, comprising of several constructs, such as e-Satisfaction and e-Trust. In this chapter, the concepts of these constructs in e-Commerce are discussed. The important difference between traditional and modern commerce is the faceless interaction between customers and sellers in an online environment. Face-to-face interaction and negotiation between customers and sellers will lead to an early agreement and the formation of trust. On the other hand, easy and fast processes in e-Commerce encourage customers to use the Internet for their respective commerce.

The main purpose of the existence of a firm is to earn benefits and retain the interest of the owner's companies. Additionally, the firm's owners have to ensure that commerce flourishes, and all of the plans must fall in line with this train of thought. Customer's needs and preferences change based on their perceived value (Afzal, 2007). New competitors enter the market with particular advantages. Technology helps convert

traditional commerce to online and modern commerce via globalization. Now, the experts should keep track of customers' interaction with this new phenomenon in order to flourish. In addition, e-Commerce enables small and medium companies to compete with large enterprises. In another study, Dubé et al. (2003) showed that companies which adopt and utilize e-Commerce in their organization ended up earning significant benefits. e-Commerce results in increased sales, reduced costs, and the ability to reach a global market .

2.2 Benefits of Internet Use for Small and Medium Enterprises

Advances in web-based technologies and services are taking place with a considerable speed around the world. Communication and information technologies have a great impact on economic, social and personal developments that have attracted attention of experts in the recent decades. Empirical and theoretical researches have demonstrated the necessity to gain and exploit the positive outcomes such as productivity growth, efficiency, effectiveness, organization expansion, and competitiveness (Tarutė and Gatautis, 2014). Internet technologies improve the way companies deal with their suppliers and customers (Janita and Chong, 2013). In this line, e-Commerce has brought a great impact on commerce activities.

2.3 e-Commerce and Small and Medium Enterprises

e-Commerce not only supplies large businesses, but also help small and medium- sized enterprises (SMEs). In this economical period, SMEs contribute to economic growth, social structure, employment, as well as regional and local developments. Consequently, they have become an important sector of the economy, moving towards globalization and fast technological changes, which also includes the Internet and e-Commerce, bringing new opportunities for SMEs (Afzal, 2007). Ramanathan et al. (2012) studied the impact of e-Commerce on marketing and

operational functions and investigated how these impacts have affected performance of SMEs. This study shows how e-Commerce adoption is linked to firm performance. The results showed that operations and marketing aspects of e-Commerce have strong impact on performance of SMEs.

2.4 Commerce Changes and Use of IT by Small and Medium Enterprises

It is stated by many authors that e-Commerce should not be considered as a mere alternative technology that helps run the operation, instead, it can be an innovation that changes traditional ways of doing business (Kendall and Kendall, 2001; Lee, 2000).

e-Commerce will change the way of doing business: in a modern environment, obtaining information, processing the captured information, designing and providing the products, includes all possible required information to the customer, can all be done via e-Commerce. Moreover, the trend among companies is moving toward "customer orientation" which was previously "product or production orientation", and this procedure will speed up via the use of new technologies, mainly e-Commerce (Chang et al., 2003).

Prior to the introduction of e-Commerce, organizations relied mainly on a product base that was supported by technology. The required physical inputs and processes of products were tangible, which could be clearly evaluated and measured. Accordingly, the introduction of technology into such processes could be evaluated and measured towards comprehensive financial influences and outcomes that were related to the revenue goals of the whole organization. Technology was designed to represent the existing organizational values and key performance indicators, with all strategies being fixed and controllable (Kuljis et al., 2000).While technology supports these strategies and the products offered by the organization, it was still bound by the nature of those products. In practice, the role of technology was simply to increase efficiency within

the boundaries of the products, which was the main focus.

The next point is the different concepts of advantages and disadvantages of technology in a pre e-Commerce and e-Commerce environment, which the businesses may experience. This issue is referred to by (MacGregor, 2004, p.132) as: "*With e-Commerce, many of the benefits and disadvantages have become less tangible and far more difficult to plan for and control*". Added to this is the fact that many of the benefits, as well as the disadvantages, are unique to e-Commerce. Some of the benefits include new customers and markets (Quayle, 2002; Raymond, 2001), improved marketing techniques and improved relations with business partners (Sparkes and Thomas, 2001). Some of the disadvantages of e-Commerce adoption, reported in the literature included security risks (Ritchie and Brindley, 2001), reduced flexibility of work (Lee, 2001). It is also important to consider the fact that e-Commerce behaves differently compared to other technologies in the case of adoption. The adoption of e-Commerce does not only influence the internal processes of the organization; it also has a great impact on external ways of doing business.

2.5 e-Commerce Entities

A multi-dimensional business to customer trust model was presented by (Kim et al., 2005). Two groups of experts participated in the research, involving academic and practitioners. In their research, trust was identified as an important subject in the formation of relationship in a social system in order to achieve particular goals. Trust in business relationships appears in preserving relationship through cooperative transaction. These transactions usually occur between individuals, firm-to-firm, or individual to firm. Identifying the structure and entities in business to customer electronic commerce is necessary to study the process of trust formation. Based on Shaw's model, four entities of buyer, seller, third party, and technology were taken into

account in the business to customer e-Commerce (Shaw, 1999) . These four entities present three important objects in the trust formation process in business to customer: buyer (trustor), seller (trustee), and (technology and third party) as the environment. Trustee, trustor, and the environment can be connected through the structure of e-Commerce, which is supported by information technology. In this research, technology, organization and customer were considered as three main entities in the research model.

Kim et al. (2005) presented six dimensional trust models in an online exchange. The six dimensions encompass technology, transaction, product, information, institutional, and customer behaviour. The technology aspect contains IT infrastructure in e-Commerce, such as hardware and software, e-Commerce application, and e-Commerce services. The information on the websites influences customer's perception of trust as a dimension in the formation of trust, due to the fact that a customer trusts a website when the information on the website exists in the goods and service quality. The product dimension relates to the service or product that a buyer would like to purchase. Transaction aspect contains delivery of products or services and how support after sales. Customer support is a range of customer services to assist customers in making cost effective and correct use of the product. It includes installation, troubleshooting, training, maintenance, upgrading and disposal of a product.

2.6 Impediment and Driver in e-Commerce Success

Recently, experts are paying more attention to the e-Commerce success framework. Quaddusa and Achjarib (2005) extracted effective factors in e-Commerce success from literature review and differentiated them based on the locus of impact and contribution to the critical factors with regards to e-Commerce. This framework encompasses four exogenous and endogenous variables: internal driver, internal impediment, external driver and external impediment. The successes of e-Commerce with six observed

variables are: page view, firm's goal, competitive advantage, conversion rate, hit and stickiness (It shows how long each visitor remains on a site). The findings revealed that internal and external driver have positive effect on e-Commerce success. However, lowering internal and external impediments do not have a significant effect on the success of e-Commerce. The expected or perceived benefit is defined as the internal driver and perceived constraint in using e-Commerce is defined as the internal impediment. The external impacts consist of both benefits and impediments to external parties such as customers and suppliers. Table 2-1 describes the drivers and impediments.

Table 2-1: Electronic commerce success variables (Quaddusa et al., 2005)

Internal Driver(ID)	Cost leadership
	Reputation
	Market
	Business Entry
Internal Impediments(II)	Finance
	Risks
	Expertise
External Driver(ED)	Product pricing
	Time spent
	Convenience
	External relationship
External Impediment(EI)	Customer expense
	Delivery time
	Transaction risks
	Access

2.7 e-Satisfaction

Perception of satisfying fulfilment over customer transaction experiences is defined as e-Satisfaction (Oliver, 2010). Oliver also believed that satisfaction comes from immediate purchase evaluative judgement, or a reaction that comes from the most recent transaction experience with a firm. Capturing the transaction, transient emotions

and evaluation lead to the customers' general level of satisfaction. This satisfaction is a cumulative construct, cumulatively collecting satisfaction with particular services or products by taking into account the overall evaluation based on the total purchase and consumption experience with a good or service over time. e-Satisfaction has become more and more important in the commerce literature recently (Fang et al., 2011; Janita et al., 2013). Lee et al. (2009) conceptualized satisfaction as the customers' evaluation over several transaction experiences. Satisfied customers tend to use more services, and have a repurchase intention, most of the time recommending the goods and services to their relatives (Kim et al., 2009). According to Winter (2001), customer e-Satisfaction is the most important issue in the firm's goal of customer relationship management in online environment.

2.8 e-Trust

Experts strongly believe that trust is ultimate importance in every form of business activities , defined "the variable most universally accepted as a basis of any human interaction of exchange" (Gundlach and Murphy, 1993, p.26). It is especially so when individuals are faced with an unpredictable situation that is beyond the dealer's control, or action in a business transaction (Gefen, 2000). To decrease the complexity in the decision making process, trust should be investigated. Experts believe trust plays an important role in online retailing (Chen, 2012; Hong and Cho, 2011). When retailers provide credit cards and save customers' information in their database, the retailer's performance is invisible during the transaction. Gefen and Straub (2004) mentioned that trust is a precondition of e-Commerce, and encourages customers towards more activities, where some customers think about the risk of these transactions.

Reliability and confidence have been considered as two important components, along with credibility and benevolence (Morgan and Hunt, 1994). Trust is a perception of

confidence in the exchange partner's reliability and integrity. Trust also refers to a willingness to rely on an exchange partner in whom one has confidence. Garbarino and Johnson (1999) defined trust as customer confidence in the quality and reliability of the service offered, encompassing both confidence and reliability. In this research, e-Trust encompasses confidence or customer's belief that the word, or the promise of a merchant, is reliable (credibility) and customer's vulnerability will not be used by the seller to be taken advantage (benevolence). Trust helps reduce the complexity in business activities, and expedite future commerce by encouraging both sides to conduct business and reduce perceived risk (Riegelsberger et al., 2005).

2.9 e-Loyalty

e-Loyalty formation is a comprehensive and complex process that contains several constructs, such as repeated buying behaviour in a particular period of time, which includes behavioural and attitudinal aspects (Keller, 1993). Cognitive, affective, conative and action are four stages of loyalty formation. Cognitive relates to value based on functional aspect, effect comes from emotional responses and satisfaction; conation refers to commitment and intention. Satisfaction plays an important role in the loyalty formation. However, inertia has been mentioned as a variable that immunized customer against competitors' counter marketing attempts and efforts (Han et al., 2011). Real loyalty is based on commitment and attachment and it is not based on force, loyal customers are not distracted by more attractive alternative (Chen, 2012).

The costs of gaining new loyal customers is very high and commitment is extremely important (Wallace et al., 2004). Creating e-Loyalty among e-Customers proves to be a great challenge, due to the fact that competing businesses in the world of electronic environment is determined by a few mouse clicks (Srinivasan et al., 2002), and customers can compare different goods and services with minimal effort or time. Kutter

(1993) posited that e-Customers are able to compare offers by sellers in the world wide web, and loyalty might be fickle due to the overabundance of information, products and services. Online shoppers are repeat customers on the Internet, where e-Sellers have built strong relationships. Additionally, they consolidate their purchases to the primary retailer in order to prove their loyalty (Reichheld and Schefter, 2000). Scheraga (2000) showed that increasing customer retention by 5% lead to 25-95% increase in profit in the long term. On the other hand, they provided another profit resource for seller.

2.10 Technological aspect of e-Commerce

Science and knowledge that use in practice to solve a problem or invent tools is defined as technology (Al-Qirim, 2007). Technology can appear in the form of software, hardware or a system in order to speed up a particular process. Technology is one of the main entities in e-Commerce (Shaw, 1999). The main difference between traditional and modern or e-Commerce is technological aspect. Technology in e-Commerce encompasses system, procedures, information and security that lead to more accuracy and efficacy in business. In variant studies, different aspects of technology with different view have been studied. A review of literature is presented in the following section.

Chang and Chen (2008), in their paper entitled "The impact of customer interface quality, satisfaction and switching costs on e-Loyalty: Internet experience as a moderator", mentioned that the quality of interface influences the success of e-Commerce, and discussed the effects of the web system on customer behaviour. An interface is a shared boundary across which two separate components of computer system exchange information. The exchange can be between software, computer hardware, peripheral devices, humans and combinations of these. In this research quality of interface refers to the quality of web system. In their framework, they tested

the relations between customization, interactivity, convenience, and characters of customer interface with customer satisfaction and switching cost, and finally, e-Loyalty. The results of their research showed that convenience directly enhances e-Loyalty. In addition, this study shows that the quality of web system positively influences switching costs (customer's effort, time and money that customer spend to change the retailer to another alternative) for users with more Internet experience.

Lin et al. (2011) also investigated the effect of system quality, information quality, service quality, product quality, delivery quality, and perceived price on the online customer satisfaction in Taiwan. The results of data analysis revealed that these factors have significant effect on customer satisfaction. Moreover, delivery quality was the most important factor followed by product quality (Ahn et al., 2004). The outcomes showed that online firms should pay attention on the product sourcing and cooperate with the delivery supplier to provide a high delivery quality such as correct order, on time, and safety.

Chang et al. (2009) also believed that the quality of web system, customer loyalty, and perceived security are vital in respect to the prosperity of e-Commerce in the competitive market environment. They presented a model, which shows the relationships between these factors by taking into account the effect of switching cost and customer satisfaction. Switching costs contain procedural (the effort and time), financial (quantified loss) and relational (brand and personal relationship loss because of psychological discomfort due to breaking of bonds) factors. Therefore, switching cost is defined as the consumers' perceptions of the effort, money, and time that are related to changing providers (Burnham et al., 2003). The data analysis demonstrated perceived security and web system quality positively influenced customer satisfaction and switching cost. The results of their study showed that the switching cost moderated the influence of customer satisfaction to loyalty.

Ribbink et al. (2004) as well as other experts, believe that e-Trust and e-Satisfaction play important roles in the formation of e-Loyalty. Their research focuses on the effect of different dimensions of e-Service quality on e-Satisfaction and e-Trust. Assurance, ease of use, responsiveness, and customization are different aspects of service quality. Ease of use enhances the efficiency of using the service. Website design should please to the eye. Customization of website or personalized web feature using language option based on user's needs affects customers' perception and e-Satisfaction. The results of their study showed that e-Trust and e-Satisfaction as well as e-Service quality positively affect e-Loyalty. Ease of use, customization and responsiveness have a significant effect on e-Satisfaction.

Lee et al. (2009) investigated e-Satisfaction and repurchase intention formation considering the moderating effect of computer self-efficacy and computer anxiety. The research model shows that e-Satisfaction affects repurchase intention directly. E-Service quality, website information satisfaction and its system satisfaction are believed to affect e-Satisfaction. The model also shows that overall e-Service quality is influenced by efficiency and fulfilment, which are salient dimensions of e-Service quality. The effects of website information and system satisfaction on e-Service quality are mediated by efficiency and fulfilment. Website system satisfaction leads to website information satisfaction. Finally, the model shows the effects of website information and system satisfaction on e-Satisfaction by computer anxiety. The findings suggest that website information satisfaction, its system satisfaction, and overall e-Service quality play key roles in forming e-Satisfaction. Furthermore, the two mediators were found to be important.

Cheung and Lee (2006) conceptualized customer satisfaction by considering and integrating service quality and end-user satisfaction in Internet shopping. Their framework encompasses service quality, information quality, and system quality as the

three main components in customer satisfaction. In addition, end-user computing (EUC) satisfaction and service quality (SERVQUAL) are two important structures for the assessment of e-Satisfaction. EUC satisfaction discusses user satisfaction in using computer application on packages. User satisfaction is extremely important, because IS success is determined by the level of user satisfaction. Customers interact with information in computing environment, whether directly or indirectly. Therefore, user interaction and information of products and services on the website are two important phenomena in the context of user satisfaction. Consequently, system quality and information quality are two important constructs in the process of user satisfaction formation (DeLone and McLean, 2003). The quality of information is usually determined by format, content, accuracy and timeliness, while system quality is represented by ease of use in most researches (Rai et al., 2002).

The following case study illustrates trust as the central dimension in e-Commerce by taking into account benevolence, ability and integrity (Hwang and Kim, 2007). This study also pointed out self-service system and human-computer interaction logics. The website user's effective variables, such as anxiety and enjoyment, were considered as moderate variables in e-Trust. Personality enjoyment is the extent to which a computer or system is used. These two subjects, enjoyment (positive) and anxiety (negative) influence trust. Web quality and web design were mentioned as important antecedents in online customer behaviour. Website perceived information content (for services and products), context (effectiveness) and information security influences customers' attitude towards the utilization of e-Commerce. The findings showed partial mediating effects of anxiety and enjoyment between e-Trust and web quality.

Web sites are the main interface between online customers and merchants. Assessment of web site by customers affects their beliefs about the merchants. Zahedi

and Song (2009) investigated customer's beliefs and the role of web design elements in altering customers' existing beliefs after their exposure to an e-Commerce web site.

In the context of online transactions, online users' mainly expect websites to facilitate their purchase (Maswera et al., 2009). Website usability can be defined, the ease of understanding the structure of a website, its functions, interface and the contents that can be observed by the user; simplicity use of the website in its initial stages; the speed with which the users can find what they are looking for with search and compare facilities. The perceived ease of site navigation in terms of time required and action necessary in order to obtain the desired results; and the ability of the user to control what they are doing, and where they are, at any given moment (Belanche et al., 2012).

In another study Wang et al. (2011) examined two dimensions of web aesthetics, aesthetic formality and aesthetics appeal, effect on customer attitude and behaviour. Customer's psychological reactions include perceived service quality, satisfaction and arousal. Customization is another strategy that is adopted by online companies. Information of customers' transaction are available in their databases that help firms to understand their customers' needs to provide better and fast services to their customers. Collecting and analysing customers' information by the system result customer satisfaction in e-Commerce environment (Lee et al., 2012). Product customization by choosing attribute, component, delivery options and prices also affect on customer satisfaction in e-Commerce. Customer's experience of self-customizing a product with a sales configuration can be a source of related benefits for customers that can satisfy idiosyncratic needs (Bharati and Chaudhury, 2009; Trentin et al., 2014).

Two studies have been discussed about fast and easy payment. Wolfinbarger and Gilly (2003) investigated e-TailQ (e-Tail quality) or quality of web system in retail. Quality in different dimensions affect on customer satisfaction. Interview with customers and website designer have been conducted to determine different dimension

of e-Tail quality. Information quality, interactivity, response time, easy to understand, visual appeal, easy payment were the different aspects that were discussed in this research. The results showed that these factors have a significant effect on customer satisfaction. Gommans et al. (2001) also investigated e-Loyalty formation in e-Commerce based on website and technology, customer service, value proposition, trust, security and brand building dimensions. In the website and technology section this study focus on website quality items such as easy navigation, information quality, language option, search functions. In the customer service this research focuses on the variables such as fast response to customer inquiries, easy payment and fast delivery. In the value proposition section, items such as product guarantee, well-known brand, customized products and variety of products were discussed. In the trust and security focus was on the security and reliability of the system and in the brand building, brand image building and community building were discussed. The results of this study showed that these dimensions affect customer loyalty in the e-tail context.

e-Commerce has become a large and important segment of the new digital economy. One of the tools used on the websites of online companies is the recommendation system: it provides a customized online shopping experience. Hostler et al. (2011) investigated the effect of recommender system on customer behavior based on their recent shopping behavior. In this research, a theoretical model was presented to illustrate the impact of recommender system on online customer behavior. The model was tested through an online shopping simulation which used a collaborative filtering based product recommender system. The results showed that recommender system increase promotion and product search effectiveness, user satisfaction and unplanned purchasing. In another research (Yoon et al., 2012) investigated the effect of recommender system in an online retail environment. The effect of recommender system on product promotion effectiveness, customer satisfaction and loyalty was

explored. The results of this research revealed that recommender system has a positive effect on product promotion, customer satisfaction and loyalty and it enhances e-Commerce.

The following case study will illustrate the factors that affect decision-making in the decision support system (DSS) in e-Commerce (Bharatia and Chaudhury, 2004)**.** DSS assists a customer's selected product and services according to their respective requirements. Individual customers can choose different products and services based on their price, components, attributes and delivery options. Knowledge processing, system and user interface are three main components in this research. These components help customers to make decision to select goods or services. The proposed model also encompasses information and system quality, and their respective effects on customer satisfaction. The results of structural equation modelling (SEM) showed that system quality and information quality influences decision-making satisfaction. The dependent part in the framework is the decision-making satisfaction, and the dependent variables were influenced by information presentation, information quality, and system quality. The ability of the system in problem solving activities and support decision making is scrutinized by decision-making satisfaction. Table 2-2 shows the independent variable in the formation of the framework based on information presentation, information quality, system quality, and decision-making satisfaction.

Table 2-2: List of independent and dependent variables in the framework – (Bharatia et al. 2004)

Independent/Dependent Construct	Construct name	Item No.	Item measured
Independent	**System quality**	V1	System reliability
		V2	Convenient to access
		V3	System ease of use
		V4	System flexibility
Independent	**Information presentation**	V5	Information accuracy
		V6	Information completeness
		V7	Information relevance
		V8	Information content needs
		V9	Information timeliness
Independent	**Information presentation**	V10	Presentation graphics
		V11	Presentation colour
		V12	Presentation style
		V13	Navigationally efficient
Dependent	**Decision Making Satisfaction**	V14	Decision confidence
		V15	Decision effectiveness

The results of data analysis showed system and information quality have positive and direct relationship with customer decision-making. This basically means that an increase in the quality of system and information will correspondingly lead to an increase in decision-making satisfaction. However, information presentation is not correlated to decision-making satisfaction, whether positively or directly. Therefore, positive changes in presentation do not positively influence decision-making satisfaction. Recommender and decision making system are complementary systems in e-Commerce that affect customer satisfaction and loyalty.

Kim et al. (2011) studied the effect of perceived trust on electronic commerce in tourism products and services in South Korea. Based on the report of OECD's 2008

(Seoul Finance Internet News, 2009), South Korea has the most home Internet access, with 80.6% of the population using the Internet in their homes or offices. OECD also reported that two-thirds of Koreans with Internet access are online shoppers. This study aimed to examine the effect of transaction cost, navigation functionality, and security of information and privacy as exogenous variables on satisfaction and trust as mediating variables, and loyalty as a depending variable. The results of their study showed that security of information and navigation functionality positively influence trust and satisfaction. However, transaction cost only effect satisfaction. Satisfaction has a positive effect on trust, which in turn, influences loyalty.

Kim et al. (2009) proposed a model of e-Loyalty development trend that integrates e-Satisfaction, e-Trust and e-Tail quality. In this research, e-Tail quality refers to information search, website navigation, interaction, delivery, and order product satisfaction. The focus of their research was on four dimensions of e-Tail that are present in the system quality aspects, such as reliability, security, responsiveness, and website design. The results of their study indicated that e-Trust and e-Satisfaction are two most important subjects in the e-Loyalty development process. e-Tail components differently influence e-Trust and e-Satisfaction. Website design has a positive relationship with satisfaction, while security has a positive relationship with e-Trust.

Zhuang and Lederer (2006) investigated e-Commerce retailer in terms of relationships among human, business and e-Commerce technology. This research focuses on different resources such as e-Commerce technology as well as the individual business resource. In the section of e-Commerce technology resources, customer interaction with system through bulletin board has been mentioned as important factor that affect customer trust and e-Commerce prosperity. Corbitt et al. (2003) also studied trust in perspective of relationship between customer and firm. In this study, perceived site quality, market orientation, user's web experiences and risk are the factors that

affect perceived trust in e-Commerce. In the section of risk, bulletin board has been mentioned as an important item that reduced the risk that has positive effect on customer trust in e-Commerce.

Jones and Leonard (2008) presented a model based on the internal and external factors. Internal factors encompasses perceived website quality (PWSQ) and natural propensity to trust (NPT), while external factors encompasses third party recognition (TPR) and others' trust to buyers or sellers (OTBS). Their research is in the context of customer-to-customer e-Commerce. These experts express their support in their research paper, positing that e-Commerce is a new phenomenon for people, and trust plays a significant role in the utilization of e-Commerce, which increases with familiarity.

Concern about ethical issues associated with online shopping was investigated by (Cheng et al., 2014). This study assesses the customer perceived ethics of e-Commerce website. The results show that complaint management also lead to trust. e-Commerce companies should publish a clear return policy and information about compensation when product or services are not delivered on time. e-Commerce firms should handle consumer inquiries and complains promptly during the transaction process. Wu (2013) also investigated the complaint behaviour to maintaining customer trust and loyalty in an online marketing. They provided insight into the customers' experience of service failure and help to redress the failure. They believe that It is important to examine the antecedents of customer satisfaction and its link to complaint intentions. Online shoppers are both buyers of products or services and users of web-based systems. Trust also plays a critical role in forming a psychological state with positive or negative feelings toward e-Vendors. In this context, there are three major concerns: justice, technology and trust. This study proposes a research model to combine these issues, in order to investigate complaint intentions. Data were collected from an online survey

where in subjects were encouraged to reflect on recent service failure experiences. The results from testing a structural equation model indicated that distributive and interactional justice contribute significantly to customer trust and, in turn, to complaint intentions, but procedural justice does not. Technology based features and trust are also important in determining the two target variables. Table 2-3 shows technological items from previous researches.

Table 2-3: Technological items in the other researches

Items	References
System quality	(Chang and Chen, 2008), (Lin et al., 2011) (Ahn et al., 2004), (Chang et al., 2009), (Burnham et al., 2003), (Lee et al., 2009), (Cheung and Lee, 2006)
Information quality	(Lin et al., 2011), (Ahn et al., 2004), (Lee et al., 2009), (Cheung and Lee, 2006), (DeLone and McLean, 2003), (Hwang and Kim, 2007)
Personalized web feature	(Ribbink et al., 2004), (Wang et al., 2011)
Language Options	(Ribbink et al., 2004), (Gommans et al., 2001), (Pennanen, 2009)
Search and Comparing Facilities	(Maswera et al., 2009) (Belanche et al., 2012) (Gommans et al. (2001)
Using other Systems (Complementary system)	(Hostler et al., 2011), (Yoon et al., 2012) (Bharatia and Chaudhury, 2004)
Collecting and Analysing Customer Information	(Lee et al., 2012), (Bharati and Chaudhury, 2009), Trentin et al., 2014)
Fast and Easy Payment	(Wolfinbarger and Gilly, 2003) (Gommans et al., 2001)
Customer Bulletin Board	(Zhuang and Lederer, 2006), (Corbitt et al., 2003)
Security of Information and Privacy	(Chung et al., 2011), (Kim et al., 2009)
Complain and Follow up Facility	(Cheng et al., 2014), (Wu, 2013)

2.11 Organizational aspect of e-Commerce

Advantages of web-based technology encourage firms to apply e-Commerce in their organizations. The prosperity of using e-Commerce has relationship with organizational policies and plan (Tarafdar and Vaidya, 2006). For instance, reputation of a company comes from their long term policy and plan and is the result of customers judgement. Organizational policies and plan lead to customer trust and satisfaction in

the online environment (Zhang et al., 2011). In the following section a review of organizational policies that affect customer satisfaction and trust will be presented.

The segmentation of online customers into multiple categories can contribute to better understanding and characterization of purchasing behaviour in e-Commerce. The databases of online shopping consist of multiple kinds of data on customer purchasing activity and demographic characteristics, consumption attribute, and internet usage. Information about customers covered by segmentation enables company administrators to establish good customer relationships and refine their marketing strategies to match customer expectation and satisfaction (Wu and Chou, 2011).

Customization of product is one of the policies that companies consider to increase customer satisfaction in e-Commerce. Many firms provide configurable products on the Internet to satisfy customers' diversified requirements. Familiarity with different components of product is necessary for customization of products. Luo et al. (2008) studied optimization of customers selection for configurable production in business to commerce in the domain of e-Commerce. This research proposes a new approach to help customers configure their expected products in order to increase their satisfaction in e-Commerce. Once customer inputs the level of important requirement, total budget of the expected product, the system can figure out a customized product which maximally meet the customer's expectations and can also provide the suboptimal solution for further selections that lead to customer satisfaction. In another study, Gommans et al. (2001) also explored the effect of value proposition with variables such as customized products, variety of goods and services, product quality, and contribution with well-known company. The results of this research also revealed that customization of products besides the other variables affect customer's attitude toward intention to use e-Commerce and loyalty.

e-Contact has become one of the important tools for linking e-Customer and e-Retailers. e-Contact centre has become an effective marketing tool, which can be applied to create and sustain relationships with customers. The relationship between e-Customers and e-Sellers via e-Contact centre increases by providing the social value and quality interpersonal service to customers (Park et al., 2011). The results of this research showed that fast response to customer inquiry lead to customer satisfaction and loyalty in e-Commerce.

Customers can buy bulky baskets of goods through the Internet. e-Commerce companies usually have home delivery services. This makes e-Commerce a technology well suited to help customers to buy in bulk or to stockpile items on discount. Pozzi (2013) investigated customers' behaviour in e-Commerce environment. e-Commerce leads to an increase in bulk purchase and stockpiling behaviour by customers. Discount items are sold at a lower price per unit besides variety of goods and services have a great effect on customer intention to buy and satisfaction.

Fernández-Sabiote and Román (2012) discussed the effect of technology and the adoption of multi-channel strategy in the marketplace. The effect of incorporating technology in the marketplace has been extremely high, particularly in the service field, which relies on close and personal contact between employees and customers. This research endeavours to explore how online and offline channels, as two main strategies, build customer loyalty. Complexity of services and the level of customers' access to the Internet were analysed in the context of the moderating role in the service value – loyalty link. Customer samples were both online and offline services. The research outcomes showed that offline perceived service value enhances online perceived value. In addition, offline value influences overall loyalty more than online value and complexity of online service and Internet adoption influence service value on loyalty as moderators. According to the results, not only the performance of the online channel,

but also the way in which online and offline channel work together to propose the total service experience are important with regards to the formation of e-Loyalty. The results also stressed that the coordination of the channels is an important factor in the multichannel strategy. Cai and Xu (2006) focused on the effect of shopping process and enjoyment on online customer behaviour. The success of transaction depends on obtaining shopping value that it is fundamental purchase goal in e-Commerce. Shopping value refers to customers' evaluations of a shopping process. It plays an important role in predicting customer's choice and future purchase intention. The effects of three component customer value (outcome, shopping process and enjoyment) on customer behaviour were investigated. The results of their study showed that clear shopping process has significant effect on customer behaviour and intention to purchase.

Cyr et al. (2007) compared traditional commerce with modern and online commerce, and focus on some characteristics such as direct or face-to-face contact in traditional commerce, and faceless interaction in e-Commerce. They described shopping as a communication process. Shoppers gather information from different ways, and based on this information, decision to purchase is made. In their model, perceived ease of use and usefulness, perceived social presence, trust and enjoyment affect customer loyalty. Two important factors (perceived usefulness and ease of use) are derived from Technology Acceptance Model (TAM). Social presence is described as the extent to which a medium allows users to experience others as being psychologically present (Gefen et al., 2003) . Social presence is discussed in communication theory, and some experts characterize it as information transmits. Social presence is connected with the user who perceives the webpages as warm, personal, sociable, imitating the feeling of human contact. Enjoyment has been mentioned as a factor that leads to returning customers to the website, and consequently, result in e-Loyalty. Chu and Yuan (2011)

also investigated the effect of interactivity on customer trust and transaction intentions in e-Commerce. The results of this study as well as other researches in this domain show that interactivity is a major determinant of e-trust and e-Loyalty. Contact interactivity has been considered as an item in organization policy.

Reputation is defined as the extent to which buyers believe a selling organization is honest and concerned about its customers. Reputation is a valuable asset that requires a long-term investment of resources, effort, and attention to customer relationship (Jarvenpaa et al., 2000). Reputation is regarded as a type of signal promoting trust in e-Commerce. Signal is a message that shows ability or advantage of a company to their customers. Bente et al. (2012) investigated three reputation condition (positive, negative and no seller's reputation). Buyers' ratings of trust and the number of purchase served as dependent variable. The results showed, positive reputation contributed toward buyers trust and higher purchase rate.

Zhang et al. (2011) tested and formulated a framework, which describes business to customers' repurchasing from the viewpoint of customer relationship quality. Their model was empirically tested in Northern Ireland. The outcome of their studies revealed that the quality of online relationship and perceived website usability positively influences the intention of repurchase by customers. In addition, online relation quality is influenced by perceived website quality, perceived seller reputation and experiences in the fulfilment of an order, whereas distrust to sellers negatively influenced online relationship quality. Vendor reputation refers to customer perceptions of the retailer's public image, quality of products and services, innovativeness, and commitment to customer trust. Vendor reputation is determined based on its past performance and behaviour by customers. Reputation is difficult to build, but easy to lose. Vendor requires maintaining a good reputation once relationship is established.

Customers tend to trust vendors with a high reputation because they believed that such firms will not risk their reputation by acting opportunistically (Koufaris and Hampton-Sosa, 2004). Pei et al. (2014) investigated the effect of return policy as a major problem for e-Commerce companies. They argued that return policies play a strategic influence on customer trust and repurchase. A signal is what a firm sends out to convey its abilities. Firms use several tools such as guaranties, advertising and return policy to signal a products' position and quality, decrease the risks and increase trust and purchasing intention. The findings revealed that clear and attractive return policy and guaranties are the most important tools to attract customer and increase their trust.

A brand is a trust mark for all intangible trust-generating activity, and in absent human touch, it can be a symbol of quality and assurance in building trust (Yoon, 2002). The importance of brand strength in building trust may vary by website category. For sites dealing with high involvement items such as automobiles, financial services and computers, brand is an important attribute in that brand association with the item and the website may be quite strong. Thus, brand strength could be a more effective driver of online trust for such categories than other categories (Bart et al., 2005). Gommans et al. (2001) studied brand loyalty toward e-Loyalty, and presented a conceptual framework of e-Loyalty. Website and technology, customer service, value proposition, trust and security, and brand building affect customers' attitude and consequently their behaviour to loyalty. These experts believed that brand loyalty is very important in marketing and proper channel of distribution, premium price, and reduced selling costs lead to customer trust and finally loyalty.

Corbitt et al. (2003) reviewed trust in a business-to-business context, and presented a conceptual framework based on the level of web experience, technical trustworthiness, and perceived market orientation. Customers with more perceived site quality have more perceived market orientation and trustworthiness in the context of e-

Commerce. In addition, customers possessing higher trust levels are more likely to participate in e-Commerce. Well-known partnerships, money back warranty, and word of mouth are the top three effective risk reduction tactics. This study highlights how the trust relationship forms on e-Commerce. Exchange theory explains how people exchange relationships form based on trust. In an online environment, customers perceive higher levels of risk compared to the usual shopping environment, due to the lack of regulation and virtual identity. Based on the balance theory, customers tend to adopt a positive attitude towards prior associations. More experience on the Internet and more opportunities lead to a more positive attitude toward e-Commerce. Therefore, customers' web experiences affect e-Trust. Based on the Theory of Planned Behaviour and Theory of Reasoned Action, behavioural intention influences behaviours and beliefs; also directly affecting intentions (Gefen et al., 2003). The findings in this research suggest that people are more likely to purchase from the web if they perceive a higher degree of trust in e-Commerce and have more experience in using the web. Customer's trust levels are likely to be influenced by awareness of market orientation, site quality, technical trustworthiness, and user's web experience. People with a higher level of perceived site quality seem to have a higher level of awareness to market orientation and trustworthiness towards e-Commerce. Furthermore, people with a higher level of trust in e-Commerce are more likely to participate in e-Commerce. Positive 'word of mouth', money back warranty and participation with well-known business partners are effective risk reduction strategies.

Number of products that are sold or bought through Internet by e-Commerce websites are increasing rapidly. In other words, people prefer to buy their requirements from Internet. The factors such as trust, security and availability play important roles in these transactions. So, companies try to improve quality of these factors to cause better feeling for customers. Lin et al. (2011) investigated different aspects of quality such as

delivery quality, information quality, system quality and service quality in e-Commerce. The results of this study showed that delivery quality was the most important factor that effect on customer intention to buy in e-Commerce environment. Abbasi et al. (2011) also investigated the quality of delivery and the ability of customers in pursuit the history of goods and its effect on customer's trust. The results of this study showed that fast and safe delivery has positive effect on customer trust and decrease the resistance of customer to use e-Commerce. Table 2-4 shows the organizational items from previous researches.

Table 2-4: Organizational items in the other researches

Items	References
Customer Segmentation	(Wu and Chou, 2011), (Kaefer et al., 2005)
Customize Products	(Luo et al., 2008), (Gommans et al., 2001)
Fast Response to Customer Inquiries	(Park et al., 2011), (Cyr, Hassanein et al., 2007)
Variety of Goods and Services	(Pozzi, 2013), (Fernández-Sabiote and Román, 2012)
Clear Shopping Process	(Fernández-Sabiote et al., 2012), (Cai et al., 2006)
Money Back Warranty	(Pennanen, 2009), (Corbitt et al. 2003)
Contact Interactivity	(Cyr et al., 2007), (Gefen et al., 2003), (Chu and Yuan., 2011)
Organizational Reputation	(Jarvenpaa et al., 2000), (Bente et al., 2012), (Zhang et al., 2011), (Koufaris et al., 2004)
Guarantee Policy	(Pei et al., 2014), (Pennanen, 2009), (Palvia, 2009)
Selling High Regarded Brands	(Yoon, 2002), (Bart et al., 2005) (Morgan-Thomas and Veloutsou, 2013)
Contribution with Well Know Company	(Gommans et al., 2001), (Corbitt et al., 2003), (Gefen et al., 2003)
Fast and Safe Delivery	(Lin et al., 2011), (Abbasi et al., 2011), (Gommans et al., 2001), (Lin et al., 2011)

2.12 Customer aspect of e-Commerce

Customers are one of the important entities in e-Commerce that without it no business can form (Shaw, 1999). In this research customer factor relates to all variables that affect customers perception and attitude toward satisfaction, trust and loyalty in e-Commerce. In the following section a review of literature will be presented.

Morgan and Veloutsou (2013) investigated online brand experience and its effect on customer. In this research the emotional aspect of a brand relationship supplements the dimension of technology acceptance to provide a more complete understanding of consumer experience with an online brand. The model incorporates technology acceptance model variables including perceived usefulness, perceived ease of use and behavioural intentions. The results showed that online brand experiences depend on the perceptions of usefulness of the brand, trust and indirectly, on its reputation. Positive experiences lead to satisfaction, behavioural intentions and in turn, to emotional ties with the brand.

Corbitt et al. (2003) believed market orientation is essentially a managerial philosophy, which takes the customer as a focal point for business activities and considers profit as a consequence of customer orientation. Information collection and usage were considered as governing determinants to the organisations' market orientation in the 1980s. Using this definition in the business to commerce context, market orientation is likely to increase the level of trust since the e-Commerce web sites will: (1) collect the customer's information dynamically to follow customer's preference from time to time; (2) use the information to customise product or services to cater to the individual customer's taste on a one-to-one basis rather than mass marketing; (3) maintain close contact with customers and respond to customer's problems in real time; and (4) allow customers to contribute to the site development. Ergün and Kuşcu (2013) also investigated relationships among e-Commerce, market orientation and innovation with e-Satisfaction and e-Loyalty. Market orientation refers to business attempts to discover, understand needs of customers. Market orientation addresses the latent needs of customers which the customer is unaware. This abilities lead to customer satisfaction and loyalty in e-Commerce.

Lee and Ahn (2006) studied the factors that encourage or discourage customers from using electronic purchasing methods in Korea and United States to investigate the adoption of e-Commerce in developing and developed countries, and mentioned that while empirical research was insufficient in Korea, significant efforts were made in the United States. Perceived convenience, risk, general demographics and technology demographics were investigated in this research. The results showed that perceived convenience, risk, and technology influence e-Commerce adoption. Risks in transactional context, products or services have negative effect on customer trust and perceived convenience. On the other hand, perceived convenience has positive effect on customer satisfaction.

The following case study will illustrate the effect of uncertainty avoidance, long-term orientation, masculinity, individualism and power distance on e-Commerce acceptance by customers in China. This study explored the effects of culture, perceived ease of use, trust, and perceived usefulness on intention to use (Yoon, 2009). In addition, Hofstede's cultural dimensions, such as uncertainty avoidance, long-term orientation, masculinity, individualism, and power distance were adopted as moderating factors. The findings showed that in the relation between intention to use and trust and long-term orientation, uncertainty avoidance is considered as a moderate factor in relationship to intention to use and perceived usefulness. However, power distance and individualism have no visible effect on the intention to purchase in this case. Table 2-5 shows the definition of different parts of the model.

Table 2-5: Definition of different part of the model (Yoon 2009)

	Definitions
Power distance (PDI)	The degree to which the less powerful members of organizations accept that power is distributed unequally.
Individualism (IDV)	The degree to which a society emphasizes the role of the individual.
Masculinity (MAS)	The degree to which a society emphasizes traditional masculine values (such as competitiveness, achievement, and ambition), as opposed to others (such as nurturing, helping others, and valuing quality of life).
Uncertainty voidance (UAI)	The degree to which people feel threatened by uncertain, unstructured situations and ambiguity.
Long-term orientation (LTO)	Fostering of virtues oriented towards future rewards.

In the new research, Hong et al. (2011) discussed the effect of trust on customers decision in online purchasing and showed the impact of trust on customer behaviour in Korea. This research shows that trustworthiness is extremely important with regards to the participating party, as the antecedent of trust. They believed that trust is transferred from one party to another, and trustworthiness is a predictor of trust. If customers realize that an online seller is trustworthy based on the quality of their website, previous experience, word of mouth, they will tend to trust the seller. The outcomes show that competence and integrity are positively related to trust in an intermediary, and trust in intermediary has a positive relationship with trust among sellers in an online environment. Competence refers to the customer belief that company is able to fulfil its promises communicated to consumers and integrity is a belief that a company acts in a consistent, reliable and honest manner when fulfil its promises (Hong et al., 2011).

Pennanen (2009) focused on e-Trust building process, and presented an integrative model that improves trust formation development. Different cognitive and affective aspects that build e-Trust are in this model. Concepts that relate to e-Trust, customer e-Trust behaviour formation, and customer characteristics that influence e-

Trust are main constructs in this research. Additionally, the model shows the roles of customers' characters and behaviour in the e-Trust formation process. In this study, it has been argued that customers utilize different mechanisms in order to build e-Trust. This refers to the customer's conscious act, that is why building e-Trust encompasses two aspects: cognitive and affective. Cognitive refers to mental process and perception of trust (Egger, 2001). In the affective aspect, cognitions and previous experiences lead to affective decision making. Previous information about any products help them decide on purchasing. Attributes of websites, like usability, and graphic design, are imperative to a customers' first impression of a website

Shankar et al. (2003) explored the differences between online and offline services by considering the level of satisfaction and loyalty. These experts tried to answer these questions: What are the difference between online and offline service in the context of loyalty and satisfaction, which factors explain these differences, and how is the relationship between loyalty and satisfaction in online and offline services? In this research, two kinds of satisfaction were examined: service encounter satisfaction, and overall customer satisfaction. Transaction specific is classified in service encounter satisfaction, whereas relationship-specific is classified in the overall customer satisfaction. The factors, which influence these two kinds of satisfactions, differ. The role of intermediary, organization constraint on choices, service attribute performance, frequency of service use, service package, prior experience with service, interactivity of web, and depth of information on website influence service encounters satisfaction. The findings showed customer satisfaction for online service is similar for offline service. However, loyalty to the service provider in online services is higher compared to offline services. In addition, the results also showed that satisfaction and loyalty are mutually related and positively influence each other. The relationship between loyalty and satisfaction is strengthened in an online environment.

Chien et al. (2012) studied the underpinning forces that influence organizational decision, in line with e-Marketplace activities to continue participation. This study has attempted to highlight the effects of perceived ease of use and perceived usefulness (Technology Acceptance Model) and relationship between trust and e-Marketplace providers. The empirical findings suggest that perceived ease of use positively influences perceived usefulness of e-Marketplaces; perceived ease of use influences user trust of e-Marketplaces via perceived usefulness; and relational embeddedness leads to enhanced trust in e-Marketplace providers. Relational embeddedness shows collaboration and cooperation among different parties in e-Commerce. Relational embeddedness is developed based on the frequency of past interactions and can be revealed through collaborative activities. The research outcome revealed that perceived ease of use influences trust via perceived usefulness. Two main purposes of this study are: Firstly, the role of trust in business-to-business transaction was investigated. The key factor in business-to-business transaction is trust. Secondly, previous studies have determined perceived usefulness and perceived ease of use as main characteristics, which influences user's attitude to adopt new technology in the homogenous environment such as a company. Current research utilized this model in order to explain the adoption process in the heterogeneous business group.

Palvia (2009) applied the theory of intention in order to understand trust in online transactions, and explained the relations between loyalty, values and satisfaction. Trust has two effects in this model: Firstly, directly on exchange relationship and secondly, indirectly on attitude. The research model shows the effect of perceived usefulness and ease of use on the customer attitude toward vendor's website. The model also describes the effect of belief in integrity and competence on customer's trust toward vendor's website. Customer's attitude and trust toward web vendor lead to customer's intention to create relationship with web vendor. This relationship affects

customer's satisfaction and perception of value that lead to customer loyalty. The results also show the effect of customer loyalty on customer's word of mouth communication.

Yoo et al. (2013) examined the effect of electronic word of mouth (e-WOM) on online shopping pattern of customers. Motivation and identification theories were applied to understand how e-WOM influences shopping behaviour. The research model shows that how intrinsic motivation forms based on concern for others, self-enhancement and social benefit. Extrinsic and intrinsic motivations lead to e-WOM participation and consequently e-WOM participation effect personal and social site identification and finally customer loyalty. The results of data analysis showed that intrinsic motivations have a stronger effect than extrinsic motivation on e-WOM participation. This shows customer consider e-WOM participation as a kind and good behaviour to other customers. The outcomes also revealed that e-WOM participation behaviour enhances social identification among customers. Social identification comes from customer interaction with others and positive referral from them.

Walczuch and Lundgren (2004) investigated the psychological antecedents of customer trust. This research highlights what happens in the customer's mind when a buyer decides to trust a seller. The significant aspect of this research was derived from inclusion of psychological aspects of trust formation in the process of purchasing. Psychological factors were categorised into five groups: knowledge-based, experience-based, attitude-based, perception-based, and personality-based. Knowledge is seen as 'technical' knowledge, which can be divided into knowledge about information practices and knowledge about security technology. Experience is defined as first-hand knowledge. This is accumulated through active participation of the consumer in the online buying process. Attitudes refer to customer attitude towards shopping and/or computers. Personality consists of all the internal traits and behaviours that make a person unique such as extraversion, neuroticism, agreeableness, conscientiousness; and

openness to experience. Perception shows the cognition of customer toward retailer. The results of this research showed that perception, experience and knowledge of customers have a positive effect on trust in e-Retailing, but personality and attitude have no effect on trust in e-Retailing. Table 2-6 shows customer items from previous researches.

Table 2-6: Customer items in the other researches

Items	References
Identifying Site Quality	(Minor et al., 2011), (Heeseok Lee, Choi, and Kang, 2009), (Hsin Chang et al., 2008)
Customer Experience in e-Commerce	(Gefen et al., 2003), (Morgan et al., 2013), (Hong et al., 2011), (Egger, 2001), (Shankar et al., 2003)
Market Orientation	(Gefen et al., 2003), (Ergün et al., 2013)
Risk	(Corbitt et al., 2003), (Lee et al., 2006), (Yoon, 2009).
Positive Referrals from friends	(Corbitt et al., 2003), (Hong et al., 2011), (Yoo et al., 2013)
Belief in Integrity	(Hong and Cho, 2011), (Hsin Chang et al., 2008),
Belief in Competence	(Palvia, 2009), (Hong and Cho, 2011)

The review of literature showed that technology, organization and customer are three main entities in e-Commerce. On the other hand, looking to these items revealed that the items relate to technological, organizational and customer aspects of e-Commerce. Table 2-7 shows the classification of items based on a review of literature. To increase the validity of the model, interview with experts in this domain were conducted that the results with more details have been presented in chapter three.

Table 2-7: Classification of items based on literature review

	Technology Factors	Organization Factors	Customer Factors
e-Satisfaction	System quality (TS1) Information quality (TS2) Personalize web feature (TS3) Language Options (TS4) Search and Comparing Facilities (TS5) Product and Service Information (TS6) Using other Systems (TS7) Collecting and Analysing Customer Information (TS8) Fast and Easy Payment (TS9)	Customer Segmentation (OS1) Customize Products (OS2) Fast Response to Customer Inquiries (OS3) Variety of Goods and Services (OS4)	Identifying Site Quality (CS1) Customer Experience in e-Commerce (CS2) Market Orientation (CS3)
e-Trust	Customer Bulletin Board (TT1) Security of Information and Privacy (TT2) Complain and Follow up Facility (TT3)	Clear Shopping Process (OT1) Money Back Warranty (OT2) Contact Interactivity (OT3) Organizational Reputation (OT4) Guarantee Policy (OT5) Selling High Regarded Brands (OT6) Contribution with Well Known Company (OT7) Fast and Safe Delivery (OT8)	Risk (CT1) Positive Referrals from friends (CT2) Belief in Integrity (CT3) Belief in Competence (CT4)
TS: Technological items that affect e-Satisfaction, TT: Technological items that affect e-Trust, OS: Organizational items that affect e-Satisfaction, OT: Organizational items that affect e-Trust, CS: Customer items that affect e-Satisfaction, CT: Customer items that affect e-Trust			

2.13 Application of Neural Networks in Marketing

Modern marketing tries to identify customers who respond to a product positively, and target their solicitation or advertising towards those particular customers. Classification, clustering, modelling and forecasting are sample of neural network application. Neural networks map input to outputs and reduce the measure of error in the learning process. Target marketing deals with market classification, whereby the market is segmented into several groups of customers based on the customer's behaviour. Basic characteristics such as attitude, purchase patterns, geographical location, socioeconomic status and demographics, are considered for market segmentation by neural network (Reutterer and Natter, 2000). Similarities of customer's characters for clustering can be used in unsupervised neural networks. Clustering can be learned by customer segmentations, based on a group of customers with known segment

labels such as rare buyer, occasional buyer, and frequent buyer (Kaefer et al., 2005). Direct marketing can be applied to sell goods or services to customers without advertisement or promotion. In customers' segmentation, the segmented customers exhibit similar behaviours. This strategy can save both time and money for the sellers. Neural networks can be applied to improve response rates to up 95% by selecting customers in a particular segment without the need to advertise (Feng and Zhang, 2014). Neural networks can monitor customer behaviour patterns over time. This way, experts can detect when a customer switches to another alternative or a competitor. Daily transaction details help predict customer behaviours based on learnt models. These strategies can be devised for other customers who are probably switching to another alternative.

2.14 Application of Neural Networks in Retailing

Companies usually need to predict sales in order to decide on pricing, staffing, and stocking their respective inventories. Neural networks are highly successful in sales prediction. Due to its capacity, different variables such as the price of products, the size of the population, customer's income and market demand need to be concurrently taken into account. The results of sales forecasting by neural network for wholesale and supermarket have been shown to perform well compared to statistical techniques such as regression (Joseph et al., 2011). Market basket analysis is another area where neural networks can flourish. Daily transaction details of customers show the products that customers buy to gather, or the time that delay sales of the two products. Sometimes, there is a relationship between products A and B in terms of selling. Then, the seller can put these products in the same shelf. The seller can decrease the chance that a customer might purchase a similar product from a competitor. Neural network can also help understand the market structure between different brands(Sun et al., 2008).

2.15 Application of Neural Networks in Banking and Finance

Finance and trade forecasting is one of the important areas in banking and finance. Neural networks have been used to solve problems such as selection prediction, derivative securities pricing, hedging, stock performance, exchange rate forecasting, and futures price forecasting (Smith and Gupta, 2000). Banks have applied credit-scoring techniques in order to sort through loan applicants for eligibility. Wealth creation is a new domain in finance that utilizes neural networks. Performance of a company, short-run financial health, and corporate strategy utilize neural networks for wealth creation. Neural networks enhance fraud detection systems that operate in ten US, and five Canadian banks. The neural network is trained to detect fraudulent activity by comparing legitimate card use with fraud cases. This method manages to save the banks USD 40 million in a mere half a year. Bank signatures' validation is another domain that actively utilizes neural networks (Karouni et al., 2011).

2.16 Application of Neural Networks in Insurance

Policyholders' segmentation, based on their behaviours, can help optimize premium pricing. Estimate of claim cost and frequency can help set premiums. Unusual circumstances or detecting fraudulent claims are two important parameters for neural network to be trained in (Lei and Ghorbani, 2012). Customer retention is another utilization of neural networks in insurance industry. Historical information regarding policy holders can sort out the reason why they left in the first place (Smith et al., 2000).

2.17 Application of Neural Networks in e-Commerce

In this part different application of neural networks in e-Commerce will be presented.

2.17.1 Customer Satisfaction Modelling with Neural Networks Approach

Several experts investigated the relationship between customer satisfaction and design attributes of new products (Jiang et al., 2012). These scholars believed that if customers were satisfied with new products, the products would be a success in the marketplace. Optimization methods based on Artificial Neural Fuzzy Interface System (ANFIS) approach was applied for modelling of customer satisfaction in order to improve product modelling accuracy. The details about ANFIS have been presented in chapter three. The design of a notebook computer was used as an example to illustrate the model. In this research, comparisons between fuzzy regression (FR), ANFIS, and Genetic Algorithm (GA) methods showed that using ANFIS method decreases the mean absolute errors and variance of errors in the research model.

2.17.2 Customer's Purchase Decision by Neural Networks

Nilashi et al. (2011) presented a model based on neural fuzzy system, which shows hidden relationship between the critical factors, such as designing of website, familiarity in the business to customer online website, security, and competitiveness. In addition, the competitive factors were discussed in their model. In the next step, the effects of these factors on customers' decision purchasing were analysed. They analysed the effect of these factors on business to customer trading as well. This study provided a device for sellers to improve their online website.

2.17.3 Internet User's Classification and Pattern Recognition

Sexton et al. (2002) analysed a wide range of factors to identify predictors of e-Commerce usage on the Internet. The results showed that job, overall computer usage, gender, and home access are important characters that influence the use of Internet and e-Commerce. Forty nine percent of Internet users bought online in 2001 and online

advertising expenditures increased from 2.8 to 22 billion dollars by 2004 in the USA. This research investigated patterns of Internet usage among university students. The results of using a neural network approach were acceptable. Reduction of CPU usage and better generalization of results are the advantages of this method.

2.17.4 Recommendation System Based on Neural Networks

Changa et al. (2006) explored user's product specific knowledge based on customers' online navigation behaviour by analysing the customers' navigation path via pre-trained artificial neural network. This part of the system was named knowledge level assessment system (KLAS). Digital camera shops were used to empirically test this concept. The important part of this system is the online Personalized Promotion Decision Support System (PPDSS). PPDSS uses data mining techniques that agree with market strategy. This system also helps businesses provide suitable and potential promotional products for different customers. The dynamic personalization system was based on both KLAS and PPDSS. The process begins when the web system creates a session for the user. KLAS records their browsing behaviours and navigation paths. In the next step, KLAS uses web-mining techniques to compare the path with pre-identified expert and non-expert patterns. The output of KLAS is the level of customer's knowledge regarding a product. This outcome is used by PPDSS to present the product information, and recommend products to users based on the strategies of the e-Commerce business.

2.17.5 Agricultural Based Intelligent e-Commerce System

Wen (2007) applied a knowledge based intelligent e-Commerce system (KIES) to deal with agricultural products. The KIES system presents sales forecasting, financial analysis, the sale of agricultural products, more importantly, rule-based and feasible

solutions to sell agricultural products. This system assists managers to select via the Internet on agriculture data in the database and rule model base system. The artificial neural network model helps the system in demanding forecasting. e-Map, combined with GPS, was applied for the purpose of delivering products to customers. KIES has three main parts, which are administration, ordering, and financial subsystems. The subsystem of financial management contains a user-friendly interface, rule, and a model based inference engine with a database.

KIES provides an effective and friendly user-interface for determining financial alternatives with regards to decision-making. Therefore, managers can observe market activities in the context of buying or selling agricultural products. The database contains information on agricultural products, offers and analysis. This subsystem utilizes data in the database and rules in order to support reasoning. This subsystem uses data in the database, and rules in the rule base to infer new knowledge or alternatives. This part also assists managers in predicting and analysing their respective problems. The database includes data regarding agricultural products, orders, passwords, and historical data. This part actively utilizes critical management science, statistical models and operations research. In order to predict the total profits and total sales in the future, the artificial neural network was utilized. Finally, the update of previous or new users, and the implementation of the security services were carried out by the administration subsystem.

2.18 Artificial Neural Network

The Artificial Neural Network (ANN) is defined as a connected group of artificial neurons that use a mathematical or computational model to process data according to a connection approach to calculation. In most cases, an ANN is an adaptive system that changes its structure, based on internal or external information that flow

through the network (Nilashi et al., 2011). In other words, a neural network is a parallel system, comprised of several interconnections. The elements send messages to the next layer in order to complete the particular process. The connections are called Synapses, and are usually formed from Axons to Dendrites. The neural network learns, and then tries to maintain a model in order to achieve the goals. Neural network are non-linear by nature (Wang and Elhag, 2008). The input-to-output maps are based on pattern recognition capabilities. Neural fuzzy discusses the combinations of fuzzy logic and artificial neural networks. Some advantages of this method are:

I. Examples are taught to the neural network, allowing it to adapt input to output.
II. The neural network can extract information from incomplete, inaccurate, and noisy data.
III. It can present the correct solutions from data, but not exactly like training data.
IV. It can form the classification decision from discriminating pattern.
V. It has acceptable speed in real time.

2.19 Artificial Neural Fuzzy Interface System

Fuzzy rule based system; fuzzy associative memories (FAM), fuzzy models and fuzzy controllers are known as fuzzy inference system. Five parts govern a fuzzy inference system:

1) Fuzzy if then rules, or rule base containing
2) The membership functions, which are used with fuzzy rules
3) Inference operations on the rules as a decision making unit
4) Transformation of the crisp input into degrees of match with linguistic values (Fuzzification)
5) Transformation of the fuzzy results of inference into crisp output (Defuzzification).

Figure 2-1 shows this concept.

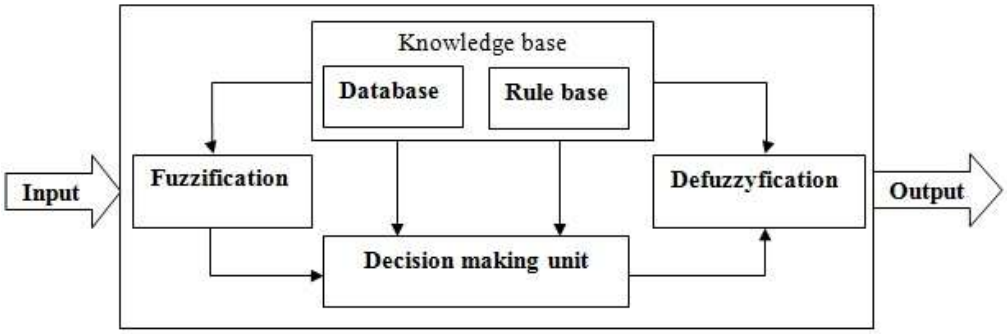


Figure 2-1: Fuzzy inference system

Knowledge usually encompasses rules and database. Fuzzy inference system contains these steps:

1) Comparing the inputs with membership functions to determine values of each linguistic label (Fuzzification).
2) Combining the membership values to determine the weight of each rule.
3) Generate the qualified consequent to each rule depending on the firing strength.
4) Converting the qualified consequents to produce a crisp output (Defuzzification) (Hush and Harne, 1993).

2.20 The Types of Fuzzy Inference Systems

There are several types of fuzzy inference systems based on fuzzy if-then rules and fuzzy reasoning:

Type 1: The rule's firing strength and output membership functions produce a weighted average of each rule's crisp.

Type 2: "Max" operation to the qualified fuzzy output leads to overall fuzzy output. Different schemes, such as the bisector of the area, the mean of the maxima, centroid of area, and maximum criterion are used in this type.

Type 3: Takagi and Sugeno's fuzzy if-then rules are used.

Each rule leads to a linear combination of input variables, plus a constant output, and the final output is the weighted average of each rule's output (Jiang et al., 2013). Figure 2-2 shows two rules and two input fuzzy inference system to show different types of fuzzy rules and fuzzy reasoning that was previously mentioned.

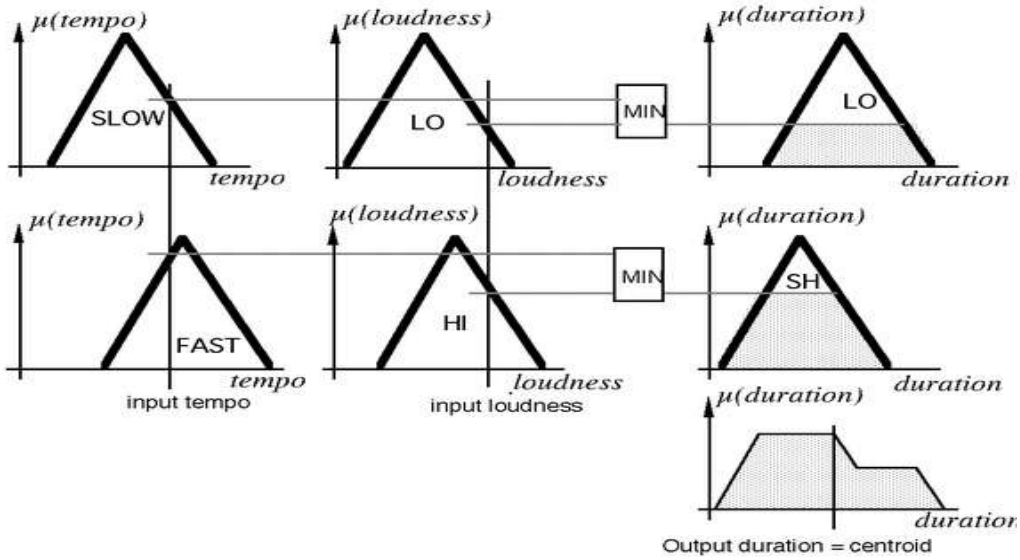


Figure 2-2: Commonly used fuzzy if-then rules

An ANFIS is a network with nodes and directional links with connected nodes. The outputs are based on the pertaining parameter(s). Therefore, all nodes are adaptive, and the learning rules determine how the parameters should be changed in order to minimize a prescribed error measure. (Werbos, 2012) proposed the basic learning rules of adaptive network, based on the gradient descent and the sequence of rules. The particular function is performed by each node based on the incoming signals, as well as a group of parameters pertaining to this node. Every node may have a particular formulation of its function, and the choice of function depends on the overall input-output function. The signals between the nodes are in the directions of the links.

2.21 Summary

The review of literature revealed that the other researches in this domain focus on particular issues and there is not comprehensive model or classification of effected

factors. The main purpose of this research is to demonstrate the formation of e-Loyalty based on the critical factors of e-Commerce. Based on the literature review, e-Trust and e-Satisfaction play mediating roles in the formation of e-Loyalty. The process of purchasing and customer loyalty formation in this environment have been presented in the Figure 2-3.

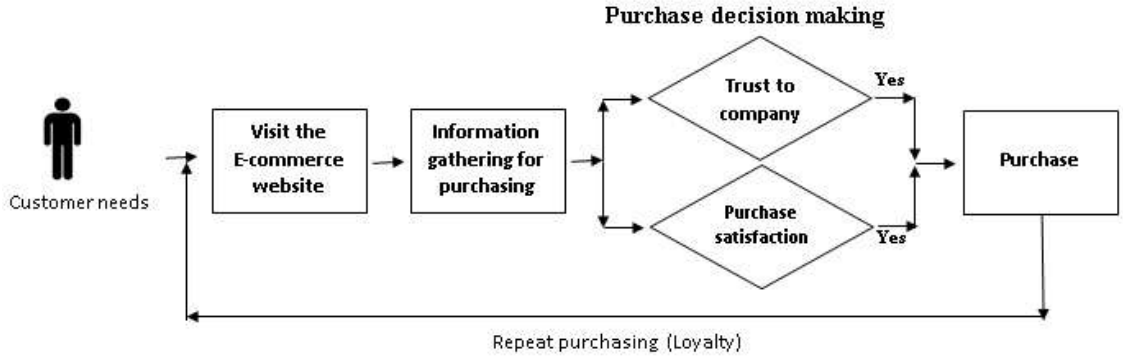


Figure 2-3: Diagram of customer repurchase formation in e-Commerce

The literature review revealed that the factors affecting e-Loyalty could be categorized into three distinct groups, which are technological, organizational and customer. These three classifications are the main entities of e-Commerce (Appendix A displays the references for these Items). On the other hand, the essences of these items are related to technology, organization and customers. The applications of neural network in commerce with review of previous study were also presented in this chapter. In the next chapter interview with experts will improve the model and final proposed model will be presented.

Chapter 3 Research Methodology

3.1 Introduction

The research methodology is an approach or a way to solve a problem with regard to the entire study. The research process encompasses several related activities in sequence. The research methodology begins with the definition of the problem, followed by the research question, explained in chapter 1. Figure 3-1 shows the research approach and the steps taken in the study.

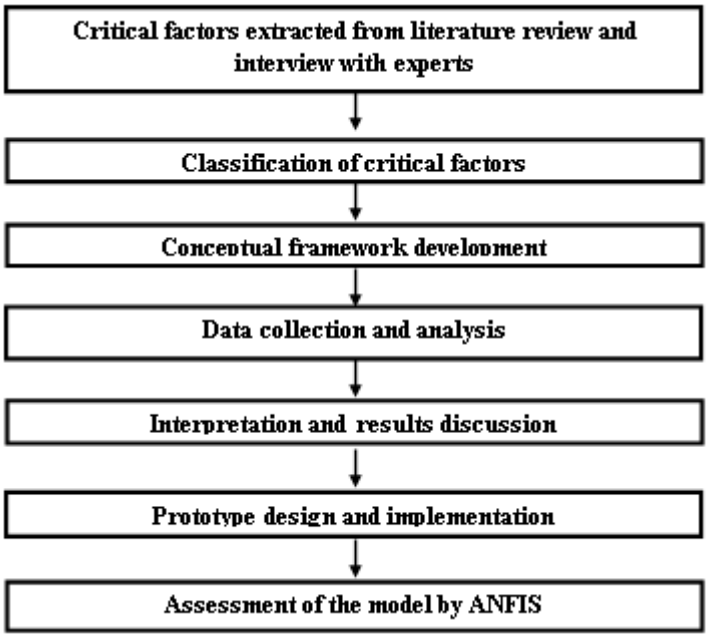


Figure 3-1: Research methodology

This research attempts to describe the formation of e-Loyalty via technological, organizational, and customer aspects (entities in e-Commerce), all of which are based on e-Satisfaction and e-Trust. Critical factors were extracted from the literature review

and interview with experts. Looking above allows us to delve deeper into the nature of these items in order to categorize them, based on their effects and roles in the formation of e-Satisfaction, e-Trust, and e-Loyalty. The research methodology that was used in this study will be thoroughly explained in this chapter.

Different resources, such as thesis, high quality papers in indexed journals, and books were used to determine the factors and variables that other researchers analysed in their respective studies. The critical factors were also extracted from interviews with experts in this field. To improve the model, the opinions of experts in the Faculty of Business and Faculty of Computer Science and Information Technology in University of Malaya, and also the view of specialists in the e-Commerce fair in Kuala Lumpur that was held at the Midvalley Exhibition Centre, were taken into account as well. Some of these factors and variables are related to technology, and some of them are related to the organizations and customers aspects. Looking at these independent variables will reveal the fact that technological variables are far more numerous compared to other variables, due to the fact that the important difference between modern commerce or e-Commerce and traditional commerce are technological items. These variables are influential in e-Trust and e-Satisfaction. The conceptual framework will be formed based on this classification.

3.2 Interview

One of the popular methods for data collection is interview. Interview-based technique is an appropriate approach for this study, due to its strength in eliciting insights with regards to e-Loyalty, e-Trust and e-Satisfaction in e-Commerce. To acquire better results that will help identify critical factors, experts in this domain are

considered as focus group for the interview. Working directly with the respondents forms one of the main advantages of an interview session. On top of that, scholars will be able to purview stories based on the personal experience of the interviewee, which will help to delve further into the topic at hand; while the interviewer has a general plan of inquiry, but they do not have a particular group of questions that must be asked. This situation will give the interview a general feel that will help the interviewer gather more information (Pickard, 2007).

Structured and unstructured interviews are two main methods that researchers can use in order to collect data.

Structured interview uses a predetermined questions set (Wilson, 2014). The structured interview encompasses two forms:

1) All interviewees answer open-ended questions. The advantages of this method are faster interview and simpler analysis with regards to the data. This method is called standardized open-ended interview.
2) A set of questions with a set of alternatives for any of them which is presented to the interviewee. This method is useful for the researchers who are not used to interviews, and is called closed-fixed response interview.

Unstructured interview is used to understand the feeling and thoughts of the interviewee. There are two kinds of unstructured interview:

1) Formal and conventional: the interviewer asks unplanned questions. There are no predetermined questions, and this is useful if the expert wants to know about the interviews priorities and nature.

2) This method is more focused compared to the conventional approach. However, it still has a degree of adaptability and freedom with regards to information collection (Wilson, 2014).

In this research structured open-ended interview was used to investigate loyalty, trust, and satisfaction in e-Commerce. By utilizing this method, participants can freely express their respective opinions. The purpose of the interview was to enrich the context and validity of the research model and the interviews help to identify the critical factors in trust, satisfaction, and the formation of loyalty in e-Commerce. Interview questionnaire was developed based on the research model and hypothesises. The interview focused on the effective items in customer satisfaction, trust and loyalty. The first part of interview relates to general questions about crucial elements to success of e-Commerce. The second part contains the questions about the effect of technological items on e-Trust and e-Satisfaction. The third part of interview questionnaire includes the questions about the effect of organizational items on e-Satisfaction and e-Trust. The fourth section encompasses questions about the effect of customer items on e-Satisfaction and e-Trust and finally, the last part asks participants opinion about the model. e-Commerce fair in the Kuala Lumpur was a good opportunity to meet experts of e-Commerce in a place and interview with them. Many of experts with variety of experiences were in the e-Commerce fair. To approach the experts for interview, a list of e-Commerce companies that attended in the fair was provided. The prominent firms in the domain of e-Commerce were selected and interviews were focused on the experts of these companies. The interviews were conducted with experts of four companies in the fair. Before starting interview, we explained the purpose of interview to the head of

company who attend in the fair and requested to introduce their experts in the domain of e-Commerce. A person with extensive knowledge in the domain of e-Commerce based on research, experience, or occupation is an expert. In this research the participants with more than two years' experience were selected for interview. The participants in the interview were twelve experts containing two professors, four lecturers that the domain of their research was in e-Commerce and six employees (experts) of e-Commerce companies. All experts had education and work experience in the domain of e-Commerce. Overall, the process of conducting all interviews took two months from first of February until the end of March in 2011. Table 3-1 shows participant demographic in the interview.

Table 3-1: Demographic of participants in the interview

Participants characteristics		n	Percent
Gender	Male	7	58.3
	Female	5	41.6
Age	20-29	3	25
	30-39	4	33.3
	40-49	3	25
	50 and above	2	16.6
Education	Bachelor	4	33.3
	Master	2	16.6
	PhD	6	50
Level	Professor	2	16.6
	Lecturer	4	33.3
	Expert	6	50
Work experience	2 years	3	25
	3-5 years	3	25
	5-10 years	4	33.3
	More than 10 years	2	16.6

After interview, the focus was on the context of interview. Due to low number of interviews (12 participants), particular software was not used for interview analysis. In the context of interviews we looked for items that they mentioned as effective items in

customer satisfaction and trust and their opinion about the model. The experts had different insights to e-Commerce. Table 3-2 shows a sample of interview.

Table 3-2: A sample of interview questions and a participant's answer

General questions	Would you please describe how can e-Commerce be successful? Would you please mention the success factors of e-Commerce? "*e-Commerce has a lot of advantages for customers such as fast and easy purchasing in the minimum of time without spending time in a traffic jam or other activities that waste our time. But, trust between companies and customers play an important role. We hear the news about fake companies that cheat people. When I buy through the Internet I worry about the quality of my stuff. I think, good quality, less price, variety of goods, delivery in the minimum of time, discount, secure environment, quality of the system, fast response to customer, and positive customer perception lead to e-Commerce successful. Customers who are satisfied will come back again."* Would you please mention the factors that lead to the failure of e-Commerce? *"Low quality of goods, services, system, security lead to failure of e-Commerce*."
Technological aspects	Could you please tell me about the effects of technology on e-Commerce success or failure? *"I think technology plays an important role, because it is an interface between sellers and customers. Reduction of time and cost are the most advantages of technology. "* Do you think technological aspects play an important role in e-Commerce? "*Yes, the main difference between traditional commerce and e-Commerce is technological aspect. Technological aspects have important effect on customer perception toward vendor's website. Technological traits affect customer trust and satisfaction.* " Could you please describe how technological items influence on your trust and satisfaction? *"The system facilities for search and finding different goods and services with different brand, price and quality lead to customer satisfaction. Fast and easy purchasing in 24 hours also lead to customer satisfaction. When customers know that the level of security is high and hackers cannot access to their information or the web system has a strong infrastructure for money transfer, they will trust to the vendor website."* Can you confirm the classification of items in the technology section? *"I think the classification of the items here is acceptable*."

Organizational aspects	Could you please tell me about the effect of organizational policies and plans on the success or failure of e-Commerce? "*Organization policies and plan lead to organizational reputation as an important characteristic. I think relationship between company and customers also is extremely important. Customers expect that companies reply to their request fast and with respect. When customers realize that company has relationship with well-known third party or brand, they trust to them. Considering discount and reward influence customer intention to buy. I think tailored advertisement also is important."* Could you please tell me how the organizational items influence on your trust and satisfaction? *"Customers think, what will happen if they do not receive the stuff that they buy through the electronic systems. Money back warranty leads to their trust to the company. When customers know that company consider customers' needs and comfort in their plans and policies they satisfy from their interactivities with the company. "* Can you confirm the classification of items in the organizational section? *"The classification of items in your model is logic."*
Customer aspects	Could you please tell me about the items that influence customer perception in e-Commerce? "*Customer's perception plays an important role in customer's decision to repurchase. Previous customer's experiences influence on their perception and their behaviour. This behaviour can be in the form of loyalty. That is why customer perception is very important.*" Could you please tell me how the customer items influence on your trust and satisfaction? "*Knowing less time transaction and belief to competence influence on their intention to buy. If they believe that the vendor's hardware and software are reliable, they trust to the company. I also think positive referrals from friends influence on their decision to purchase*." Can you confirm the classification of items in the customer section? "*Yes, I think these items show customer perception and this part of the model is acceptable.*"
Ended questions	Could you please tell me your opinion about this research model? "*I think the classification of items is ok and the model shows customer satisfaction, trust, and loyalty formation."* Could you add some Items that you think they influence customer satisfaction, trust, and loyalty in e-Commerce? *"I think it is better you rephrase the items that are in the customer part in the shape that shows these items relate to customer mind and perception.*"

Academics in the domain of e-Commerce exhibited matured and proper answers to the questions in comparison to some experts who were in the e-Commerce fair with

less familiarity in this domain. The majority of the participants emphasized on technological variables as the main difference with traditional commerce. Online web system is between organization and customer and shows technological aspect of e-commerce. Some of them described their concern about hackers and how the security issue affect their trust. The classification of items in three groups of technological, organizational, and customer factors that are three main entities in e-Commerce (Shaw, 1999) seems logic based on their feedback. All participants expressed that e-Commerce is integral part of their life and using electronic devices and Internet is unavoidable due to high population and traffic jam in the cities. However, news about information security breaches affect their attitude and is their main concern. The interested participants asked how the items were collected. After our explanations about the review of literature, they expressed their opinion about the model enthusiastically. The recommendations made by experts have been reflected in the Table 3-3.

Table 3-3: Summary of Experts' Responses

Experts	Tec-e-Sat	Org-e-Sat	Cus-e-Sat	Tec-e-Tru	Org-e-Tru	Cus-e-Tru	e-Sat	e-Tru	e-Loy
Pro1	√	R1	√	√	√	R2	√	√	√
Pro2	R3	√	√	√	√	√	√	√	√
Lec1	√	√	R4	√	√	√	√	√	√
Lec2	√	√	√	√	√	√	√	√	√
Lec3	R5	√	√	√	√	√	√	√	√
Lec4	√	√	√	√	√	√	√	√	√
Exp1	√	√	√	√	√	√	R6	√	√
Exp2	√	√	√	√	√	√	√	√	√
Exp3	√	√	√	√	√	√	√	√	√
Exp4	√	√	√	√	R7	√	√	√	√
Exp5	√	√	√	√	√	√	√	√	√
Exp6	√	√	√	√	√	√	√	√	√

Legends: Pro = Professor, Lec = Lecturer, Expert = Exp, R= Recommendation
√ means that expert confirms this part of the model.

The recommendations of experts are as follows:

R1: This expert believed that considering reward and discount can be a good policy that affects customer satisfaction. Reward and discount is a policy that many retailers apply to attract more customers. Yang et al. (2004) investigated the effect of customer satisfaction and perceived value on customer loyalty and mentioned reward and discount as an item that affect customer's perceived value and satisfaction. This item was added to organization policy.

R2: This expert believed that knowing hardware and software reliability has a positive effect on customer trust in e-Commerce. This item is in line with Hong and Zhu (2006) study about the effect of technology integration and hardware and software reliability in e-Commerce. This item was placed in the customer-trust section.

R3: Possibility of business activities in 7days and 24 hours is the advantage of the Internet that affect customer satisfaction. This participant believed that this item should be in the technology-satisfaction section. Quaddusa et al. (2005) investigated the effective factors in e-Commerce. In this research, convenience of customers that relates to working with e-Commerce system in 7 days and 24 hours was considered as an important factor that leads to customer satisfaction.

R4: This expert believed that awareness of less time transaction in e-Commerce by customer affects customer satisfaction. Less time and automated transaction was also stated by Albrecht et al. (2005) as an important facility in e-Commerce that lead to customer satisfaction.

R5: This expert believed that considering customer feedback facilities affects customer trust in the online environment. This item is in line with Cyr et al. (2007) investigation about customer interactivity with e-Commerce and mentioned connectedness and

responsiveness as two important dimensions of interactivity that lead to customer trust and loyalty.

R6: This expert requested for some explanations about some items in e-Satisfaction section and after more description, the participant accepted the classification of items.

R7: Advertisement is the factor that mentioned by this expert. He believed that proper advertisement affects customer trust in online environment. This item is in line with Kim et al. (2011) study about measuring effectiveness of online advertisement in online marketplace. In this research, a model was presented that could estimate the effectiveness of online advertisement on buyer trust and behavior.

The experts' recommendations were applied in the research model. In the next section, a classification of independent variables and description of conceptual framework will be presented, based on the literature review and interview with experts.

3.3 Classification of Factors

Looking at the items allows us to delve deeper into the notion and their effects on both e-Satisfaction and e-Trust. Some of these factors influence e-Customer's satisfaction, while some of them influence e-Trust. The classification of the variables and factors were presented to experts in the e-Commerce fair, held in Kuala Lumpur. In addition, the classification was improved based on the experts' interviews. Table 3-4 shows the final classification of items on customer satisfaction, trust and loyalty.

Table 3-4: Classification of items based on technological, organizational and customer factors after interview

	Technology Factors	Organization Factors	Customer Factors
e-Satisfaction	System quality (TS1) Information quality (TS2) Personalize web feature (TS3) Language Options (TS4) Search and Comparing Facilities (TS5) Product and Service Information (TS6) Using other Systems (TS7) Collecting and Analysing Customer Information (TS8) Fast and Easy Payment (TS9) Buying and Selling 7 days and 24 hours (TS10- from interview)	Customer Segmentation (OS1) Customize Products (OS2) Fast Response to Customer Inquiries (OS3) Variety of Goods and Services (OS4) Rewards and Discounts (OS5-from interview)	Identifying Site Quality (CS1) Customer Experience in e-Commerce (CS2) Less Time Transaction (CS3- from interview) Market Orientation (CS4)
e-Trust	Customer Bulletin Board (TT1) Security of Information and Privacy (TT2) Customer Feedback Facility (TT3- from interview) Complain and Follow up Facility (TT4)	Clear Shopping Process (OT1) Money Back Warranty (OT2) Contact Interactivity (OT3) Organizational Reputation (OT4) Guarantee Policy (OT5) Selling High Regarded Brands (OT6) Contribution with Well Know Company (OT7) Tailored advertisement and Promotion (OT8- from interview) Fast and Safe Delivery (OT9)	Knowing Hardware and software Reliability (CT1- from interview) Risk (CT2) Positive Referrals from friends (CT3) Belief in Integrity (CT4) Belief in Competence (CT5)
TS: Technological items that affect e-Satisfaction, TT: Technological items that affect e-Trust, OS: Organizational items that affect e-Satisfaction, OT: Organizational items that affect e-Trust, CS: Customer items that affect e-Satisfaction, CT: Customer items that affect e-Trust			

Some variables in this model were named with different words in different researches, although the meanings are quite similar. The variables have a close effect on e-Commerce, or ones having similar definitions are regarded as a single variable, examples of these include system quality, web design, website characters, site design, and vendor's website all of which are regarded as system quality. Security, privacy, and information disclosure were also considered as security in this model.

3.3.1 Technological Factors

Technology is defined as the science or knowledge that was placed into practical use in order to solve problems or invent useful tools. Technology refers to the

characteristics and the ability of a system, hardware, and software in order to achieve a goal. Technology in e-Commerce encompasses all aspects of the system, information, procedures, and security, which form the main difference between traditional and online commerce (Al-Qirim, 2007). Technological variables can improve the efficiency of the business in an online environment. In this research, the technology items have been classified into two groups, some of them influencing e-Satisfaction, while others influence e-Trust.

3.3.2 Organizational Factors

Organizational factors refer to the firm's policies and plans that directly or indirectly influence on business. Tarafdar et al. (2006) presented a framework that explains the influence of organizational factors on the prosperity of e-Commerce. The roles of plans, organizational culture and policies, information system, and organizational structure have been highlighted as important factors in this research. These policies lead to customer trust or satisfaction even in the online environment. In this research, organizational factor encompasses the items that relate to organizational policies and plans that influence customer satisfaction and trust.

3.3.3 Customer Factors

Customers are the most important entity in e-Commerce. Without this object e-Commerce is meaningless (Shaw, 1999). Customer factor refers to variables that affect customer mind set and perception and lead to formation of trust or satisfaction. These items were divided into two parts in the model. First section belongs to items that affect customer satisfaction and the second section contains the items that affect customer

trust in e-Commerce. This classification is not a final classification for the conceptual framework. More analysis will be conducted in the next steps, and the process of finalization will be described in detail.

3.4 Conceptual Framework

Table 3-4 shows a classification of factors, based on their effects on e-Satisfaction and e-Trust. Figure 3-2 presents the concept of Table 3-4 in the form of a conceptual framework. Technological items affect customer satisfaction and trust. The group of technological items that affect customer satisfaction were named Customer-e-Satisfaction and the technological items that affect customer trust were labelled Technology-e-Trust in the model. Organizational items also affect customer satisfaction and trust. In a similar way, the organizational items that affect customer satisfaction were labelled Organization-e-Satisfaction and a set of items that affect customer trust were named Organization-e-trust in the model. Among customer items, a set of items that affect customer satisfaction were labelled Customer-e-Satisfaction and a group of items that affect customer trust were named Customer-e-Trust in the model. Customer-e-Satisfaction, Organization-e-Satisfaction and Technology-e-Satisfaction are independent variables and e-Satisfaction is dependent variable in the satisfaction part of the model. Customer-e-Trust, Organization-e-Trust and Technology-e-Trust also are independent variables and e-Trust is dependent variable in the trust part of the model. On the other side, e-satisfaction and e-Trust are independent variables and e-Loyalty is dependent variable in the model.

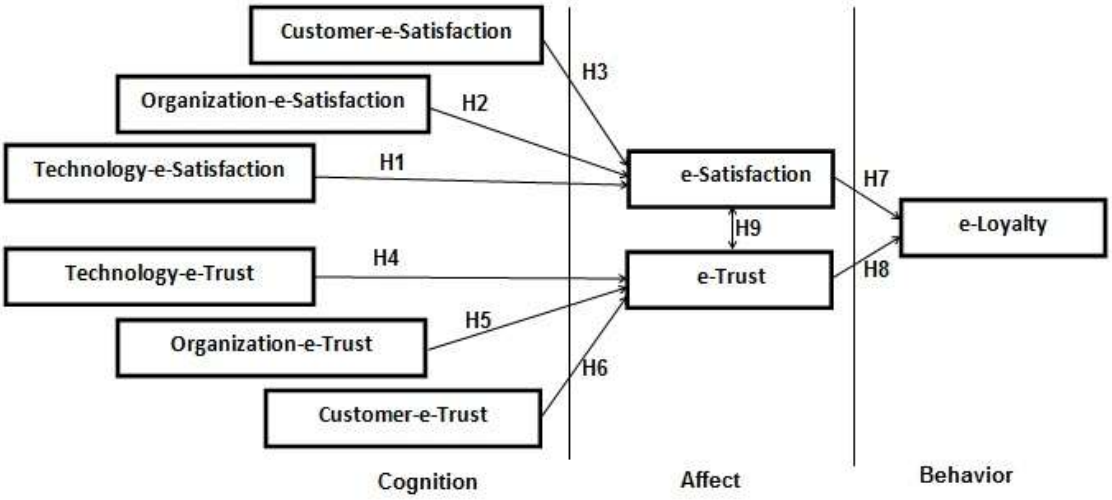


Figure 3-2: Conceptual framework

Theory of reasoned action (TRA) and cognition-affect-behaviour are basic theory and model that were adopted as a background for the research model. TRA is a model for the prediction of behavioural intention, spanning predictions of attitude and predictions of behaviour. TRA was developed by Ajzen and Madden (1986), derived from previous research that started out as the theory of attitude, which led to the study of attitude and behaviour. TRA suggests that a person's behavioural intention depends on the person's attitude about the behaviour. Attitude consists of beliefs about the consequence of performing the behaviour multiplied by his or her evaluation of these consequences (Lee et al., 2009). The effects of technological aspects of e-Commerce, organizational plan and policies, and customer mind set on the formation of e-Trust, e-Satisfaction and e-Loyalty encouraged us to adopt cognition-affect-behaviour model with this research model. Cognition makes beliefs, perceptions, and thoughts of customers when they interact with the system (Chang et al., 2009). Affect refers to favourable disposition toward a stimulus that leads to a relative preference. Based on the

model, our study posited that customer perceptions in terms of satisfaction, trust and loyalty forms through technological, organizational and customer factors. In a simple words, technological, organizational and customer factors influence customer attitude towards satisfaction, trust and finally lead to loyalty behaviour. Based on the research model, these hypotheses were considered for this research:

H1: Technological factor has positive effect on customer satisfaction in e-Commerce.

H2: Organizational factor has positive effect on customer satisfaction in e-Commerce.

H3: Customer factor has positive effect on customer satisfaction in e-Commerce.

H4: Technological factor has positive effect on customer trust in e-Commerce.

H5: Organizational factor has positive effect on customer trust in e-Commerce.

H6: Customer factor has positive effect on customer trust in e-Commerce.

H7: e-Satisfaction has positive effect on e-Loyalty.

H8: e-Trust has positive effect on e-Loyalty.

H9: e-Satisfaction has positive effect on e-Trust and vice versa.

3.5 Questionnaire Design

Validity discusses the question of whether we correctly measure what we want to measure (Gliem and Gliem, 2003). Most parameters or concepts that researchers need to measure cannot be directly measured. This is primarily why the experts develop instruments that are capable of indirectly measuring these concepts. In the next step, data will be collected by questionnaire. Between open-ended and closed-ended format question, closed-ended format with five Likert scale (very disagree to very agree) was chosen for questionnaire design. Open-ended questions allow the respondents to format their own answers provided by researcher. However, Open-ended questions are more

difficult and time consuming to work with because the answers will first need to be coded and quantified using comparability of answers across respondents. On the other hand, open-ended questions are more time consuming for respondents, who will as a result be more inclined not to answer this type of question than closed-ended questions (Muijs, 2004). Due to above reasons closed-ended format questionnaire was used in this research.

Every concept can measure with several items and right question about item is important in measuring the concept and difficult to achieve. The structure of the research questionnaire closely mirrors the structure of the framework. The questionnaire consists of three main parts (technological, organizational and customer factors) for both e-Satisfaction and e-Trust sections. Technological part of the model contains fourteen items, in which ten questions measure technological items that affect customer satisfaction and four questions measure technological items that affect customer trust. The questions for satisfaction part were adopted from (Chang and Chen, 2009; Lin et al., 2011) studies and for trust part were adopted from (Corbitt et al., 2003; Kim et al., 2009) researches. In organization section, five questions measured organizational items that affect customer satisfaction and nine questions measured customer trust; The questions for satisfaction part were adopted from (Park et al., 2011; Wu et al., 2011) studies and for trust part were adopted from (Abbasi et al., 2011; Palvia, 2009) researches. Finally, among nine customer items, four questions measured customer satisfaction and five questions measured customer trust that the questions for satisfaction part were adopted from (Koufaris et al., 2004) study and for trust part were adopted from (Yang et al., 2004) research. Totally thirty seven items measured

technological, organizational and customer factors for both e-Satisfaction and e-Trust. Appendix B shows the questionnaire.

3.6 Pilot Test

The purpose of pilot test is to make sure that everyone in the sample not only understands the questions, but also understand them in the same way. Researcher can see the respondent feel (comfortable or uncomfortable) and the time that participants need to answer questionnaire. It is important scholars know (Pickard, 2007):

Are all the words understood?

Do all the participants interpret the question in the same way?

Are all answer choices appropriate?

Is the range of response choices actually used?

Do participants correctly follow directions?

To test the questions, the questionnaire was answered by four colleagues who finished PhD and had experience in developing questionnaire for data collection. Then the questionnaire was randomly presented to a small group (twenty eight) of customers in Refah Chain Stores Company who had experience in e-Commerce and their feedback were considered for improvement of the questionnaire. Overall, thirty two participants read the questionnaire in the pilot test. Table 3-5 shows the demography of participants in pilot test.

Table 3-5: Demography of participants in pilot test

Demographic characteristics		n	Percent
Gender	*Male*	20	62.5
	Female	12	37.5
Age	*20-29*	8	25
	30-39	12	37.5
	40-49	8	25
	50 and above	4	12.5
Education	*Undergraduate*	2	6.25
	Master	26	81.25
	PhD	4	12.5
Job Domain	*Art*	1	3.13
	Science	4	12.5
	Engineering	8	25
	Business and Commerce	4	12.5
	Computer Science	6	18.75
	Social Science	6	18.75
	Medicine	3	9.37

The process of pilot test took one month from the first to end of October in 2011. The questions that participants had problem with them improved. Table 3-6 shows the improvement of questions based on the participants' feedback.

Table 3-6: The results of pilot test

Before Pilot test	After pilot test
The information on the vendor system satisfies me for purchasing (TS2).	The quality of information on the vendor website is sufficient to buy through this site (TS2).
Working with system in every moment satisfies me (TS10).	Possibility of having business activities in 7 day and 24 hours is a great facility (TS10).
I trust to vendor web system in terms of information security (TT2).	Information security technology on the vendor website assures me about my private information (TT2).
Classification of customers leads to my satisfaction (OS1).	Classification of customers in order to provide proper services for them on the website lead to a good feeling towards vendor(OS1).
I satisfy when I can find different product on the website (OS4).	Variety of goods and services on the website fulfil my needs (OS4).
I rely on vendor website because of simple shopping steps (OP1).	I rely on vendor website when the process of shopping is clear (OP1).
Money back by company leads to my trust when I purchase through the website (OT2).	I have confidence towards vendor website when I know vendor will return my money if transaction is not completed (OT2).
Reputation of company leads to my trust (OT4).	I feel confidence when I deal with a reputable online company (OT4).
My relatives and friends word lead to my trust to company (CT3).	Positive referral from my friends and relatives influence my confidence towards vendor website (CT3).

3.7 Data Collection

Data collection were conducted using questionnaire during three months from the first of January to the end of March 2012. We explained that the collected data will be used for academic purposes and the data will not be disclosed for any person or company. We also explained to them that this research relates to customer behaviour such trust, satisfaction and loyalty in e-Commerce. The consent of participants was important for research group. Random sampling data collection was applied in this study. Two hundred questionnaires were distributed. One hundred and seventy four

participants answered to the research questionnaire. Nine (4.5%) of them were eliminated from data set, because they did not have experience in e-Commerce or answer all questions with one option. For example, the questionnaires that participants answer to all questions “very disagree” were omitted from data set. After data cleaning, one hundred sixty five records were used for data analysis.

3.8 Data Cleaning

Before beginning data analysis, the high missing data were removed from the data set. Tabachnick and Fidell (2007) asserted that the most pervasive problem in data analysis is missing data, as it affects validity, reliability and the generalization of the results. The missing data were removed, based on these criteria:

1) The participants who answered all questions either “1” or “5” were removed from the dataset.
2) The participants who never used e-Commerce in their monthly activities were also removed from the data set.
3) The questionnaires with more than 5% missing data were omitted from the dataset.

3.9 Population and Sample

There are not many active companies in the domain of e-Commerce in Iran, due to economy situation and international boycott. Refah Chain Stores (RCS) is a well-known company, which started to provide goods and services through the Internet from 1995, and now has over 160 branches across the country. Refah goods encompass a wide range of products in the lines of home appliances and electronics, clothing and textiles and stationeries, food and beverages, fresh produce, hygiene and cosmetics, all

in quality value and competitive prices. Online sales are provided for those customers who prefer to shop, compare, and decide to purchase. In this research, the customers of Refah Chain Stores Company in Iran are the population, and the samples were randomly selected from e-Customers by using the database of this company. The Refah Chain Store Company had about three hundred active e-Customers. In this research, the number of final samples is one hundred sixty five.

3.10 Sample Size

In every study, determining the size of the sample is very important to design analysis. Sample size is defined as having a sufficient number of subjects that will statistically result in significant outcomes. Using too much samples results in wasted effort, time, animal lives, and research dollars, will also lead to inevitable failure. Inconclusive results cannot determine whether the intervention or particular treatment is effective, which can in turn be identified in future studies. Some experts believe "the more samples the better". Utilizing too many samples may result in significant conclusions and future study directions; however, fewer samples may lead to similar results. Therefore, effort, animal lives, research dollars, and time have been wasted. Utilizing the proper number of samples minimizes the wastage in research (Faraday, 2006).

Morgan suggested a formula based on required sample size, the population size, and the degree of accuracy that is expressed as proportional. Table 3-7 shows the sample size that is based on the population size (Morgan, 1970).

Table 3-7: Determining sample size from a given population (Morgan, 1970)

N	Sample	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	246
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	351
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	181	1200	291	6000	361
45	40	180	118	400	196	1300	297	7000	364
50	44	190	123	420	201	1400	302	8000	367
55	48	200	127	440	205	1500	306	9000	368
60	52	210	132	460	210	1600	310	10000	373
65	56	220	136	480	214	1700	313	15000	375
70	59	230	140	500	217	1800	317	20000	377
75	63	240	144	550	225	1900	320	30000	379
80	66	250	148	600	234	2000	322	40000	380
85	70	260	152	650	242	2200	327	50000	381
90	73	270	155	700	248	2400	331	75000	382
95	76	270	159	750	256	2600	335	100000	384

3.11 Statistical Analysis

Statistical analysis is the science of collecting, exploring and presenting large amount of data to discover underlying pattern and trend (Filliben, 2001). In this research, a conceptual framework was developed based on literature review and improved based on experts' opinion. Data were collected from e-Customers of a company in Iran. In the next sections, the explanation of statistical test will be presented.

3.11.1 Data Type

Knowing the type of data is vital with regard to data analysis, as choosing the right test in data analysis depends on data type and data distribution type (normal or non-normal). This helps researchers decide how they should collect and display data in the appropriate way. Table 3-8 shows data classification.

Table 3-8: Data type in statistical analysis (Foster, 2001)

Continuous data:	These data contain any value and usually are called measurement data.
Discrete data:	This type of data contains specific values and has three categories: Nominal: this type of data is only used for naming: Male (1) and Female (2). Ordinal: this type of data is used for naming and ordering: Bachelor (1), Master (2) PHD (3). Scale: These type of data can have a name, order or any number value.

In this research, gender and participants job style (job style can be in art, engineering, social science, medical etc.) are nominal, education is ordinal; age and the number of using e-Commerce per month are scale. The answers of participants (Likert scale) also are ordinal (refer to questionnaire).

3.11.2 Data Distribution

Statisticians have proposed different statistical methods for examining a data set in order to summarizing their characteristics (Tabachnick et al., 2007). Experts are usually interested to know:

1) The general level, average value of their measures
2) The amount to which the different scores tend to vary around or deviate from the mean
3) The distribution shape

Therefore, the familiarity with the measure of mean, median, mode and the dispersion measures is deemed necessary. In addition, distribution of data is very important with regard to the selection of data analysis method (Field, 2005). Data can be distributed in

different shapes. It can be spread out more on the left, more on the right, or jumbled up. Figure 3-3 shows different data distribution.

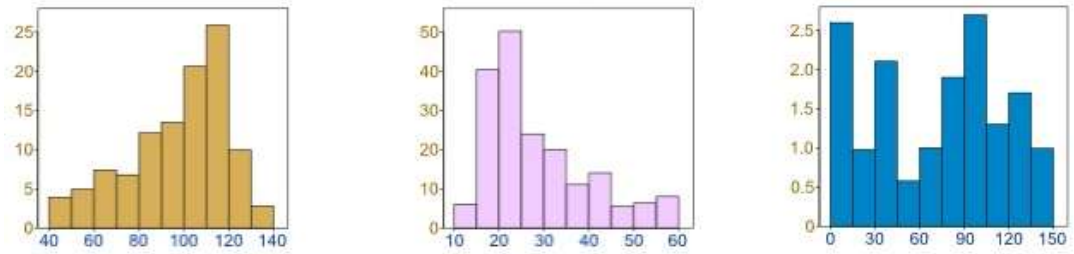


Figure 3-3: Data distribution

In a normal distribution Mean=Median=Mode

The measures of Skewness and Kurtosis in Appendix C show the tendency of data for every measure in this research. Skewness is a measure of symmetry. A distribution, or data set, is symmetric if it looks the same to the left and right of the centre point. Kurtosis is a measure of whether the data are peaked or flat relative to a normal distribution. Data sets with low kurtosis tend to have a flat top near mean rather than a sharp peak.

3.11.2.1 Normalization Test Methods

Normalization is one of the important pre-tests that researchers should carry out before beginning data analysis. Parametric tests use for data with normal distribution and non-parametric test for data with non-normal distribution. Table 3-9 shows a classification of normalization tests.

Table 3-9: Classification of normalization tests

Methods Classification	Methods Type	
	Numerical Methods	**Graphical Methods**
Descriptive based	Kurtosis Skewness	Stem and Leaf graph Histogram graph Box graph
Theory Based	One sample Kolmogrov Smirnov Shapiro-Francia Anderson-Darling Shapiro-Wilk	Probability - Probability (P-P)graph Quintile – Quantile graph

3.11.2.2 Numerical Methods

In these methods, normalization will be probed based on numerical measure of Skewness and Kurtosis. There is an indirect relation between Skewness measure and normalization. Once Skewness increases, normalization decreases, due to the fact that in this situation, data distribution tends to lean to the right or left (Abasi et al., 2005).

3.11.2.3 Graphical Methods

In these methods, scholars can observe the data distribution in the form of different graphs. Numerical methods are more reliable compared to graphical methods, due to the fact that graphical methods just show an overview of data distribution(Abasi et al., 2005). In this research, numerical methods (Skewness and Kurtosis) were applied as a data distribution test, because:

1) Many graphs should be provided to show the normality of all variables.
2) Skewness and Kurtosis test shows the accurate measure of distribution in a table. Numerical methods are more accurate and popular in these kinds of researches.

3.11.3 Reliability

Reliability answers questions such as whether the selected methods measure the main objects in our research, or if the same situation is retested, will it result in the similar outcome (Carmines and Zeller, 1979). The advantages of the reliability test are:

1) The correlation between variables and factors will be appeared.
2) Improving the structure or framework by discarding of variables with low correlation.
3) Improving the structure or framework by adding new variables or factors.

Cronbach's Alpha, test-retest, Parallel-form, and Split-half method are different methods that are usually utilized for reliability tests. In this research, Cronbach's Alpha test was applied for the reliability test.

3.11.3.1 Cronbach's Alpha Method

Characters, senses, and beliefs are studied in different researches, and Likert scales are usually applied to determine the responses of the participants. Likert scales are often made up of factors such as strongly agree, agree, neutral, disagree, and strongly disagree. In this method, researchers collate the overall scores for different variables or factors, as it leads to error in the reduction process (Gliem and Gliem, 2003).

Cronbach's Alpha method is the most famous method of reliability testing. In this method, reliability is calculated based on internal correlations among variables of a construct (Cronk, 2008). Questions with three answers from the Likert scale are grouped together, while question with five answers Likert scales are grouped together. The measure between 0.7 and 0.8 is acceptable for reliability, but experts recommend

improving the structure to good levels of reliability (George and Mallery, 2003). Table 3-10 shows different level of consistency based on Cronbach's Alpha.

Table 3-10: The level of consistency - (George et al., 2003)

Cronbach's alpha	Internal consistency
$\alpha \geq 0.9$	Excellent
$0.8 \leq \alpha < 0.9$	Good
$0.7 \leq \alpha < 0.8$	Acceptable
$0.6 \leq \alpha < 0.7$	Questionable
$0.5 \leq \alpha < 0.6$	Poor
$\alpha < 0.5$	Unacceptable

3.11.4 Choosing the Right Test

Researchers should determine the kind of hypotheses examination (test of the relationship or test of differences), and also the distribution of variables (normal or abnormal) for the purpose of hypotheses testing. Appendix D shows the proper tests in different conditions (HabibporGetabi and SafariShali, 2006). Relational hypothesis shows the relationship between independent and dependent variable(s), and causal hypothesis shows that independent variable(s) leads to dependent variables. In this research, the hypotheses are relational. This research aims to investigate the relationships between technological, organizational and customer factors with the formation of satisfaction and trust in e-Commerce. Normality of data distribution examined at the first step. Factor analysis was applied to improve the model. The items with low factor loading were omitted from the model then regression showed the relationship between technological, organizational and customer factors with e-

Satisfaction and e-Trust. Path analysis determined the effects of technological, organizational and customer factors on e-Loyalty.

3.11.5 Factors Analysis

Principal Component Analysis (PCA) and Factor Analysis (FA) are used when the researcher is interested in decreasing the number of variables in order to fit a framework or a structure. The variables with high correlation among them and are largely independent, are combined into factors or groups. FA and PCA are usually applied for measuring the instruments that are not directly observable in real life (Gaur and Gaur, 2006). PCA and FA are essentially techniques that are applied for data reduction. In PCA, all variances in the variables were duly analysed. However, in FA, only the shared variance is analysed (Kerr et al., 2002).

3.11.5.1 Exploratory and Confirmatory Analysis

In the exploratory factor analysis (EFA), scholars are interested in exploring the underlying or hidden dimensions that leads to correlations among the collected variables. However, in the confirmatory factor analysis (CFA), the researchers are interested in testing whether the correlation between variables is in line with the hypothesized framework; this hypothesis is based on previous researches or theories (Gaur et al., 2006). Therefore, EFA deals with theory building and CFA with theory testing. In this research, the framework is result of a literature review, theory and a model that is why confirmatory factor analysis is applied for hypothesis testing.

3.11.5.2 Sampling Adequacy in FA

Kaiser-Meyer-Oklin (KMO) and Bartlett's test are two tests that determine whether the samples are suitable for FA and factor reduction. KMO test reveals whether the variances of the variables are affected by the variance of hidden variables. In other words, the variances of hidden variables influences the total variance (HabibporGetabi et al., 2006). The measurements of KMO test are between zero and one. The measures less than 0.5 show that these data are unsuitable for FA. The measure between 0.5 and 0.69 implies that the data should be improved, and a measures more than 0.7 implies the fact that the data are suitable for factor analysis or reduction. The measures that are closer to one are more suitable for FA.

Bartlett's test of sphericity helps scholars realize the relationship between variables and factors, and reveals the existing structure between them. In fact, Bartlett's test reveals the relational matrix, a matrix with zero main diagonal. Kline (1994) suggested three to five variables to measure a factor. Therefore, the number of variables is three times more than the number of factors. The factors with three or less variables are weak, while factors with five variables are more suitable. The sample size follows the rule of "more is better". Some experts have expressed the opinion that the sample size should not be less than 100 samples (George et al., 2003). Factor loading shows the relationship between variables and factors. Therefore, factor loading changes between -1 and +1. More factor loadings show more relation between variables and a factor. Tabachnick et al. (2007) suggested 0.32 as a minimum value of factor loading. Chong (2013) and Wang et al. (2011) have mentioned factor loading greater than 0.5 is more significant

for statistical model. In this research the items with less than 0.5 loading were omitted from the model.

3.11.5.3 Factors Determination

Researchers explore the number of factors based on the relationships between items and factors. In the exploratory factor analysis, the results of factor analysis show the number of factors (Rawen, 1997). Different methods use for determination of factors:

3.11.5.3.1 Prior Criterion

In this case, researcher has an initial model that shows relationships between items and factors based on literature review. Prior criterion helps to select the number of principal components that will explain a maximal amount of variance. Scholars attempt to prove the existing relationship or improve the model. For instance, experts are interested to know whether system quality, information quality, service quality, product quality, delivery quality have relationship with customer satisfaction and trust in e-Commerce (Habibpor and Safari, 2008).

3.11.5.3.2 The Variance of Factors by Variables

It is a simple method for the determination of factors. Cumulative variance of variables on the factor shows the number of factors. Therefore, the variables are acceptable, which have more variance affect certain factors. The measure of acceptable variance is different in variant science. For instance, the acceptable variance for medical science is %60, while for social science, it is %90 (Mansorfar, 2005).

3.11.5.3.3 Kaiser Method

This method is called Guttman-Kaiser. The factors are acceptable, with their Eigenvalues being more than 1. This method is mostly utilized in the FA (Rawen, 1997). Therefore, all factors with Eigenvalue of less than 1 will be deleted. In contrast, Tucker and MacCallum (1997) believed that sometimes, factors with Eigenvalues of less than (close to) 1 can be regarded as main factors.

3.11.5.3.4 Screen Test

The screen graph shows the Eigenvalue of the factors, and the factors with Eigenvalues of more than 1 are acceptable. The selection of factors continues unless the specific variance is less than common variance.

There is a variation in the collection of data. Scholars are interested in identifying the source of the variation, due to the fact that when we have a single source, there is systematic variance. Also, there might be other sources of variations. The variance of a variable encompasses common, specific and error variance.

Common variance: Variance of a variable that is shared with common factors.

Specific variance: The others variance have no effect on it.

Error variance: In simple words, variation due to errors can be part of error variance.

In this research, the independent variables are extracted from literature review and interview with experts. Then based on their effects and notions a classification of variables was presented. This classification shows the effects of technological, organizational and customer factors on e-Satisfaction, e-trust and e-Loyalty. Indeed, the researchers are aware of the construct and are attempting to enhance the structure. In the next chapter, the results of factor reduction will be discussed with more details.

3.11.6 Factor Rotation

Determining the effects and relationship between variables and factors is the main aim of factor analysis. Factor rotation is more adept at showing these effects and relationships. Rotation table helps scholars describe and interpret these effects more effectively. In other words, factor rotation converts factor structure to a simple structure for better interpretation (Habibpor et al., 2008).

3.11.7 Linear Regression

Some researchers look for a relationship between independent and dependent variables, while some researchers focus on the differences. Different statistics methods are used for this type of researches. Sometimes, changes in the independent variables lead to changes in the dependent variable. In contrast, a scholar may be interested in the relation between independent variables with dependent variable (Kerr et al., 2002).

Linear regression is used for interval data and Multi-linear regression shows the relationship between groups of independent variables with dependent variable. Regression is one of the important tools in prediction.

3.11.8 Multi Linear Regression

Multi linear regression shows the linear relationships between a set of independent variables and a dependent variable. Multi linear regression explains the variance of the dependent variable, based on independent variables. In fact, the dependent variable is predicted by several independent variables:

$$y=b0+ b1x1+b2x2+\ldots.+ bnxn.$$

Nominal variables should be converted to interval variables in the utilization of multiple linear regressions. Different regression analyses are applied based on the independent and dependent variable types:

Where there are nominal dependent variables with two aspects, nominal logistic regression will be applied.

Where there is ordinal dependent variable, ordinal regression (OR) will be used.

Where all independent variables are interval discriminant analysis (DA) will be used.

Where both independent and dependent variables are ordinal or nominal, linear regression will be used.

Where the independent variables are ordinal or nominal and the dependent variable is an interval variance analysis will be applied. Table 3-11 shows the regression test based on independent and dependent variables.

Table 3-11: Different regression tests based on IV and DV

Independent variable (IV)	Dependent variable (DV)	Regression Type
-	Nominal with 2 aspects	Nominal Logistic Regression
-	Ordinal	Ordinal Regression
Interval	-	Discriminant Analysis (DA)
Interval	Interval	Linear regression
Nominal / Ordinal	Interval	Univariance Analysis

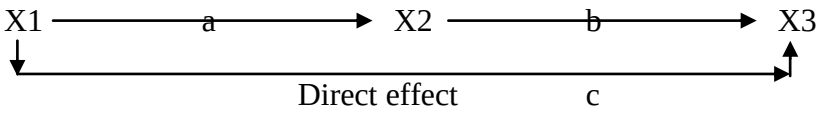
3.11.9 Co-Linearity

Co-linearity shows the linear relationship between independent variables. Co-linearity among independent variables decreases the validity of the model, due to the fact that independent variables have a double effect on dependent variable. Tolerance shows the co-linearity among independent variables, and it changes between zero and one. The measures are close to one, show less co-linearity, and vice versa. The other

measure is Variance Information Factor (VIF) that comes from one divided to Tolerance. The VIF that is larger than two shows more co-linearity among independent variables (HabibporGetabi et al., 2006).

3.11.10 Path Analysis

In the regression analysis, researchers are usually interested in investigating the direct effect of independent variables on dependent variables. Sometimes, scholars need to probe the direct and indirect effect of independent variables on a dependent variable when the mediator variables are present.



Path diagram is a structure that describes the relationship between variables. This structure can be a scholar's hypotheses, which investigates the path analysis. Path diagram is a combination of vectors that connect independent variables to dependent variables(Olobatuyi, 2006). In the above example, the effect of x1 on x2 is a, x2 on x3 is b, and the overall effects is a*b+c.

In the last step of research methodology, Artificial Neural Fuzzy Interface System in the MATLAB software was applied to test the reliability of the model. e-Trust and e-Satisfaction data were used as input, while ANFIS predicted e-Loyalty. The results showed that there is a difference of almost zero between the ANFIS output and e-Loyalty data.

3.12 Artificial Neural Network

Classification and prediction are two main applications of neural networks. In this research prediction of neural network is utilized to show the reliability of the model. A simple inference system with 2 input x and y, and 1 output were taken as a sample. Two fuzzy rules for a Sugeno fuzzy model were defined (Equation 1 and 2).

Rule 1: if x is x_1 and y is $y_1$then $f_1 = p_1x + q_1y + r_1$ (1)

Rule 2: if x is x_2 and y is $y_2$then $f_2 = p_2x + q_2y + r_2$ (2)

Figure 3-4 shows two rules for Sugeno fuzzy model and Figure 3-5 shows ANFIS structure.

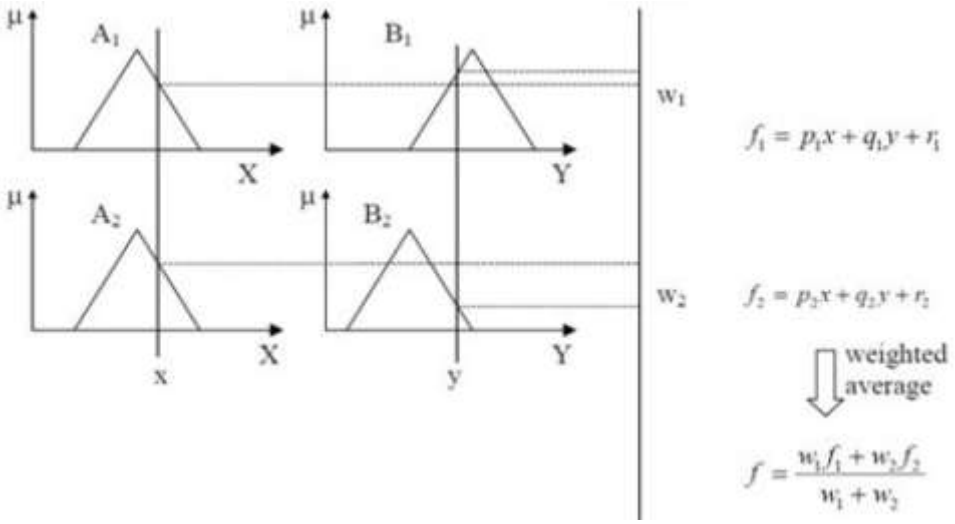


Figure 3-4: Two rules for Sugeno fuzzy model

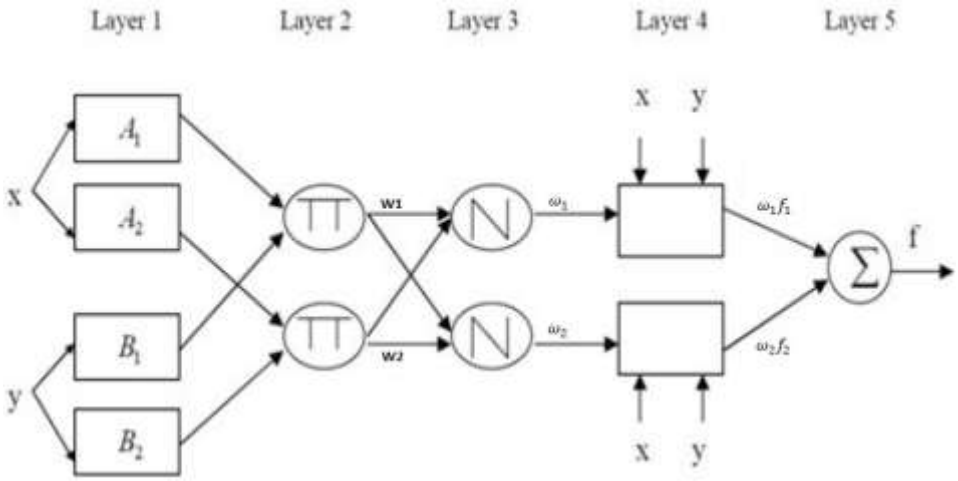


Figure 3-5: ANFIS structure

Layer 1: In this layer, parameters are called premise parameters, and every node is regarded as an adoptive node (Equation 3 and 4).

$Q_{l,i=}\mu_{Ai}$ (x) for i=1, 2 (3)

$Q_{l,i=}\mu_{Bi}$ (y) For i=3, 4 (4)

x and y are input to the i_{th} node, and μ_{Ai} (x) is a membership grade of fuzzy set A= (A_1, A_2). The bell function generally uses for this kind of model (Equation 5).

$$O^1{}_{i=}\mu_{Ai}\, Q(t) = e^{\frac{-(Q(t)-\sigma)^2}{2\sigma^2}}$$ (σ: standard deviation) (5)

Layer 2: every node presents a rule, based on inputs in the previous layers (Equation 6).

$Q_{l,i=}\, W_{i=}\mu_{Ai}$ (x) μ_{Bi} (y) (i=1,2) (6)

Layer 3: in this layer, the i_{th} node calculates the ratio of the i_{th} rule's firing strength. Thus, the outputs are normalized firing strengths (Equation 7).

$$O^3{}_{i=}\omega_i = \frac{w_i}{\Sigma_i w_i}$$ (i=1,2) (7)

Layer 4: Every node is an adoptive node (Equation 8).

$$O^4{}_{i=}\omega_i\ f_i = \omega_i\ \ p_i\ \ Q(t) + q_i\ \ Q(t-1)\ \ + r_i \qquad \text{(i=1,2)} \qquad (8)$$

ω_i comes out from layer 3.

Layer 5: The nodes in this layer calculate the overall output as the summation of all incoming signals (Equation 9).

$$O^5{}_{i=}\frac{\sum_i \omega_i f_i}{\sum_i \omega_i} \qquad (9)$$

The fuzzy modelling procedure uses the neuron-adaptive learning techniques to gain information about a data set in order to compute the membership function parameters that will allow the fuzzy interface system to track the given input/output data (Jang, 1993). The hybrid algorithm provided the learning process and the construction of the rules. The finest fit model structure was determined according to the criteria of the performance evaluation.

The common practice is to commence learning with a high training rate, such as 0.7, and decrease the rate as learning proceeds to set the training rate and momentum (Hush et al., 1993). For terminating a network, learning illustrates three ways:

(1) Learning can be stopped when the Root Mean Square Error (RMSE) between the expected value and network output value has been reduced to a pre-set value.

(2) When the pre-set number of training repetitions has been reached.

(3) When the RMSE of a validation sample has started to rise. The first two conditions are based on the pre-set values.

Fuzzification, inference, and defuzzification are the main parts of every fuzzy system (Ahmed El-Shafie, 2011). Five main and common function blocks of fuzzy inference systems were presented in Figure 3-6.

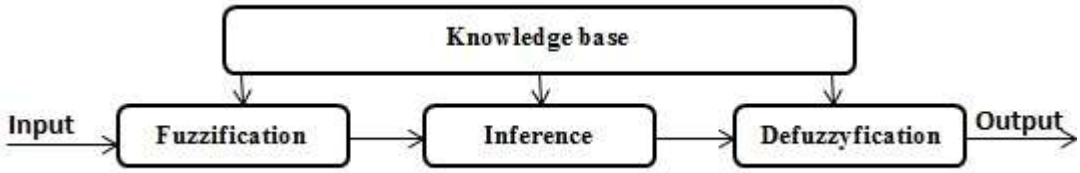


Figure 3-6: Fuzzy Interface System

1) Input membership functions were created based on input characteristics.
2) Rules were created based on input membership functions.
3) The set of characteristics were created based on rules.
4) Output membership functions were created based on output characteristics.
5) An output single-value based on the output membership function.

Adoption of this method with the research model will be presented in chapter six.

3.13 Summary

This chapter details the research methodology of this work. First, the problem statements were determined, and the research questions were formed. Critical factors were extracted from literature review, along with points from interview with experts. These independent variables affect e-Satisfaction, e-Trust, and e-Loyalty. On the other hand, these variables are related to technological, organizational, and customer aspects of e-Commerce. The conceptual framework is based on this classification. Data were collected by means of questionnaire.

In this chapter, statistical tests have also been explained in the logical trend. After determining the research hypotheses, scholars are expected to select the proper statistical tests, based on the type of hypotheses (relational or causal), data distribution (normal or abnormal), and data type (nominal, ordinal or interval). The statistical methods that are related to the reliability of data gathering, data suitability, and

framework were also described in this chapter. In addition, the application of neural network in this research was described. In the next chapter, the results of statistical test will be presented and hypotheses will be tested.

Chapter 4 Results and Discussion

4.1 Introduction

Statistical analysis will be explained in this chapter. Exploration and analysis will focus on the hypothesis test and the clarification of the research findings. The data collection has undergone preliminary analyses such as data purification, and the tabulating dispersion of respondent's demographic. Data normality assessment, examination of validity, investigation of reliability, and conducting statistical techniques with a focus on factors analysis and reduction, multiple regression and path analysis, and assessment of the model with artificial neural network will be described in this chapter.

4.2 Demography of Participants

As previously mentioned, data were collected from e-Customers of an online company in Iran. The questionnaires of one hundred sixty five participants were saved in the dataset. These samples vary in terms of gender, age, and education. Demographic of participants showed that 49.1% of them were males and 50.9% were females. Participants' ages were categorized into 4 distinct groups: between 20 and 29; 30 and 39; 40 and 49; and above 50 years. Two participants were reluctant to disclose their age. In terms of education, 46.1 percent were undergraduates, 34.5 percent possessed a Master's degree, and 19.4 percent were PhD holders. Participants had variety of job, 4.8 % of participants' job was in the art domain, 20% science, 27.9% engineer, 10.3% business, 23.6% computer, 8.5% social science and 4.2% medicine. One of the participants was reluctant to reveal his job. Table 4-1 shows demographic of participants.

Table 4-1: Demographic of the respondents

Demographic characteristics		n	Percent
Gender	*Male*	81	49.1
	Female	84	50.9
Age	*20-29*	51	30.9
	30-39	77	46.7
	40-49	34	20.6
	50 and above	1	0.6
Education	*Undergraduate*	76	46.1
	Master	57	34.5
	PhD	32	19.4
Job Domain	*Art*	8	4.8
	Science	33	20
	Engineering	46	27.9
	Business and Commerce	17	10.3
	Computer Science	39	23.6
	Social Science	14	8.5
	Medicine	7	4.2

A simple review of the demographic revealed that there is a relationship between the level of education and the number of e-Commerce that participants used per month. Table 4-2 shows the level of education and mean of e-Commerce usage per month by participants.

Table 4-2: Level of education and use of e-Commerce

Level of education	Mean of e-Commerce usage Per month
Undergraduate	3
Master	5
PhD	7

Once the level of education increases, the participants will use more e-Commerce in their daily activities. It means that people with higher levels of education use more e-Commerce compared to people with lower levels of education. Figure 4-1 depicts the relationship between education and frequency of e-Commerce usage.

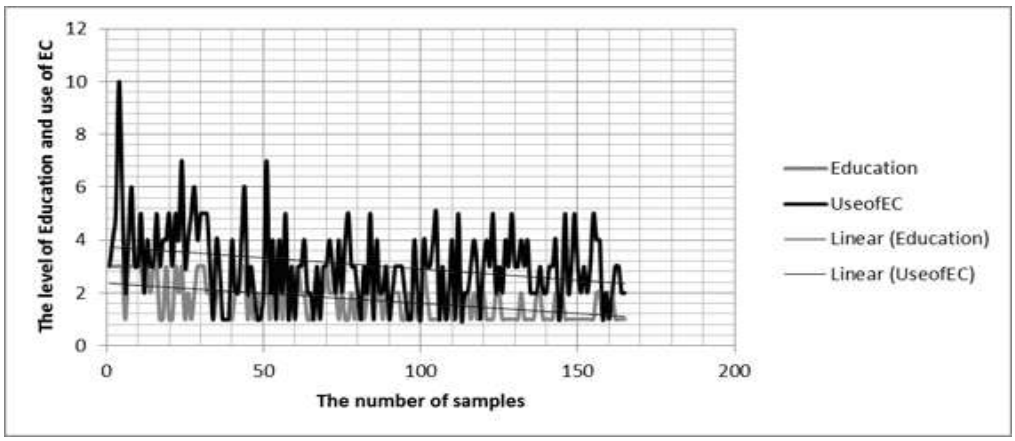


Figure 4-1: The level of education and number of using EC

Statistical tests also show the relationship between the level of education and the numbers of using e-Commerce. The result of Pearson correlation in Table 4-3 shows a relationship between the level of education and the number of using e-Commerce per month. The result is acceptable with 0.99% confidence.

Table 4-3: Correlation between the level of education and use of EC

		RESPONDENT EC USE	RESPONDENT EDUCATION
RESPONDENT EC USE	Pearson Correlation	1	.418**
	Sig. (2-tailed)		.000
	N	165	165
RESPONDENT EDUCATION	Pearson Correlation	.418**	1
	Sig. (2-tailed)	.000	
	N	165	165

**. Correlation is significant at the 0.01 level (2-tailed).

Figure 4-2 shows that participants with a particular job use more e-Commerce compared to other participants. In order to simplify this issue, the jobs of participants were coded as follows:

1) Art, 2) Science, 3) Engineering, 4) Business and Commerce, 5) Computer science, 6) Social Science, 7) Medicine

As shown in Figure 4-2, participants with engineering and computer science job utilized more e-Commerce in their daily activities.

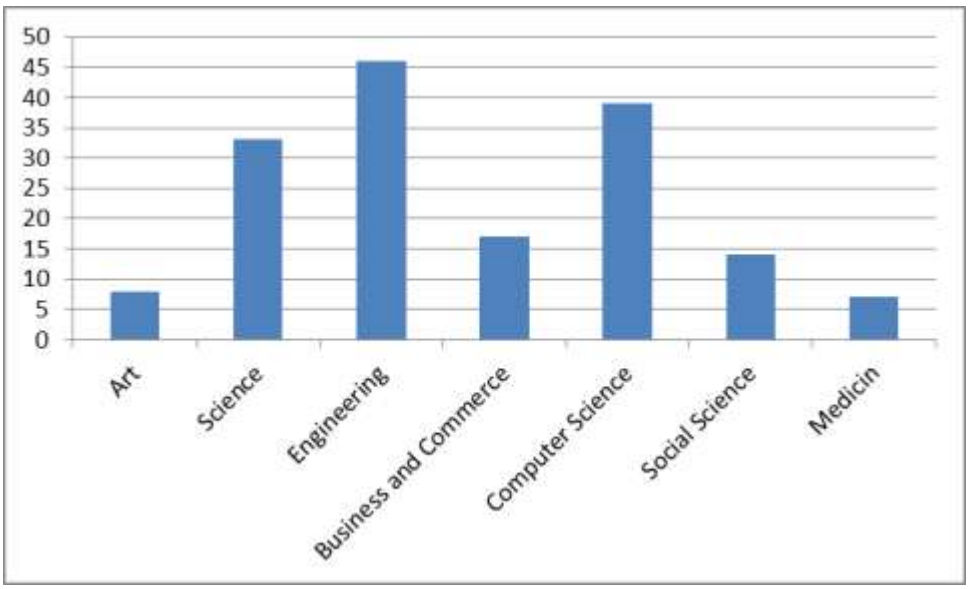


Figure 4-2: Job style and use of e-Commerce

4.3 Sampling Adequacy in FA

The measure of Kaiser-Meyer-Olkin (KMO) test shows that the data are suitable for factor analysis. The result of this test is more than 0.5; therefore, the variables are sufficient for factor analysis and factor reduction. In addition, Bartlett's test of sphericity is significant, indicating that the correlation matrix is significantly different from an identity matrix, in which correlations between variables are zero (Leech et al., 2005). Table 4-4 displays these data.

Table 4-4: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.737
Bartlett's Test of Sphericity	Approx. Chi-Square	4539.647
	df	1275
	Sig.	.000

Principal component analysis works on the initial assumption that all variance is common. Therefore, before extraction the communalities are all one. The communalities in the column labelled Extraction reflect the common variance in the

structure. We can say that 79.3% of the variance associated with question one is common or shared variance. In this step the measure of extraction for all items are more than 0.5. Appendix E shows the share variance of items.

4.4 Factor Extraction

Appendix F lists the eigenvalues associated with each linear component (factor) before extraction, after extraction and after rotation. The result of data analysis in this section shows 51 linear components before extraction within the data set. The eigenvalues associated with each factor represent the variance explained by that particular linear component. Appendix F also shows the eigenvalue in terms of the percentage of variance explained (factor 1 explains18.112% of total variance). It should be clear that the first few factors explain relatively large amount of variance whereas subsequent factors explain only small amount of variance. The results of factor extraction analysis revealed that nine factors have eigenvalue more than one that contain 58.195% of cumulative variance. Table 4-5 shows the rotated component matrix (also called the rotated factor matrix in factor analysis) which is a matrix of the factor loadings for each variable into each factor. Factor loadings less than 0.5 have not been displayed because we asked for these loadings to be suppressed.

Table 4-5: Factor loadings Matrix

	Component								
	TS	**TT**	**OS**	**OT**	**CS**	**CT**	**eS**	**eT**	**eL**
TS1	.772								
TS2	.718								
TS3	.685								
TS4	.661								
TS6	.805								
TS7	.801								
TS9	.788								
TS10	.648								
TS5		.587							
TT1		.619							
TT2		.718							
TT3		.700							
TT4		.649							
OS1			.742						
OS2			.764						
OS3			.741						
OS4			.662						
OS5			.509						
OT1				.810					
OT2				.828					
OT3				.805					
OT4				.594					
CS1					.616				
CS2					.740				
CS3					.635				
CS4					.660				
CT1						.612			
CT2						.582			
CT3						.583			
CT4						.546			
TS8							.550		
eS1							.647		
eS2							.532		
eS3							.523		
eS4							.634		
eT1								.505	
eT2								.816	
eT3								.817	
eT4								.578	
eL1									.520
eL2									.706

TS: Technological items that affect e-Satisfaction, TT: Technological items that affect e-Trust, OS: Organizational items that affect e-Satisfaction, OT: Organizational items that affect e-Trust, CS: Customer items that affect e-Satisfaction, CT: Customer items that affect e-Trust,eS: e-Satisfaction, eT: e-Ttrust,eL:e-Loyalty

Factor loading matrix shows the loading of items on nine factors. Factor one is technological factor that affects customer satisfaction. This factor was labelled TS. Among ten items that had loading on TS, two items had loading into the other factor; TS5 had loading into the technological factor that affect customer trust (TT) and TS8 had loading into the customer satisfaction that was labelled S. It means that TS5 should move to technological factor that affect customer trust (TT) and TS8 should move to satisfaction (S) part of the model. The findings in this part show the effect of technological items on customer satisfaction that is in line with (Chang and Chen, 2008) studies. Technological items that affect customer trust were labelled TT that had four acceptable loading. The outcomes are in line with (Gommans et al., 2001) results in this part of the model. Organizational factor that affects customer satisfaction was labelled OS that had five items with acceptable loading; OS1 to OS5 were remained in the model. This result is in line with (Fang et al., 2011) studies. Organizational items that affect trust were labelled OT in which among nine items in this section, Items OT5 to OT9 had loading less than 0.5. Therefore, these items were omitted from the model. The outcomes show the effect of organizational factor on customer trust that is in line with (Hong et al., 2011) studies. Customer items that affect satisfaction were labelled CS in which all four items had acceptable factor loading. Therefore, CS1 to CS4 remained in the model. The result in this part is in line with (Hwang et al., 2007; Lee et al., 2009) researches. Customer items that affect trust were named CT. Among five items in this section, one item (CT5) had loading on organizational factor that affect customer satisfaction. However, CT5 relates to the customer view towards seller and cannot be part of organizational factor. CT5 was omitted from the model. These results are in line with (Gefen and Straub, 2004; Yoo et al., 2013) studies.

Satisfaction items that shows customer satisfaction was labelled eS in which among five items in this section, eS5 had loading less that 0.5 that was omitted from the model. The items that show customer trust was named eT in which among five items eT5 had loading less than 0.5. Therefore eT5 was omitted from the model. The items that show customer loyalty were labelled eL in which among four items in this section, eL3 and eL4 had loading less than 0.5 and were omitted from the model.

4.5 Internal Consistency Reliability

The measures of Mean, Standard Deviation and Cronbach's Alpha have been presented in Table 4-6. Every factor measures with several items. As can be seen, the measures of Cronbach's Alpha for technology items that affect satisfaction (TS1-TS10, .914), technological items that affect trust (TT1-TT5, .792), organizational items that affect satisfaction (OS1-OS5, .765), organizational items that affect trust (OT1-OT4, .865), customer items that affect satisfaction (CS1-SC4, .777), customer items that affect trust (CT1-CT5, .730), satisfaction items (eS1-eS5, .785), trust items (eT1-eT4, .721) and loyalty items (eL1-eL4, .695) show strong internal consistency among items.

Table 4-6: The measure of Cronbach's Alpha after factor analysis

Items		Statistics		Cronbach's Alpha
		Mean	Std. Deviation	
TS1	System quality	4.30	.557	.914
TS2	Information quality	4.32	.633	
TS3	Personalize web feature	4.38	.628	
TS4	Language option	4.36	.616	
TS6	Products and services information	4.41	.584	
TS7	Complementary systems	4.38	.618	
TS9	Fast and easy payment	4.33	.626	
TS10	Business in 7/24 hours	4.09	.723	
TT1	Customer bulletin board	4.38	.744	.792
TT2	Information security	4.25	.702	
TT3	Customer feedback	4.30	.743	
TT4	Complain and Follow up Facility	4.41	.672	
TT5	Search and compare facilities	4.34	.610	
OS1	Customer Segmentation	4.65	.573	.765
OS2	Customize Products	4.62	.511	
OS3	Fast Response to Customer Inquiries	4.60	.516	
OS4	Variety of Goods and Services	4.59	.541	
OS5	Rewards and Discounts	4.34	.722	
OT1	Clear Shopping Process	4.81	.407	.865
OT2	Money Back Warranty	4.76	.496	
OT3	Contact Interactivity	4.82	.397	
OT4	Organizational Reputation	4.69	.537	
CS1	Identifying Site Quality	4.24	.586	.777
CS2	Customer Experience in e-Commerce	4.40	.603	
CS3	Less Time Transaction	4.32	.732	
CS4	Market Orientation	4.25	.648	
CT1	Knowing Hardware and software Reliability	4.29	.518	.730
CT2	Risk	4.39	.549	
CT3	Positive Referrals from friends	4.38	.556	
CT4	Belief in Integrity	4.48	.548	
eS1	pleasurable purchases	4.59	.528	.785
eS2	Satisfy my needs	4.47	.630	
eS3	Having a good feel	4.41	.602	
eS4	Having good experiences	4.55	.512	
eS5	Collect and analyse customers' information	4.16	.662	
eT1	Do not have doubt about security of this website	3.44	.693	.721
eT2	Web site has a safe backbone	3.27	.578	
eT3	Web site is reliable	3.32	.582	
eT4	Trust to web vendor website	3.27	.606	
eL1	Buy again	4.50	.514	.695
eL2	Recommend this web vendor to my friends	4.38	.579	

4.6 The Result of Regression Analysis

In this research, the aim of using regression is to investigate whether there are significant relationships between technological, organizational, and customer factors with customers satisfaction and trust, on one hand, and customers trust and satisfaction with customers loyalty, on the other hand. According to the structure of the conceptual framework, some of technological, organizational and customer items affect customer satisfaction that the names of these groups of items respectively are Technology-e-Satisfaction, Organization-e-Satisfaction and Customer-e-Satisfaction factors in the model. In this part of the model Technology-e-Satisfaction, Organization-e-Satisfaction and Customer-e-Satisfaction are independent variables and e-Satisfaction is dependent variable. The results of regression analysis revealed that there are significant relationships between Technology-e-Satisfaction, Organization-e-Satisfaction and Customer-e-Satisfaction with e-Satisfaction. Table 4-7 shows the results of regression analysis (adjusted R square =.573, F=73.485, Sig=.000). In this test F is significant, this indicates that the combination of the predictors significantly predict e-Satisfaction. Table 4-7 shows the results of regression for this part of the model.

Table 4-7: The results of regression for e-Satisfaction part

Section	Standard Coefficient Beta	t	Sig.
Technology-e-Satisfaction	.250	3.798	.000
Organization-e-Satisfaction	.383	7.174	.000
Customer-e-Satisfaction	.448	8.228	.000

On the other hand, some of technological, organizational and customer items affect customers trust that the name of these groups of items are Technology-e-Trust, Organization-e-Trust and Customer-e-Trust factors in the model. Technology-e-Trust, Organization-e-Trust and Customer-e-Trust are independent variables and e-Trust is

dependent variable. The results of regression also showed that there are significant relationships between Technology-e-Trust, Organization-e-Trust and Customer-e-Trust factors with e-Trust (adjusted R square =.842, F=88.056, Sig=.000). In this test F is significant, this shows that the combination of the predictors significantly predict e-Trust. Table 4-8 shows the results of regression for this part of the model.

Table 4-8: The results of regression for e-Trust part

Section	Standard Coefficient Beta	t	Sig.
Technology-e-Trust	.573	17.302	.000
Organization-e-Trust	.459	14.421	.000
Customer-e-Trust	.311	9.547	.000

In addition, the outcomes showed that there are significant relationships among e-Satisfaction, e-Trust with e-Loyalty (adjusted R square =.890, F=65.071.056, Sig=.000). In this test F is significant, this shows that the combination of the predictors significantly predict e-Loyalty. Table 4-9 shows the results of regression for this part of the model.

Table 4-9: The results of regression for e-Loyalty part

Section	Standard Coefficient Beta	t	Sig.
Satisfaction-loyalty	.367	6.177	.000
Trust-loyalty	.600	10.081	.000
Satisfaction-trust	.699	15.45	.000

Table 4-10 shows the results of hypothesises testing.

Table 4-10: Hypothesises test results

Hypothesis		Results
H1	Technological factors have positive effect on customer satisfaction in e-Commerce.	Supported
H2	Organizational factors have positive effect on customer satisfaction in e-Commerce.	Supported
H3	Customer factors have positive effect on customer satisfaction in e-Commerce.	Supported
H4	Technological factors have positive effect on customer trust in e-Commerce.	Supported
H5	Organizational factors have positive effect on customer trust in e-Commerce.	Supported
H6	Customer factors have positive effect on customer trust in e-Commerce.	Supported
H7	e-Satisfaction has positive effect on e-Loyalty.	Supported
H8	e-Trust has positive effect on e-Loyalty.	Supported
H9	e-Satisfaction has positive effect on e-Trust and vice versa.	Supported

Figure 4-3 depicts the results of regression analysis clearly. The results showed that customer-e-Satisfaction factor (Standard Coefficient Beta=.448) had the most contribution in predicting e-Satisfaction that followed by organization-e-Satisfaction (Standard Coefficient Beta=.383) and technology-e-Satisfaction factor (Standard Coefficient Beta=.250). These results are in line with (Belanche et al., 2012; Chang et al., 2009) studies. In the e-Trust section, the results of regression also showed that technology-e-Trust factor (Standard Coefficient Beta=.573) had the most contribution in predicting e-Trust that followed by organization-e-Trust (Standard Coefficient Beta=.459) and customer-e-Trust factor (Standard Coefficient Beta=.311). These results are in line with the results of (Chu et al., 2011; Kim et al., 2005) researches. In addition, the results showed that between e-Satisfaction (Standard Coefficient Beta=.367) and e-Trust (Standard Coefficient Beta=.600), e-Trust had more contribution in predicting e-Loyalty that confirm with the results of (Hong et al., 2011; Safa et al., 2013; Srinivasan et al., 2002) researches. Figure 4-3 shows the research model with the measure of standard coefficient beta.

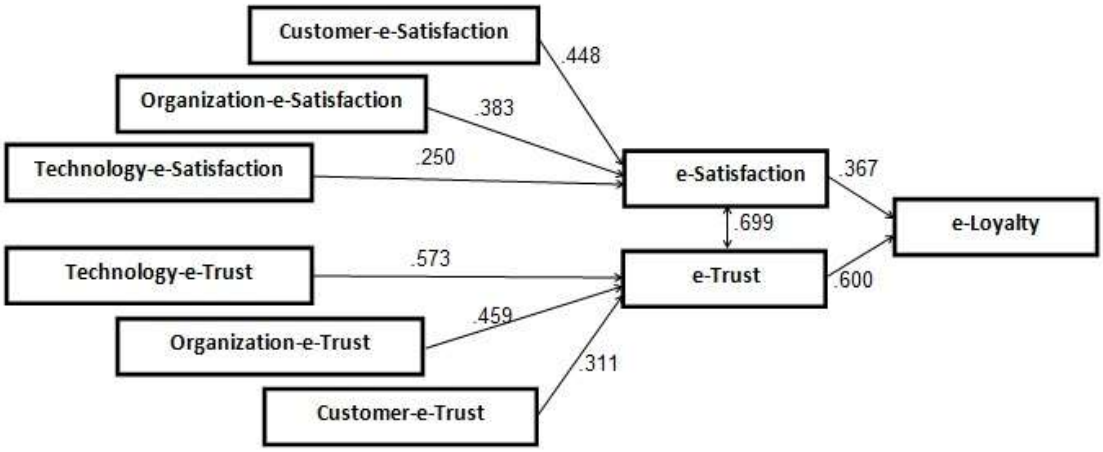


Figure 4-3: Research model

Based on the results of the regression analysis, Table 4-11 details the overall contribution of technological, organizational, and customer factors through different parts of the model. For instance, Customer-e-Satisfaction factor has relationship with e-Satisfaction and then e-Loyalty (.448*.367) and also has relationship through e-Trust with e-Loyalty (.448*.699*.600). Overall contribution on e-Loyalty is .448*.367 + .448*.699*.600 that equal to .351. The results in table 4-11 show that technology-e-Trust factor has the most contribution in the formation of e-Loyalty that is in line with the results of (Kim et al., 2011) studies. Organization-e-Trust and customer-e-Satisfaction factors are second and third effective factors in the formation of e-Loyalty respectively that are in line with (Gommans et al., 2001; Morgan et al., 2013) studies.

Table 4-11: Overall effect on e-Loyalty

Path	Effects	Overall Effect on e-Loyalty
Technology-e-Satisfaction –> e-Satisfaction -> e-Loyalty Technology-e-Satisfaction –> e-Satisfaction -> e-Trust -> e-Loyalty	0.091 0.104	0.195
Organization-e-Satisfaction –> e-Satisfaction -> e-Loyalty Organization-e-Satisfaction–> e-Satisfaction -> e-Trust -> e-Loyalty	0.140 0.160	0.300
Customer-e-Satisfaction –> e-Satisfaction -> e-Loyalty Customer-e-Satisfaction –> e-Satisfaction -> e-Trust -> e-Loyalty	0.164 0.187	0.351
Technology-e-Trust -> e-Trust -> e-Loyalty Technology-e-Trust -> e-Trust -> e-Satisfaction -> e-Loyalty	0.343 0.146	0.489
Organization-e-Trust -> e-Trust -> e-Loyalty Organization-e-Trust -> e-Trust -> e-Satisfaction -> e-Loyalty	0.275 0.117	0.392
Customer-e-Trust -> e-Trust -> e-Loyalty Customer-e-Trust -> e-Trust -> e-Satisfaction -> e-Loyalty	0.186 0.079	0.265

4.7 Modelling e-Loyalty Based ANFIS

ANFIS can be a neural network with several layers of feed-forward, which is regarded as the learning mechanism, and fuzzy reasoning is used to map inputs into outputs (Wang and Lin, 2009). In this research, ANFIS was applied to model customer's e-Loyalty, based on e-Trust and e-Satisfaction (Larasati et al., 2012). The steps of modelling are as follows:

The first step of customer e-Loyalty modelling is to create a conceptual framework that explains customer e-Loyalty based on e-Trust and e-Satisfaction. This part of the research had been carried out, and duly explained in the previous chapters.

The second step is collecting data based on the conceptual framework, which was carried out by questionnaires from e-Customers of the largest retail chain stores in Iran.

In the third step, data from e-Trust and e-Satisfaction were entered into the ANFIS model in order to generate fuzzy rules (Kwong et al., 2009). An ANFIS with five layers, two inputs, and one output is presented in Figure 4-4.

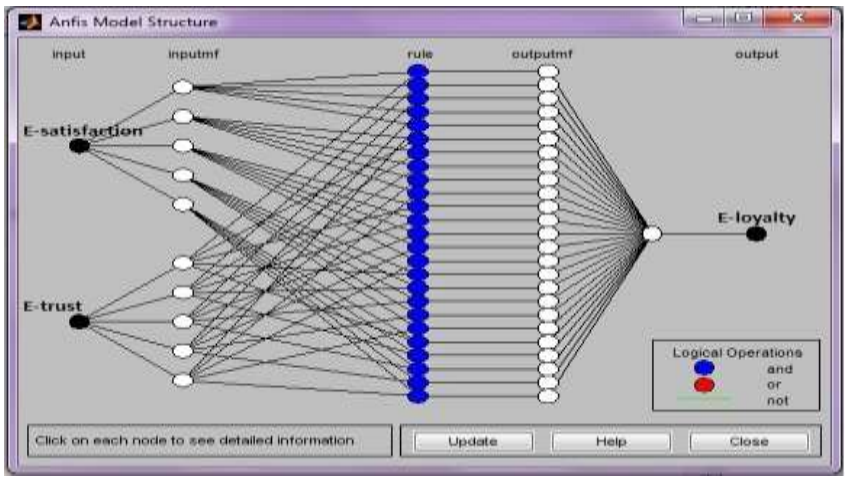


Figure 4-4: An ANFIS with five layers, two inputs and one output

Feed forward back propagation neural network consists of several layers of computational units, which are interconnected in a feed-forward way. Neurons in one layer have a direct connection to the neurons of the subsequent layer. In the input layer, data are introduced to the network. Data are processed in the hidden layer (that can be one or more). The results for given inputs are produced in the output layer.

Five rules were considered for every input in the ANFIS system. Thus, the inputs of the system have ten rules and twenty-five rules for processing the data to calculate the outputs. Membership functions for input variables acts in layer two. Every fuzzy rule relates to one neuron that is connected to each other. Each neuron in the third layer presents one fuzzy rule, based on the precondition of the previous layer and present output conditions. This system has one output.

MATLAB software was used for Modelling e-Loyalty, based on e-Trust and e-Satisfaction. E-Trust and e-Satisfaction data are in the first and second column, and e-Loyalty data is in the third column of the matrix, which is utilized as operational data for ANFIS. Seventy percent of the data were used for training, while thirty percent were utilized for testing and checking data. Finally, the predicted data for e-Loyalty is

extracted from the ANFIS model. C programming was used for this process, and the data in each step is duly stored. Comparing the ANFIS output and observed data showed that there is a small difference between the results. The C code that was used in Matlab is shown in Appendix G.

4.8 Validity of ANFIS Model

Root Mean Square Error (RMSE**)** shows the difference between two datasets. This difference can be between values actually observed, and values that are estimated or predicted by the model. RMSE is a suitable measure of accuracy (Armstrong and Collopy, 1992). In this research, the results of prediction by regression (linear relationship test) and artificial neural network (non-linear relationship test) were compared. The difference between these two dataset was calculated by RMSE.

RMSE = 0.140060

MSE= 0.019617

The results showed that there is a small difference between the calculated data by ANFIS and regression. Figure 4-5 shows the differences between two dataset. This means that prediction of e-Loyalty through two methods had the same results. This shows the reliability of the model.

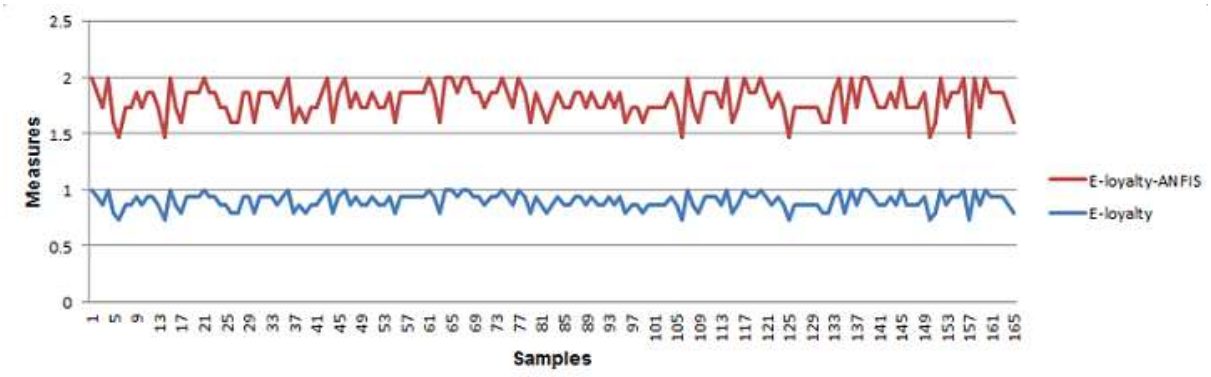


Figure 4-5: Data trend in ANFIS and e-Loyalty data

4.9 Summary

The results of data analysis and assessment of the model with statistical tests and artificial neural network were presented in this chapter. Data analysis process focused on data purification, description of data by statistical measures, demographic of participants, normality of data distribution, improvement of research model, and examination of hypothesises. The results of factor analysis showed nine factors based on the data in data set. The total variance explained table (appendix F) showed how the variance is divided among nine factors. All nine factors have variance greater than one that is common criterion for a factor to be useful (Leech et al., 2005). Cumulative variance for these nine factors is 58.195 that it shows these factors account more than fifty percent of cumulative variance. Fifty one items measure nine factors in this research model. Factor loading matrix showed that ten items had loading less than 0.5 on the respective factors. The items with loading less than 0.5 were omitted from the model. Finally, forty one items remained that measured Technology-e-Satisfaction, Organization-e-Satisfaction, Customer-e-Satisfaction, Technology-e-Trust, Organization-e-Trust, Customer-e-Trust, e-satisfaction, e-Trust and e-Loyalty. The results of regression analysis revealed the relationships between Technology-e-Satisfaction, Organization-e-Satisfaction, and Customer-e-Satisfaction with e-Satisfaction and also the relationships between Technology-e-Trust, Organization-e-Trust, and Customer-e-Trust with e-Trust. In addition, the outcomes of regression analysis showed significant relationships between e-Satisfaction and e-Trust with e-Loyalty. Based on the results of regression analysis, path analysis showed that Technology-e-Trust factor has the most contribution in the formation of e-Loyalty that follow by Organization-e-Trust and Customer-e-Satisfaction. Beside statistical analysis,

artificial neural network was applied for assessing the model. The results of prediction by regression and artificial neural network for e-Loyalty were close to each other that shows reliability of the model.

Chapter 5 Prototype Development and Implementation

5.1 Introduction

The development of e-Commerce prototype based on different aspects of technology, organization, and customer will be duly discussed in this chapter. Critical factors that influence e-Satisfaction, e-Trust, and e-Loyalty have been extracted from the literature and interviews with experts. The classification of independent variables was based on their effect on both e-Satisfaction and e-Trust. The variables are linked to the technology, organization, and customer aspects, which forms three main entities in e-Commerce. Based on this classification, the conceptual framework was constructed. A prototype was designed and developed by considering critical factors in the framework structure. The effective items in every construct are based on the results of data analysis. It means that the items that were omitted from the model were not considered for prototype development.

5.2 Prototype Development

The development of a prototype will demonstrate how the technological, organizational, and customer factors influence customer satisfaction and trust in an online environment. These key elements, which make up the three main entities in e-Commerce, influence e-Satisfaction, e-Trust, and e-Loyalty. Five steps of system Analysis, Design, Development, Implement, and Evaluation (ADDIE) were applied for the creation of the prototype. e-Satisfaction, e-Trust, and e-Loyalty are the psychological aspects of this research, which are duly influenced by technological

factor, organizational policies, and the perception of the customers. The main goal of this prototype is to demonstrate these effects.

Experts usually apply a prototype as an early model or sample in order to test a concept, process, or act. Researchers also design a prototype for the purpose of testing the hypotheses of their research, or to demonstrate a concept on a smaller scale. Prototypes show the results in real environment prior to upscale implementation, which minimizes the budget and time (Mohdzain and Ward, 2007). Most of the characters and attributes of a category are combined in an instance or a prototype.

5.3 The Aim of Prototype in This Research

The prototype was developed as a proof of e-Commerce technology concept that affects customers' e-Satisfaction and e-Trust in the real world. We disregarded organizational and customer factors in the prototype due to difficulty of developing a prototype based on these items in terms of fund and time. Some of items in organizational section such as organizational reputation need to a company with long time activity and proper advertisements. The content of technological factors, along with the concept of e-Satisfaction, e-Trust, and e-Loyalty are important in forming a suitable prototype in this research.

5.4 Development of Prototype

ADDIE encompasses several steps, such as Analysis, Design, Development, Implement, and Evaluation, which come from Instructional System Design (ISD). Experts utilized ISD in the U.S. Army in 1950, and ADDIE presented in 1975. It was introduced by the centre of Educational Technology at Florida by the U.S. Army. The sequence of developing a system is as follows (Fardoun et al., 2009):

1) Analysis
2) Design
3) Development
4) Implementation
5) Evaluation

The ADDIE Model shows a method for developing a software systems.

5.4.1 Analysis

In the analysis part of a system, the current tasks, process, needs, and problems are considered and analysed by the experts. Based on the outcomes, the system will be designed. The research prototype demonstrates the effect of technological items on both e-Trust and e-Satisfaction. These effects were determined in the data analysis part of this research. Identification of these variables is based on the needs of the customers. For example, customers interest to buy book through the site with good system quality, proper information about books, reliable payment system and so on that they are the variables that affect customer satisfaction and trust. These variables will be considered in the analysis step of the system.

5.4.1.1 User's Requirement Gathering

One of the important steps prior to develop a system is requirements gathering. The elicitation of needs is the main step involved in requirement gathering. Programmer usually start to develop an initial version of system based on users' needs and current workflow and get idea from the similar systems that exist in the market place for their own system. The similar systems can be Alibaba.com, eBay.com and eBooks.com in this case. Then the system will be developed and improved based on the feedback of the users. Experience of developer in programming play a vital role in developing a suitable

system. Users start to work with the system, and they will outline their needs, which will allow us to enhance the system based upon their requirements until the product meets a good situation. In this research, a preliminary system was developed and then the system was improved based on the feedback of the users who participated in the test; the demography of the participants were presented in table 5-6. In this case, the system should be able to sell book via the Internet, and customers should be able to purchase book and pay through the system.

5.4.2 Design

System design encompasses several processes, such as defining the architecture, modules, components, interface, and data structure of a system in order to satisfy the requirements. The results of the previous step (analysis) will be the main input for the system design.

The conceptual framework and the variables categorized in chapter 3 show the characters (the abilities of prototype) that should be considered in the design step. The biggest difference between traditional commerce and modern or online commerce is the technological considerations. That is why the implementation of these factors in the design phase is extremely important. The prototype was developed to validate of e-Commerce technological concept that affects customers' satisfaction and trust. The participants examined the prototype in two steps.

I. Before applying the items

II. After applying these items in the web system

For instance:

1) Ajax is a new technology that leads to fast page loading (faster postponed). In the second phase, Ajax technology was used in the web system and customer's opinion regarding the speed of the page loading is examined (Ullman, 2008).
2) Some parts of the main menu were changed for aesthetic purposes, based on the feedback of experts and participant (refer to system evaluation section).
3) To create a more attractive system, several texts and picture animations with different colours were also used in the variant pages in the system.
4) To obtain a more secure system in terms of user information disclosure, all passwords were coded by a Hash function, and then saved in the database.
5) The web system lacks a language option, only showing all of the menus, submenus, and text in the English language. The second part of the system includes a development language option.
6) The information regarding books were regularly updated.
7) In order to realize a level of convenience for users and customers, several complementary systems, such as searching for a book based on the title, author(s), and ISDN were provided in the system. The barcode system also leads to ease of use. The reporting system helps users and administration take in different information regarding transaction.
8) The opinions of the customers are shown on the main page of the system, in the form of a customer bulletin board.
9) Customers are able to complain, present their opinions, ideas or suggestions via the Contact Us section of the system.

10) All monetary transactions are carried out via CIMB clicks, online. The online system has many quick and easy options for consumers.
11) Customers can utilize the system 24 hours and 7 days.
12) The information regarding customers, their respective transactions, purchases, selections, contacts, login and logout information are saved in the system's database.
13) The system displays information regarding books in the appropriate place with a different design.

Table 5-1 shows the technological requirement for the e-Commerce prototype.

Table 5-1: The technological requirement for the e-Commerce prototype

Technological Item	System Implementation
System quality (TS1)	Ajax technology, text and picture animation
Information quality (TS2)	Updating book information regularly Presenting complete information about books
Personalize web feature (TS3)	Ability to personalize the web page.
Language Options (TS4)	Using language option
Search and Comparing Facilities (TS5)	Comprehensive search system
Product and Service Information (TS6)	Presenting different information about different book on the website.
Using other Systems (TS7)	Barcode and reporting sub-system
Collecting and Analysing Customer Information (TS8)	Different information about customers' activities save in the system.
Fast and Easy Payment (TS9)	Using online banking for payment
Buying and Selling 7 days and 24 hours (TS10)	Using system 24/7
Customer Bulletin Board (TT1)	Showing customer opinion on the main page.
Security of Information and Privacy (TT2)	Using Hash function for password
Customer Feedback Facility (TT3)	Ability of sending massage and feedback through the contact us.
Complain and Follow up Facility (TT4)	Facility for complaining, presenting suggestion and opinion

5.4.2.1 Data Flow Diagram

Data Flow Diagrams (DFD) helps us in identifying existing business processes. It is a technique we benefit from particularly before we go through business process re-

engineering. A data flow diagram looks at how data flows through a system. It concerns things like where the data will come from and go to as well as where it will be stored (Sommerville, 2009). But you won't find information about the processing time. Entities should be determined in this process. An external entity can represent a human, system or subsystem. It is where certain data comes from or goes to. It is external to the system we study, in terms of the business process. For this reason, experts use to draw external entities on the edge of a diagram. Figure 5-1 shows two main entities in the system.

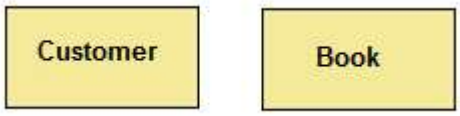


Figure 5-1: Main entities in the system

A process is a business activity or function where the manipulation and transformation of data takes place. A process can be decomposed to several levels, for representing how data are being processed within the process. The processes are order book, deliver book, and issue receipt. Figure 5-2 shows three main processes in the system.

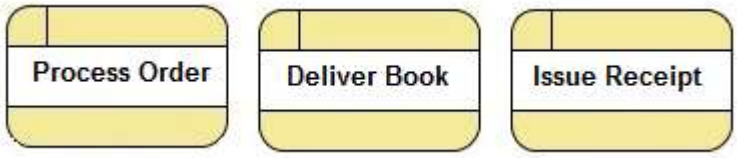


Figure 5-2: Main processes in the system

A data store represents the storage of persistent data required and/or produced by the process. Figure 5-3 shows the database on the system.

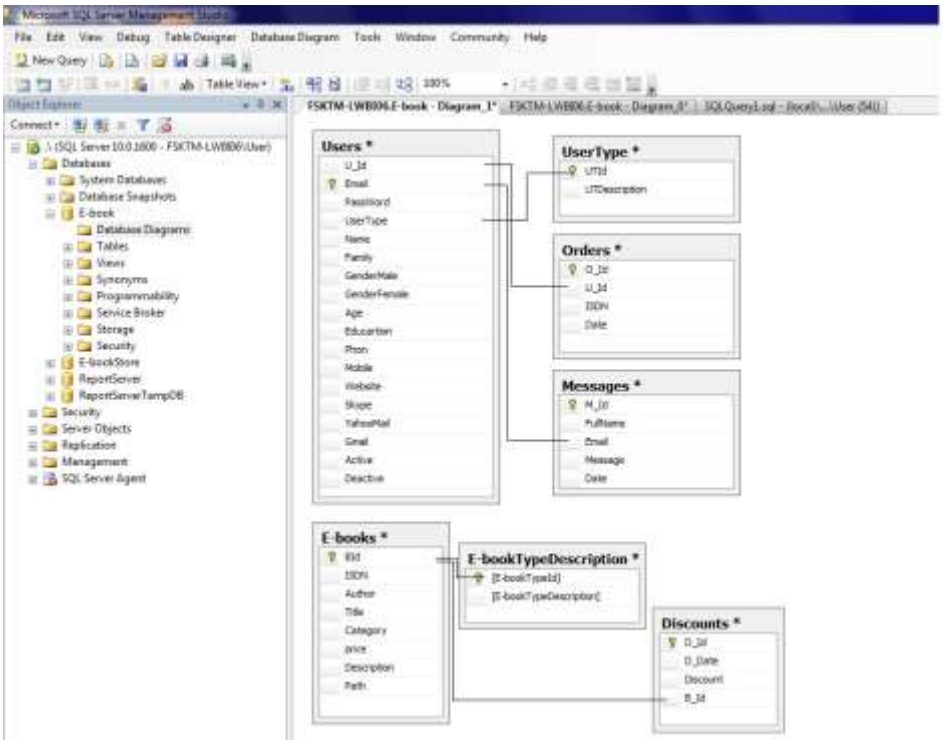


Figure 5-3: Database of the system

A data flow represents the flow of information, with its direction represented by an arrow head that shows at the end(s) of flow connector. Customers can visit the website and choose their interesting books. Before purchasing, they should register their information in the system. After registration they have a password that they can review their purchase items on the site. After confirmation of their payment by the administrator, the books with a receipt will be sent to their address. Figure 5-4 shows data flow diagram of the system.

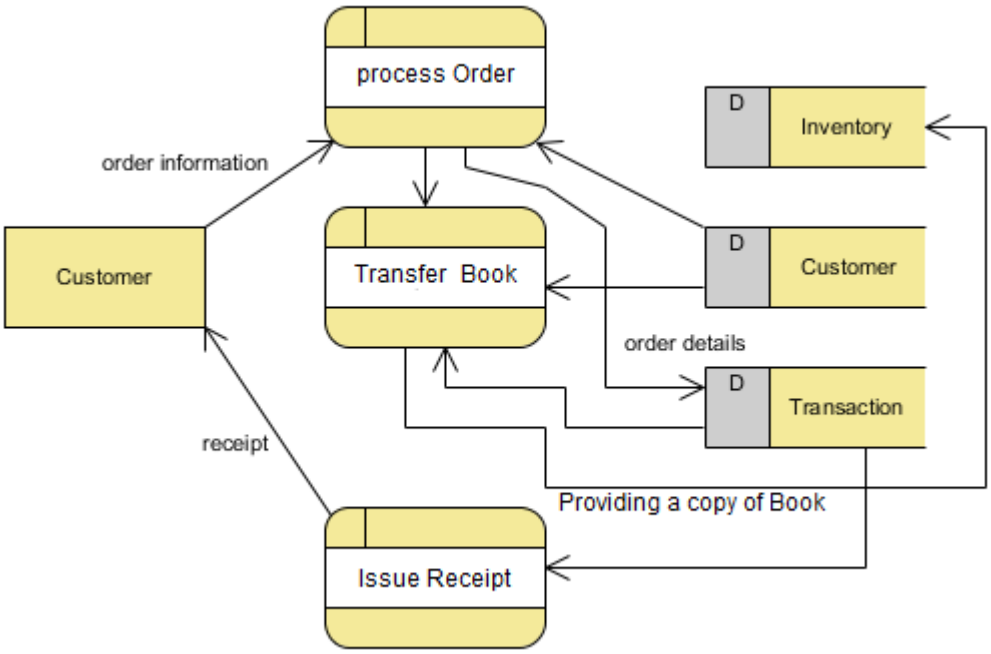


Figure 5-4: Data flow diagram

5.4.3 Development

Extracting the requirements or analysis of requirements is an important task prior to the development of the software (Ralph and Wand, 2009). After the requirements are gathered, analysis of the development should be clearly determined. Implementation begins when programmer begins programming. In this project, the C# language in Visual Studio 2008 was used to code, and the SQL Server 2008 serves as the database of the system. Object Oriented (OO) methodology was considered as a structure of programming. SQL server is one of the best databases in terms of security and the volume of the data that it manages. C# with .Net Framework 3.5 also is one of the famous programming languages in the community of developers. These two tools are sufficient for this project. The prototype was presented to participants in two steps in order to investigate the effect of technological items on their satisfaction and trust.

Table 5-2 shows the differences of the prototype before and after applying technological items.

Table 5-2: The differences of the prototype before and after applying technological items

Before applying the technological items	After applying the technological items
The speed of page loading was related to the speed of the Internet in the first version of the prototype.	By applying Ajax technology, the speed of page loading was increased.
There were not any text and image animation in the initial version of the prototype.	Text and image animation were added to the second version of the prototype.
Username and password were saved without encryption in the first version of the prototype.	Username and password were encrypted and saved in the database to increase the security of the system.
Information of the books was based on author and title of books in the first version of prototype.	Information of books was presented with more details such as author name, title, book category, ISEN, price, etc. In the new version of prototype.
The initial version of the prototype was based on Persian language.	The new version of the prototype has Persian and English language options.
The first version of prototype did not have facility for customer's suggestion or complain.	The new version of prototype has facility for customer suggestion and complaining.
Old version of prototype did not have secure facility for money transaction.	CIMB Bank facility used for money transaction to provide a secure money transaction.
The first version of the prototype did not have facility for barcode of the books.	The facility for registering the barcode of books was added to the new version of the prototype.

5.4.4 Implementation

Implementation refers to the process of guiding a client throughout the usage of the software. This is after requirements analysis, customization, scope analysis, system integration, training and delivery. There are large numbers of interrelated tasks in

appropriate sequence that is required prior to implementing the system. We explained the purpose of this system and described how they can work with this system before participants start to work with the prototype.

5.4.5 System Evaluation

Once the system has been developed and implemented, it should be evaluated. The purpose of evaluation is to see if the system works, whether it is working well, quickly, or smoothly. This will allow all users of the system to easily and effectively use the system. The system should meet the requirements that were determined prior in the analysis part. The outcomes of the evaluation will help the analyst to identify any problems or limitations within the new system. Then, the system analyst needs to begin system analysis from the beginning. This basically means that analysis; design, test and implementation should be repeated. Based on ISO/IEC quality model there are major quality characteristics namely functionality, reliability, usability, and efficiency. Functionality refers to ability of the system to performance according to specific needs and it is used to measure the level of which system satisfies functional requirements of the users. Functional criteria are different for different software. Usability refers to ability of the software packages as well as the easiness to learn and operate it under certain specific condition. Reliability is ability of the system to run consistently without crashing under specific condition. Efficiency refers to ability of the system to provide appropriate performance, relative to the amount of resources used under certain conditions (Jadhav and Sonar, 2011). The prototype was evaluated by eight experts that had experience and academic education in computer science in order to be sure about functionality, reliability, usability and efficiency of the prototype. Two PhD with more

than ten years experiences, three masters with five years experiences and three analyst, designer and developer with more than ten years experiences attended in this assessment. Table 5-3 shows the demography of experts

Table 5-3: Demographic of computer science experts

Demographic Characteristics		n	Percent
Gender	Male	5	62.5
	Female	3	37.5
Education	Undergraduate	3	37.5
	Master	3	37.5
	PhD	2	25
Work experience	Below 10 years	3	37.5
	Above 10 years	5	37.5

The questionnaire for system evaluation contains four parts (Appendix H): eight questions measure functionality of the system (FU1-FU8), four questions for reliability (RE1-RE4), six questions for usability (UE1-UE6) and three questions for efficacy. Evaluation of the prototype by these questions shows that the prototype works properly in terms of functionality, reliability, usability and efficacy. Fulfilment of these criteria has a positive effect on validity and reliability of the statistical tests. We should have confidence about the system before presenting to participants, collecting data and conducting statistical test. Table 5-4 shows the result of experts' evaluation.

Table 5-4: The results of system evaluation

Expert	Functionality	Reliability	Usability	Efficacy
E1	Good	Good	Good	Good
E2	Fair	Good	Good	Fair
E3	Good	Good	Good	Good
E4	Good	Fair	Good	Good
E5	Good	Good	Fair	Good
E6	Good	Good	Good	Good
E7	Good	Good	Good	Good
E8	Good	Good	Good	Good

The web system is available at this address: www.Ebook4buy.com, and Figure 5-5 shows the main page of the prototype. On the first page, information regarding the advantages of books was presented. On the left side of the main page, a brief category of books was highlighted. Customers, administrators of the website and the staff log in on the right side of the site. Based on the user type and accessibility, certain facilities in the system will be available only to them. For instance, when administrators login to the system, all parts of the system are available to them. The site administrators are the only ones who can enter and update information regarding books for sale. Meanwhile, customers are able to view their respective purchase cards, and view the antecedent of their purchases.

In order to create a more attractive environment, several different text animations regarding books are shown in the ribbon on the header of the site. Several graphical animations are also shown in the bottom of the left side of the system. Figure 5-5 shows this page of the system.

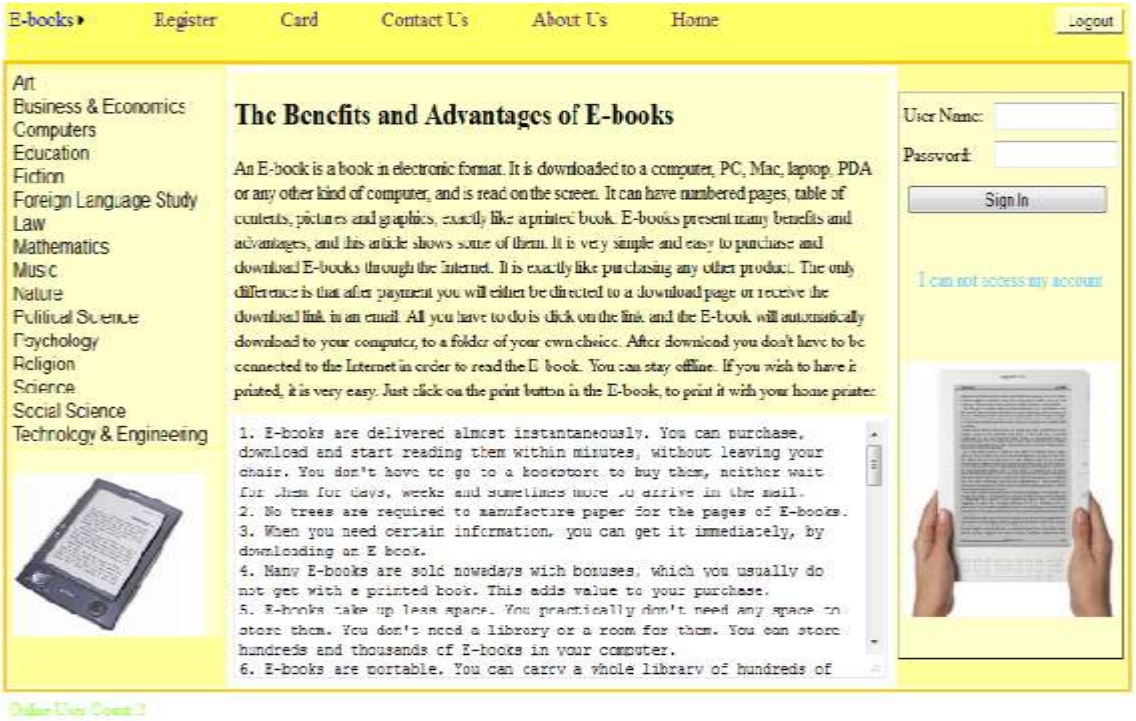


Figure 5-5: : Home page of the system

With regards to web page design, the page is divided into four distinct parts:

Header: In this part, a picture shows that we can possess a huge number of books in our laptop in the form of e-books. This picture also shows an electronic library. An animation text is also created in order to make the page more attractive.

Right side: On the right side of the pages, a classification of books has been presented. A picture animation is placed under this section.

Left side: The login section is on the left side of the page. Different parts are accessible, based on user preferences.

Footer: The number of online users and total users are shown in this part.

The above parts are created in the master page of the system, and the master page is a common part for all of the pages. Figure 5-6 shows this page of the system.

Figure 5-6: Main page of the system

All users, customers and staff should be registered in the system prior to any activity. As previously mentioned, every user is allowed to use certain facilities, based on the access policy. The email address serves as the key field of identification a user. If they are previously registered, the system shows their information and prompts an indicator of their prior registration. After registration, users can log in and use the system to purchase, search for books, and send feedbacks to the administrators of the system. Figure 5-7 shows the registration page of the system.

Figure 5-7: Registration form

Customers are able to observe and control their purchases in the card page of the system. The information regarding their respective purchases is saved in the database, which allows them to see the title of the books, ISBN, author, a brief description, and the price of the books that they purchased or selected. Figure 5-8 shows this page of the system.

Figure 5-8: Customer purchase card

In the contact page, users can send messages, their opinions, or any feedback to the administrators of the system. The administrators will pass these messages to the parties that are responsible for them, and will pass their respective replies to the customers once it is completed. The contact page saves the emails, the full name, message and date of the respective messages. Figure 5-9 shows this page of the system.

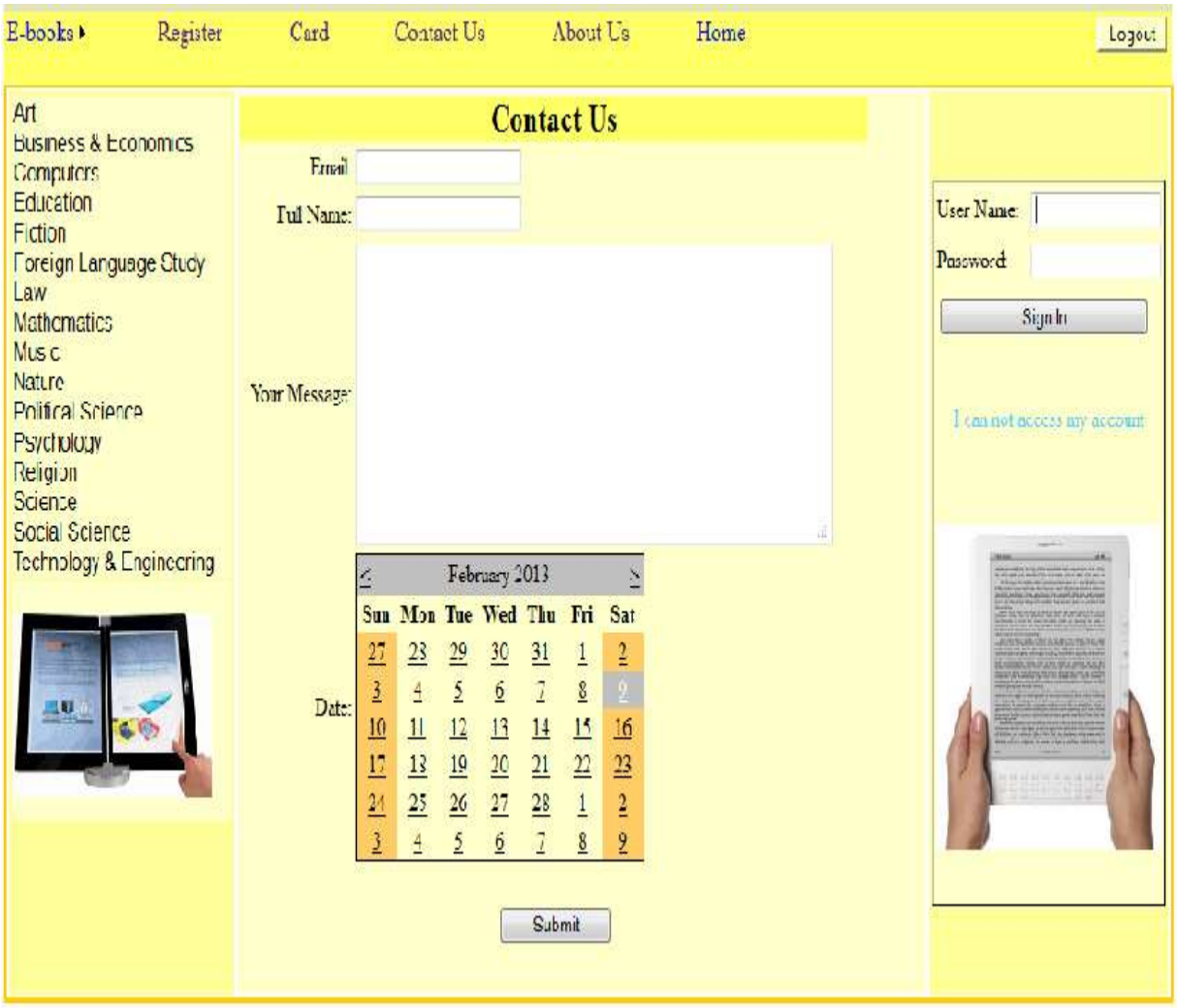


Figure 5-9: Contact us form

The administrators of the system can enter the information of a new book into the system. When the new book is provided for sale, this section is utilized. The title, ISBN, author(s), category of book, price, and a brief description of the book are saved in the system. Figure 5-10 shows this page of the system.

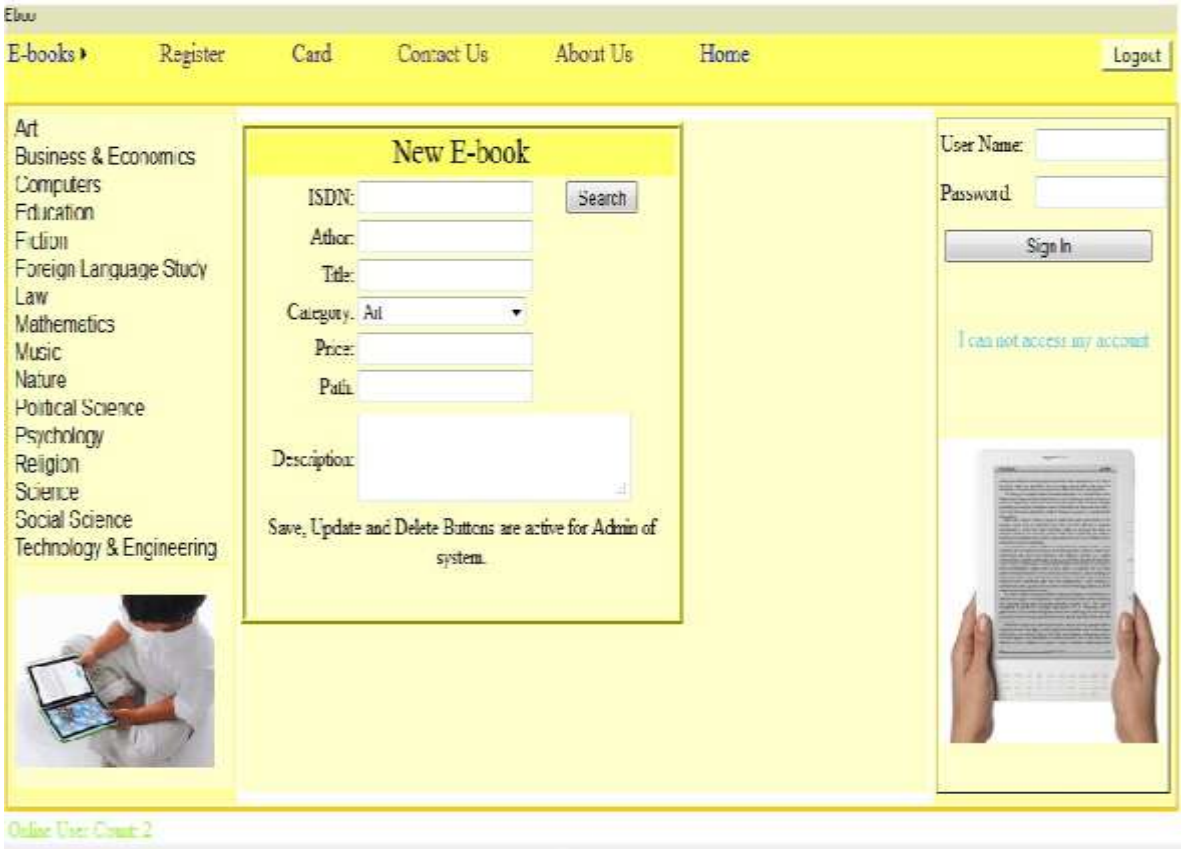


Figure 5-10: New book enter form

A conceptual framework was formed based on the classification of the critical factors. In order to show the effect of technological items regarding e-Satisfaction and e-Trust on a small scale, a prototype was developed. C# language 2008 and SQL Server 2008 were applied to develop the website. Table 5-5 shows some facilities in the system that affect customer satisfaction and trust in a concise form.

Table 5-5: Facility of the system that influences customer satisfaction and trust

Factors	In system	Implication (Lead to)
Fast navigation Fast page loading	Ajax technology	Customer satisfaction
Attractive environment	Text and picture animation	Customer satisfaction
Information security	Hash code	Customer trust
Language option	Different language	Customer satisfaction
Information quality	Update and in right place	Customer satisfaction
Different sub-system	Report sub-system Barcode sub-system Search sub-system	Customer satisfaction
Customer bulletin board	Show customer opinion	Customer trust
Facility for suggestion and complain	Contact Us	Customer trust
Secure money transfer	Online transaction	Customer trust

Figure 5-11 shows the effect of technological items on the prototype.

Figure 5-11: Prototype after applying technological items

In order to increase the speed of page loading in the system Ajax technology was applied. Text with different colours and animation were used to create more attractive pages. Hash code function was applied to code the passwords in the database to increase the security of the system. Flexible search sub-system helps customers to find their favourite book in the system. Contact us is another sub-system that customer can send their suggestion, opinion and complains through the system. The information of book was presented based on classification of books. In the next chapter prototype will be assessment.

5.5 Assessment of Prototype by Participants

The aim of prototype is to prove that e-Commerce technological concept affects customers' satisfaction and trust. Prototype was tested in two situations; before and after applying technological factor. Pre-test and post-test are proper tests for this part. The prototype with a proper explanation was presented to participants and we asked to participate in this part of our research. Figure 5-12 shows the process of prototype testing in two steps, before and after applying technological items.

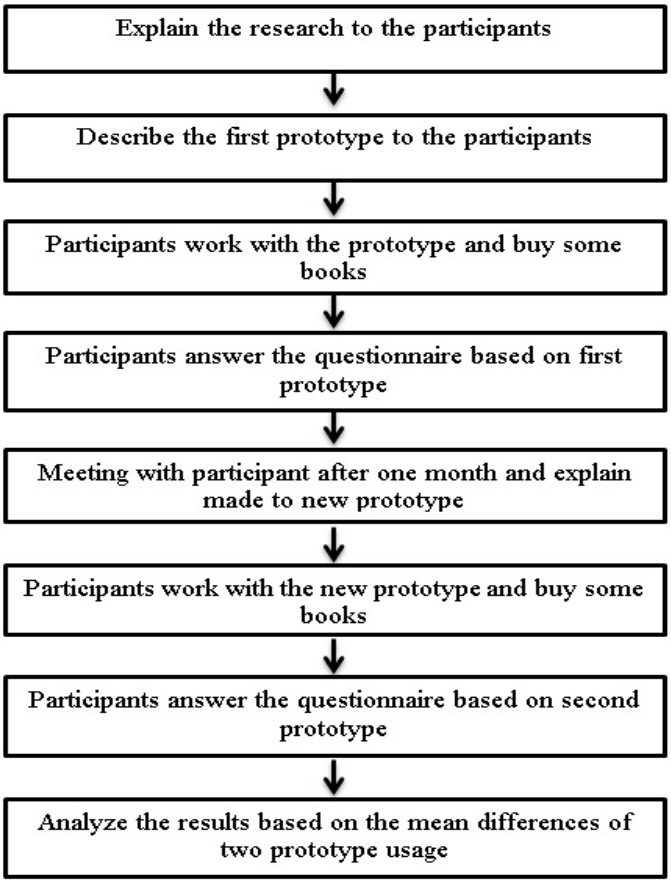


Figure 5-12: The process of prototype paired sample test

The participants were Iranian that they had experience in e-Commerce. Forty one participants answered our questionnaires, with (43.9%) males, and (56.1%) females. Participants' ages were categorized into four distinct groups of 1) 20-29, 2) 30-39, 3) 40-49 years of age, and 4) more than 50 years old. In terms of education, (46.3%) were undergraduates, (43.9%) possess a Master's degree, and (9.8%) were PhD holders. Participants had variety of job, (7.3%) of participants' job is in the art domain, (26.8%) science, (24.4%) engineer, (12.2%) business, (17.1%) computer, (9.8%) social science and (2.4%) medicine. Table 5-6 shows demography of participants.

Table 5-6: Demography of participants in prototype test

Demographic characteristics		n	Percent
Gender	*Male*	18	43.9
	Female	23	56.1
Age	*20-29*	3	7.4
	30-39	25	60.9
	40-49	12	29.3
	50 and above	1	2.4
Education	*Undergraduate*	19	46.3
	Master	18	43.9
	PhD	4	9.8
Job Domain	*Art*	3	7.3
	Science	11	26.8
	Engineering	10	24.4
	Business and Commerce	5	12.2
	Computer Science	7	17.1
	Social Science	4	9.8
	Medicine	1	2.4

5.6 Data Analysis

The prototype presented to the participants with proper explanation about the system. Forty one participants that had experience in e-Commerce answered to the research questionnaire (Appendix I). The normality of data was examined with skeweness and kurtosis test. Paired sample t-test showed that there were significant differences between customers' satisfaction and trust before and after applying the effective items to the system.

5.6.1 Prototype Data Normality

Normality test is the first test that was conducted. If the distribution of the data is normal, the parametric test will be applied. Otherwise, non-parametric tests will be used. Skewness and Kurtosis tests are numerical methods for the normality test. Appendix J shows the descriptions and characters of the prototype data. The results

show that all Skewness and Kurtosis measures are between -3 and +3, therefore the data distribution are normal.

5.6.2 Comparing Participants in Two Condition

The paired sample t-test is appropriate for data in which two samples are paired in some way. This type of analysis is appropriate for pairs consist of before and after measurements on a single group of subjects or participants. On the other words, the paired-sample t-test is used in repeated measures or correlated groups design, in which each subject is tested twice on the same variable. The test can also be used for the matched group design in which pairs of subjects that are matched on one or more characteristics serve in the two conditions (Field, 2005). In any one analysis, there must be only two sets of data. The two sets of data must be obtained from the same subjects or from two matched groups of subjects. The sampling distribution of the difference score should be normally distributed.

The characteristics that were applied in the prototype relate to technological items after factor analysis that affect customers' satisfaction and trust. The aim of pairs sample t-test is to show there are significant differences in the customers' satisfaction and trust between before and after applying these changes in the system. Forty one participants tested the system in two steps, before and after applying the technological items in the system. IBM SPSS version 20 was utilized for data analysis.

5.6.3 Prototype Paired Samples Test

The aim of conducting paired sample test is to investigate whether there is a significant difference between the pre-test and post-test. In order to test the system before and after applying technological items, the paired sample test was used. These

tests have been named pre-test and post-test in some reference books. Before paired sample test, normality of data distribution was examined. Appendix J shows that the measures of skewness and kurtosis for all items are between -3 and +3. This shows the normality of data distribution. Table 5-7 shows the results of paired sample t-test.

Table 5-7: Paired Samples Statistics

		Mean of prototype (before enhancement)	Mean of prototype (after enhancement)	Paired Differences		t	df	Sig. (2-tailed)
				Mean	Std. Deviation			
Pair 1	TS1 - TS12	3.80	4.32	.512	.553	5.928	40	.000
Pair 2	TS2 - TS22	3.85	4.29	.439	.502	5.595	40	.000
Pair 3	TS3 - TS32	3.78	4.22	.439	.550	5.112	40	.000
Pair 4	TS4 - TS42	3.85	4.29	.439	.594	4.735	40	.000
Pair 5	TS6 - TS62	3.85	4.29	.439	.550	5.112	40	.000
Pair 6	TS7 - TS72	3.83	4.24	.415	.591	4.496	40	.000
Pair 7	TS9 - TS92	3.95	4.24	.293	.602	3.114	40	.003
Pair 8	TS10 - TS102	3.88	4.20	.317	.610	3.329	40	.002
Pair 9	TT1 - TT12	4.07	4.39	.317	.722	2.810	40	.008
Pair 10	TT2 - TT22	4.10	4.49	.390	.802	3.114	40	.003
Pair 11	TT3 - TT32	3.98	4.46	.488	.870	3.592	40	.001
Pair 12	TT4 - TT42	3.93	4.27	.341	.728	3.002	40	.005
Pair 13	TT5 - TT52	4.02	4.37	.341	.617	3.545	40	.001

TS: Technological items that affect customer satisfaction (Technology-e-Satisfaction)
TT: Technological items that affect customer trust (Technology-e-Trust)

The paired t-test involves taking the difference between the two scores for each respondent and finding the mean of these difference scores. The Paired Samples Test table in the output gives this mean difference and its standard deviation. The measures of mean differences show increase the measures after applying the technological items. Technological factor is measured by technological items; improvement in items depicts improvement in the factor. The value of the t statistic is then shown, with its degrees of freedom (df) and its probability level (Sig. 2-tail). The measures of t-test are significant; it means that there are significant differences between items before and after applying

the effective factor in the system. Table 5-8 shows the improvement of Technology-e-Satisfaction and Technology-e-Trust factors are significant (in the factor level).

Table 5-8: Paired Samples Statistics in the factor level

Factors	Mean of prototype (before enhancement)	Mean of prototype (after enhancement)	t	df	Sig. (2-tailed)
Technology-e-Satisfaction1 Technology-e-Satisfaction2	3.84	4.26	4.73	40	.000
Technology-e-Trust1 Technology-e-Trust2	4.02	4.39	4.89	40	.000

5.7 Summary

In order to show the effect of technological factor on customer satisfaction and trust, a prototype was developed. C# programming and SQL server as database were utilized to develop the prototype. Prototype was evaluated by experts in term of functionality, reliability, usability and efficacy. Participants worked with the system in two steps: before and after applying technological items in the system. Collected data were analysed and the results showed that there are significant improvement in customer satisfaction and trust before and after applying the technological items.

Chapter 6 Conclusion

6.1 Introduction

In line with the thriving development in e-Commerce, many online companies have started a web-based business. However, previous experiences in this domain have shown that some of them were unsuccessful due to a lack of trust, satisfaction, and loyalty between them and their customers. In this research, a model shows e-Loyalty formation that is based on two important elements (e-Satisfaction and e-Trust) on one hand, and technological, organizational and customer factors that are three main entities in e-Commerce on the other hand.

6.2 Problem Statements at a Glance

The most valuable asset for each company is their loyal customers. However, online firms easily lose them in the competitive environment on the Internet. Moreover, many customers visit websites of e-Commerce, register themselves; however, they rarely purchase anything throughout the year. Converting these inactive or non-profitable customers to active or profitable customers (by increasing their trust, satisfaction and loyalty) forms one of the motivations of this research. Gaining new loyal customers requires a minimum time of three years and high costs. The aforementioned motivation encouraged us to launch a research regarding the formation of e-Loyalty in e-Commerce.

6.3 Problem Solving Approach

Systematic problem solving is an effective approach that avoids intuitive judgment alone. Systematic problem solving technique ensures that the researchers will

consider all aspects of the issue to solve the problem (Engelhart et al., 2013). This approach is more effective and efficient than spending hours in unorganized thought and creating a possible solution. Solving a problem needs a series of determination to arrive at a successful conclusion. Effective decision making is possible after systematic problem solving (Yan et al., 2014). Having doubt about purchasing, avoiding online buying and losing the customers are the symptoms of the main problem that have mentioned before. Understanding the root of problems is extremely important. The basic barriers are the lack of satisfaction, trust and loyalty in this domain. Framing the problem allows to structure the problem in the proper content, identify the resources and potential solutions that may need to be employed. Customer's need, information gathering and decision making are the steps of purchasing process. Trust and previous satisfied purchases are important elements that lead to customer loyalty.

6.4 Achieving Research Objectives

Determining the critical factors of e-Satisfaction, e-Trust, and e-Loyalty is the first objective of this research. These factors were extracted from literature review by considering different resources such as theses, books, and high indexed journals in this field. Looking at these factors revealed the fact that they can be categorized in technological, organizational and customer groups. Based on literature review (presented in chapter 2) these three elements are three main entities in e-Commerce.

Second objective relate to the role of technological, organizational and customer factors in the formation of e-Satisfaction, e-trust and e-Loyalty. Technology is defined as the science or knowledge that is placed into practical use in order to solve problems or invent useful tools. Technology refers to the characteristics and the abilities of the system, hardware, and software in order to realize a goal. Technology in e-Commerce

encompasses all aspects of the system, information, procedures and security, and it is the main difference between traditional and modern commerce (Al-Qirim, 2007). Technological factors can improve the efficiency of the business in an online environment. The technological items were grouped into two categories based on their effects on e-Satisfaction and e-Trust. The first group was comprised of the items that influence e-Satisfaction, while the second group consists of the items that influence e-Trust.

Rapid changes and uncertainty have led to a reassessment of direction, focus of companies, and consideration of how customers learn and collaborate with new technology in online commerce. The items that are related to organizational aspects, characteristics, or policies are defined as organizational factor. The mission and vision of the companies influences their respective policies. Undoubtedly, the main aim for most companies is to retain and increase the number of loyal customers. To determine the position of the organization in the marketplace, customers should trust them and be satisfied with the deals (Yu et al., 2002). Molla and Licker (2005) believed that the organizational factor play a vital role in the success of e-Commerce in the online environment. Some organizational items influence customer trust, while other items influence customer satisfaction.

Customers are other important entity in e-Commerce, and their perceptions about online companies change based on their previous experiences. Customers' belief, perceptions, and mind set encourage them to use e-Commerce (Hernández et al., 2010). Some of these items affect customer trust, while some of them influence customer satisfaction. Table 6-1 shows the contribution of technological, organizational and customer factors in the formation of e-Satisfaction, e-Trust and e-Loyalty.

Table 6-1: The results of regression analysis

	Hypothesized Relationship			Beta	t	Conclusion
H1	Technology-e-Satisfaction	--->	e-Satisfaction	0.250	3.798	Supported
H2	Organization-e-Satisfaction	--->	e-Satisfaction	0.383	7.174	Supported
H3	Customer-e-Satisfaction	--->	e-Satisfaction	0.448	8.228	Supported
H4	Technology-e-Trust	--->	e-Trust	0.573	17.302	Supported
H5	Organization-e-Trust	--->	e-Trust	0.459	14.421	Supported
H6	Customer-e-Trust	--->	e-Trust	0.311	9.547	Supported
H7	e-Satisfaction	--->	e-Loyalty	0.367	6.177	Supported
H8	e-Trust	--->	e-Loyalty	0.600	10.081	Supported
H9	e-Satisfaction	--->	e-Trust	0.699	15.45	Supported

Third objective was achieved by presenting a conceptual framework. The framework shows the effect of technological, organizational and customer factors on one hand and e-Satisfaction, and e-Trust on e-Loyalty formation on the other hand. Figure 6-1 shows the above table in the form of framework.

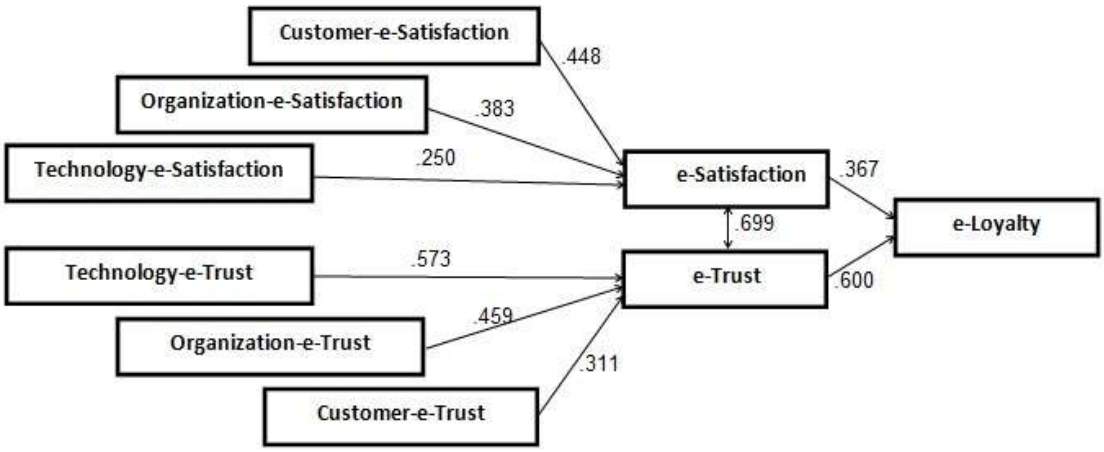


Figure 6-1: Research model

Fourth objective discusses evaluation of the model. Besides statistical analysis, the artificial neural network was utilized to assess the model. Experts suggested using more than one method to assess the research models. Statistical analysis is usually employed for validity and reliability of the model. However, it requires certain preparations; the researcher should examine the distribution of the samples

(normal/non-normal), determining the number of independent/dependent variables or groups, and the type of data (ordinal/nominal/scale). Then, based on this information, they select a suitable statistical test. However, in the neural network analysis, scholars do not need to know this information. The predictions are improved based on the learning process. In this research, besides factor analysis, regression, and path analysis, artificial neural network was applied as an alternative method to assess the model. The results of both methods were almost similar, proving the reliability of the model.

6.5 Contribution of This Research

This research endeavours to describe the formation of e-Loyalty in e-Commerce. A conceptual framework shows the formation of e-Loyalty based on the effective factors. Customer trust, satisfaction, and loyalty are extremely important in the failure or success of e-Commerce. The results can be a guideline for companies to improve their systems and policies in order to gain more advantages from the Internet marketplace. Converting inactive customers to active and loyal customers for companies is a great potential of benefits. This approach needs less investment in comparison to the increase number of branches to gain more benefits. Attention to these results and the factors in the model prevents the waste of funds and time in e-Commerce for firms, and leads to thriving business activities.

The outcomes of this research also contribute to government policies to encourage people to use e-Commerce in their daily activities in order to avoid traffic, wasting money and time of people. This model provides a suggestion that might increase the application of e-Commerce among people. Considering these factors and the model in the structure of e-Commerce activities by various companies will lead to

their prosperity. Both academics and industrial practitioners can use the results of this research.

6.6 Limitations

Although this study managed to realize all of its objectives, there were some inevitable limitations. Firstly, as with any research, scholars should take into account the generalization of the findings with respect to their studies. This survey was conducted as a non-random sampling, as there are a few active companies in the field of e-purchasing or e-selling in Iran. The generalization could be enhanced in future research.

Secondly, despite the fact that this study was carefully planned, there are factors such as customers' overloaded work that might, to some extent, affect the accuracy of their respective response to the research questionnaire. We endeavoured to contact them in the weekends or holidays in order to increase the accuracy of their responses; but it was not possible to meet all customers of online companies during the holidays.

The third limitation of this study is due to international sanctions. PayPal is a company that provides a secure environment for money transactions, on top of some other companies such as Visa and MasterCard, both of which are vital to e-Commerce. The lack of international e-Commerce companies in Iran forced the localization of e-Commerce and the respective factors.

6.7 Future Works

This study presents a model that shows the formation of e-Loyalty in e-Commerce. The critical factors were classified in a logical and understandable form, based on previous research. However, the domain of e-Commerce is widespread, and this study could be improved in the future.

The previous studies have shown that satisfaction, trust, and loyalty formation differed based on gender, due to intrinsic human nature. It is clear that the nature of males and females are different. However, a little research by focusing on gender was previously conducted. It might form a good focus for future work.

As mentioned before, the main difference between traditional commerce and modern commerce (e-Commerce) is in its technological aspect. New technologies, such as touch and voice recognition devices, are important in creating e-Satisfaction, particularly for the disabled people. During this survey, anxiety among some non-educated and senior respondents was observed once they took part in e-Commerce. These subjects can also be researched in the future.

The patterns of customers' behaviour demonstrate their interests and perceptions. This might also form the subject of future research. Customer behaviour in e-Commerce is one of the important subjects for scholars since it exhibits trust, satisfaction, and loyalty formation on the e-Commerce environment.

Future researches can also focus on the effect of personalized web environment or customizing the context, based on customers' preference to realize customer satisfaction.

With the advent of smart mobile and the development of hardware, software, and mobile capabilities; the subject of satisfaction, trust, and loyalty in mobile commerce can be researched in the future.

e-Customer Modelling can be a new useful research in the future. Some e-Customers purchase goods or use services frequently. The period of their repurchasing can be related to their job, diet, or their lifestyles. Classification of e-Customers or e-Customer Modelling in different dimensions can be a new interesting research.

Another new research is e-Customer opinion mining. This study can enhance the system of e-Commerce, based on opinions of the customers. This will allow the experts to surmise the hidden needs of e-Customers. It is difficult for people to read the opinion, summarize them, find relevant items, and finally classify them in the useable structure to develop business.

6.8 Closing Statement

In this research, the formation of e-Loyalty is described based on the critical factors in the domain of e-Commerce. Literature reviews and expert opinions revealed that e-Trust and e-Satisfaction are two important elements that influence e-Loyalty. Looking to the collected variables encouraged us to classify them based on their nature and effects in three groups of technology, organization, and customer factors. Technology, organization, and customer are three main entities in e-Commerce. Based on this classification, a conceptual framework was formed. Statistical analyses were utilized for data analysis, with IBM SPSS version 20 in the role. The results showed that customer factor (Customer-e-Satisfaction) has the most contribution in the formation of e-Satisfaction and technological factor (Technology-e-trust) has the most contribution in the formation of e-Trust. Finally, e-trust has more contribution than e-Satisfaction in the formation of e-Loyalty.

Besides statistical analysis, Artificial Neural Fuzzy Interface System (ANFIS) was also applied to assess the model. The results showed that there is a small difference between prediction by ANFIS and regression for e-Loyalty. This shows the reliability of the model.

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Appendixes

APPENDIX A: The technological, organizational and customer factors in different study

Technology Factor	
System quality	(Chang et al., 2008), (Lin et al., 2011) (Ahn et al., 2004), (Chang et al., 2009), (Burnham et al., 2003), (Lee et al., 2009), (Cheung and Lee, 2006)
Information quality	(Lin et al., 2011), (Ahn et al., 2004), (Lee et al., 2009), (Cheung and Lee, 2006), (DeLone et al., 2003), (Hwang et al., 2007)
Personalize web feature	(Ribbink et al., 2004), (Wang et al., 2011)
Language Options	(Ribbink et al., 2004), (Gommans et al., 2001), (Pennanen, 2009)
Search and Comparing Facilities	(Maswera et al., 2009) (Belanche et al., 2012) (Gommans et al., 2001)
Using other Systems	(Hostler et al., 2011), (Yoon et al., 2012) (Bharatia et al., 2004)
Collecting and Analysing Customer Information	(Lee et al., 2012), (Bharati et al., 2009), (Trentin et al., 2014)
Fast and Easy Payment	(Wolfinbarger et al., 2003) (Gommans et al., 2001)
Buying and Selling 7 days and 24 hours	(this item also come from interview)
Customer Bulletin Board	(Zhuang et al., 2006), (Corbitt et al., 2003)
Security of Information and Privacy	(Myung-Ja, Chung et al. 2011), (Kim et al., 2009)
Customer Feedback Facility	(this item also come from interview)
Complain and Follow up Facility	(Cheng et al., 2014), (Wu, 2013)
Organization Factor	
Customer Segmentation	(Wu and Chou, 2011), (Kaefer et al., 2005)
Customize Products	(Luo et al., 2008) Gommans et al., 2001)
Fast Response to Customer Inquiries	(Park et al., 2011), (Cyr, Hassanein et al., 2007)
Variety of Goods and Services	(Pozzi, 2013), (Fernández-Sabiote and Román, 2012)
Rewards and Discounts	(this item also come from interview)
Clear Shopping Process	(Fernández-Sabiote et al., 2012), (Cai et al., 2006)
Money Back Warranty	(Pennanen, 2009), (Corbitt et al. 2003)
Contact Interactivity	(Cyr et al., 2007), (Gefen et al., 2003), (Chu et al., 2011)
Organizational Reputation	(Jarvenpaa et al., 2000), (Bente et al., 2012), (Zhang et al., 2011), (Koufaris et al., 2004)
Guarantee Policy	(Pei et al., 2014), (Pennanen, 2009), (Palvia, 2009)

Selling High Regarded Brands	(Yoon, 2002), (Bart et al., 2005) (Morgan-Thomas and Veloutsou, 2013)
Contribution with Well Know Company	(Gommans et al., 2001), (Corbitt et al., 2003), (Gefen et al., 2003)
Tailored advertisement and Promotion	(this item also come from interview)
Fast and Safe Delivery	(Lin et al., 2011), (Abbasi et al. (2011), (Gommans et al., 2001), (Lin et al., 2011), (Abbasi et al., 2011)
Customer Factor	
Identifying Site Quality	(Yong Jian Wang, Minor et al., 2011), (Heeseok Lee, Choi, and Kang, 2009), (Hsin Chang et al., 2008)
Customer Experience in e-Commerce	(Gefen et al., 2003), (Morgan et al., 2013), (Hong et al., 2011), (Egger, 2001), (Shankar et al. (2003)
Less Time Transaction	(this item also come from interview)
Knowing Hardware and software Reliability	(this item also come from interview)
Risk	(Corbitt et al., 2003), (Lee et al., 2006), (Yoon, 2009).
Market Orientation	(Gefen et al., 2003), (Ergün et al. (2013)
Positive Referrals from friends	(Corbitt et al., 2003), (Hong et al., 2011), (Yoo et al., 2013)
Belief in Integrity	(Hong and Cho, 2011), (Hsin Chang et al., 2008),
Belief in Competence	(Hong et al., 2011), (Palvia, 2009)

APPENDIX B: Sample of questions

Assessment of e-Loyalty in Electronic Commerce in the Small and Medium Size Firms

Dear Sir/Madam
I am postgraduate student at the faculty of Computer Science and Information Technology in University of Malaya. This questionnaire is a part of the research for a PhD dissertation to investigation electronic loyalty (e-Loyalty) in electronic commerce (e-Commerce). Your responses are valuable for researchers to find out the dimensions of e-Loyalty and factors associated with this phenomenon. The results of this survey will be used for academic purposes only. None of this information will be disclosed to any individual or organization. Estimated time for this questionnaire completion is 5-9 minutes.

Aggregated research data will be available for you upon survey completion. For any question about this survey, contact the researcher at 0060104202372 or e-mail:sohrabisafa@yahoo.com. The research team greatly appreciates your help and support with this research and thank you in advance for your valuable contribution.

Sincerely

Nader Sohrabi Safa
PhD student
Department of Computer Science
Faculty of Computer and Information Technology
University of Malaya

Before starting to fill out this questionnaire please pay attention to the definition of e-Satisfaction, e-Trust, and e-Loyalty.

e-Loyalty is a customer's favourable attitude and commitment towards the online commerce that results in repeat purchase behaviour.

e-Satisfaction is a pleasurable fulfilment accumulated over multiple transaction experiences, resulting in an overall evaluation of the online commerce.

e-Trust is a belief or confidence that the word or promise by the merchant can be relied upon and the seller will not take advantage of the consumer's vulnerability.

Gender	Male□	Female□	
Level of study	Undergraduate□	Master□	PhD□
Nationality	Malaysian□	Iranian□	Foreigner□
Age			
Job domain: Art□ science□ engineering□ Business and Commerce□ computer Science□ Social Science□ Medicine□			
On average, how many times do you use e-Commerce per month:			

1	I feel that the quality of the vendor web system leads to a pleasurable online purchasing through the vendor website.	TS1
	□ very high □ high □ none □ low □very low	
2	The quality of information on the vendor website is sufficient to buy through this site.	TS2
	□ very high □ high □ none □ low □very low	
3	Facility of personalize web feature leads to a better feel when I work with vendor website.	TS3
	□ very high □ high □ none □ low □very low	
4	I feel convenience when I work with a vendor website that has languages option.	TS4
	□ very high □ high □ none □ low □very low	
5	I have good feel when search and compare facilities enable me to find my needs fast on the vendor website.	TS5
	□ very high □ high □ none □ low □very low	
6	Proper information about products and services satisfy my curiosity when I work with vendor website.	TS6
	□ very high □ high □ none □ low □very low	
7	Using complementary systems such as recommender system and decision support system lead to my comfort when I work with the vendor website.	TS7
	□ very high □ high □ none □ low □very low	
8	I am contented when I know that the system collect and analyse my information in order to provide better services for me.	TS8
	□ very high □ high □ none □ low □very low	
9	I enjoy when I work with a system with fast and easy payment facilities.	TS9
	□ very high □ high □ none □ low □very low	
10	Possibility of having business activities in 7 day and 24 hours is a great facility.	TS10
	□ very high □ high □ none □ low □very low	
11	Access to the customer bulletin board increases my confidence toward vendor website.	TT1
	□ very high □ high □ none □ low □very low	
12	Information security technology on the vendor website assures me about my private information.	TT2
	□ very high □ high □ none □ low □very low	
13	Review of customer feedback in the vendor website influence my confidence towards vendor.	TT3

	□ very high □ high □ none □ low □very low	
14	Complain and follow up facilities on the vendor website lead to my reliance towards vendor.	TT4
	□ very high □ high □ none □ low □very low	
15	Classification of customers in order to provide proper services for them on the website lead to a good feeling towards vendor.	OS1
	□ very high □ high □ none □ low □very low	
16	Customizing products for customers on the website satisfy me when I purchase from vendor website.	OS2
	□ very high □ high □ none □ low □very low	
17	Fast response to my inquiries influences my consent toward vendor website.	OS3
	□ very high □ high □ none □ low □very low	
18	Variety of goods and services on the website fulfil my needs.	OS4
	□ very high □ high □ none □ low □very low	
19	Reward and discount on the website have a positive effect on me.	OS5
	□ very high □ high □ none □ low □very low	
20	I rely on vendor website when the process of shopping is clear.	OT1
	□ very high □ high □ none □ low □very low	
21	I have confidence towards vendor website when I know vendor will return my money if transaction is not completed.	OT2
	□ very high □ high □ none □ low □very low	
22	I trust to vendor when I have proper contact through the website.	OT3
	□ very high □ high □ none □ low □very low	
23	I feel confidence when I deal with a reputable online company.	OT4
	□ very high □ high □ none □ low □very low	
24	Guarantee policy influence my trust toward vendor website.	OT5
	□ very high □ high □ none □ low □very low	
25	Selling high regarded brand through the website leads to my confidence toward vendor.	OT6
	□ very high □ high □ none □ low □very low	
26	Vendor website is reliable for me when I know they work with well-known company.	OT7
	□ very high □ high □ none □ low □very low	
27	Tailored advertisement and promotion influence my reliance on vendor web site.	OT8
	□ very high □ high □ none □ low □very low	
28	Fast and safe delivery of goods or services show reliability of vendor website.	OT9
	□ very high □ high □ none □ low □very low	
29	I consent from the online purchasing when I identify vendor website as a good website.	CS1
	□ very high □ high □ none □ low □very low	
30	My previous experiences in online purchasing lead to a pleasurable feel when I buy through the vendor website.	CS2
	□ very high □ high □ none □ low □very low	
31	I enjoy when the transaction on the vendor website is short.	CS3

	□ very high □ high □ none □ low □very low	
32	Dealing with vendor website satisfies me when I know vendor consideres market orientation to fulfil customers' needs.	CS4
	□ very high □ high □ none □ low □very low	
33	Reliability of hardware and software in the vendor website influence my confidence towards vendor website.	CT1
	□ very high □ high □ none □ low □very low	
34	I rely on vendor website when I realise the possibility of risk is low.	CT2
	□ very high □ high □ none □ low □very low	
35	Positive referral from my friends and relatives influence my confidence towards vendor website.	CT3
	□ very high □ high □ none □ low □very low	
36	My belief to integrity influence on my trust toward vendor website.	CT4
	□ very high □ high □ none □ low □very low	
37	Competence of vendor encourages me to deal with vendor website.	CT5
	□ very high □ high □ none □ low □very low	
38	I had pleasurable purchases through vendor website.	eS1
	□ very high □ high □ none □ low □very low	
39	I satisfy my needs through vendor website.	eS2
	□ very high □ high □ none □ low □very low	
40	I have a good feel when I buy through the vendor web site.	eS3
	□ very high □ high □ none □ low □very low	
41	I had good experiences from purchasing through the website of vendor.	eS4
	□ very high □ high □ none □ low □very low	
42	I am happy when I buy through the vendor website.	eS5
	□ very high □ high □ none □ low □very low	
43	I do not have doubt about security of my information in this web site.	eT1
	□ very high □ high □ none □ low □very low	
44	The vendor website has a safe backbone for money transaction.	eT2
	□ very high □ high □ none □ low □very low	
45	Purchasing through this vendor website is reliable.	eT3
	□ very high □ high □ none □ low □very low	
46	I buy my needs from this web site because I trust them.	eT4
	□ very high □ high □ none □ low □very low	
47	I have not heard security breaches about this web site.	eT5
	□ very high □ high □ none □ low □very low	
48	I will buy again my needs through this web site.	eL1
	□ very high □ high □ none □ low □very low	
49	I will recommend this web vendor to my friends.	eL2
	□ very high □ high □ none □ low □very low	
50	The priority of purchase from this website is more than the other web vendor	eL3
	□ very high □ high □ none □ low □very low	
51	I frequently refer to this website to provide my needs.	eL4
	□ very high □ high □ none □ low □very low	

APPENDIX C: Data descriptive

Descriptive Statistics

Items	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
TS1	165	2	5	4.30	.557	-.244	.189	.685	.376
TS2	165	2	5	4.32	.633	-.663	.189	.878	.376
TS3	165	2	5	4.38	.628	-.640	.189	.216	.376
TS4	165	2	5	4.36	.616	-.576	.189	.264	.376
TS5	165	2	5	4.34	.610	-.505	.189	.275	.376
TS6	165	2	5	4.41	.584	-.766	.189	1.668	.376
TS7	165	2	5	4.38	.618	-.769	.189	1.177	.376
TS8	165	3	5	4.52	.580	-.723	.189	-.454	.376
TS9	165	2	5	4.33	.626	-.677	.189	.975	.376
TS10	165	2	5	4.09	.723	-.629	.189	.580	.376
TT1	165	1	5	4.38	.744	-1.366	.189	2.706	.376
TT2	165	2	5	4.25	.702	-.603	.189	.018	.376
TT3	165	2	5	4.30	.743	-.993	.189	.981	.376
TT4	165	2	5	4.41	.672	-.958	.189	.779	.376
OS1	164	2	5	4.65	.571	-1.621	.190	2.707	.377
OS2	165	3	5	4.62	.510	-.795	.189	-.740	.376
OS3	164	3	5	4.60	.516	-.671	.190	-.945	.377
OS4	165	3	5	4.59	.541	-.824	.189	-.431	.376
OS5	165	2	5	4.34	.720	-.910	.189	.564	.376
OT1	165	3	5	4.81	.407	-1.884	.189	2.373	.376
OT2	165	3	5	4.76	.496	-1.942	.189	2.023	.376
OT3	165	3	5	4.82	.397	-2.011	.189	2.945	.376
OT4	165	3	5	4.69	.537	-1.530	.189	1.445	.376
OT5	165	3	5	4.43	.566	-.336	.189	-.827	.376
OT6	165	2	5	3.39	.778	.853	.189	.091	.376
OT7	165	1	5	4.18	.811	-1.235	.189	2.378	.376
OT8	165	3	5	4.22	.556	.037	.189	-.253	.376
OT9	165	3	5	4.70	.497	-1.343	.189	.757	.376
CS1	165	3	5	4.24	.586	-.101	.189	-.438	.376
CS2	165	2	5	4.40	.603	-.622	.189	.387	.376
CS3	165	2	5	4.32	.732	-.679	.189	-.499	.376
CS4	165	3	5	4.25	.648	-.291	.189	-.698	.376
CT1	165	3	5	4.29	.518	.244	.189	-.595	.376
CT2	165	3	5	4.39	.549	-.129	.189	-.930	.376
CT3	165	2	5	4.38	.556	-.356	.189	.561	.376
CT4	164	3	5	4.48	.548	-.380	.190	-.980	.377

CT5	165	2	5	4.49	.580	-1.006	.189	2.081	.376
eS1	165	2	5	4.59	.528	-1.011	.189	1.483	.376
eS2	165	2	5	4.47	.630	-.932	.189	.550	.376
eS3	165	3	5	4.41	.604	-.473	.189	-.639	.376
eS4	165	3	5	4.55	.512	-.322	.189	-1.573	.376
eS5	165	2	5	4.16	.662	-.439	.189	.307	.376
eT1	165	3	5	3.44	.693	1.267	.189	.225	.376
eT2	165	2	5	3.27	.578	1.245	.189	1.673	.376
eT3	165	2	5	3.32	.582	1.508	.189	1.587	.376
eT4	165	2	5	3.27	.606	1.127	.189	1.538	.376
eT5	165	2	5	4.45	.557	-.546	.189	.592	.376
eL1	165	3	5	4.50	.514	-.125	.189	-1.666	.376
eL2	165	2	5	4.38	.579	-.481	.189	.468	.376
eL3	165	3	5	4.52	.559	-.616	.189	-.675	.376
eL4	165	3	5	4.28	.601	-.201	.189	-.564	.376

APPENDIX D: Choosing proper test

Hypothesis Type		Data Type	Data Scale	Status of Groups	Hypothesis Test
Relational Hypothesis	correlation	**Parametric**	Interval-Interval	-	Pearson
		Non-Parametric	Nominal-Nominal	Independent	Phi Cramer Goodman and Kruskal
			Nominal-Ordinal	Independent	Cramer Lambda Uncertainty Coefficient
			Nominal-Interval	Independent	Eta
			Ordinal-Ordinal	Independent	Gamma Spearman Kendall
			Ordinal-Interval	Independent	Spearman &Kendall
	Causal	**Parametric**	Interval-Interval	-	Simple Linear Regression Multiple Linear Regression Non-Linear Regression Path Analysis
		Non-Parametric	Nominal-Nominal or ordinal	Independent	Fisher Independence
			Nominal(DV)	-	Binominal Logistic Regression Multinominal Logistic Regression
			Ordinal(DV)	-	Ordinal Regression
			Nominal(DV)	-	Discriminant Analysis

Hypothesis Type	Data Type	Data Scale	Number of Groups	Status of Groups	Hypothesis Test Type
Comparative Hypothesis	**Parametric**	**Interval**	**1**	-	One Sample T-Test Hoteling T-Test
			1	-	Z test
			2	-	Independent-Samples T-Test Paired-Samples T-Test
			3 or more	Independent	ANOVA
				Independent	UNANOVA-UNIANCOVA
				Independent	MANOVA-MANCOVA
				Dependent	Variance Analysis GLMRM
	Non-Parametric	**Nominal**	**1**	-	Binomial Test
			1	Dependent	Sign Test
			1		McMenar Test
			3 or more	Independent	Cochran Test
		Ordinal	**1**	-	Chi-Square
			1		One Sample Run Test
			1		One Sample Kolmogorov-Smirnov
			2	Independent	Mann-Whitney U Test
					Two-Samples Kolmogorov-Smirnov
					Wald-Wolfowitz Run Test
					Moses Extreme Reactions Test
				Dependent	McNemar Test Sign Test Wilcoxon Test
			3 or more	Independent	Kruskal-Wallis
					Mean
				Dependent	Friedman
					Kendall's W Ranks

APPENDIX E: Communalities

Items	Initial	Extraction	Items	Initial	Extraction
TS1	1.000	.793	OT1	1.000	.705
TS2	1.000	.751	OT2	1.000	.567
TS3	1.000	.700	OT3	1.000	.709
TS4	1.000	.719	OT4	1.000	.504
TS5	1.000	.558	OT5	1.000	.531
TS6	1.000	.727	OT6	1.000	.605
TS7	1.000	.818	OT7	1.000	.563
TS8	1.000	.502	OT8	1.000	.594
TS9	1.000	.745	OT9	1.000	.598
TS10	1.000	.779	CS1	1.000	.575
TT1	1.000	.602	CS2	1.000	.626
TT2	1.000	.586	CS3	1.000	.581
TT3	1.000	.675	CS4	1.000	.502
TT4	1.000	.645	CT1	1.000	.608
OS1	1.000	.649	CT2	1.000	.588
OS2	1.000	.692	CT3	1.000	.608
OS3	1.000	.701	CT4	1.000	.543
OS4	1.000	.574	CT5	1.000	.537
OS5	1.000	.675			

APPENDIX F: Total Variance Explained

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	9.237	18.112	18.112	9.237	18.112	18.112	6.583	12.909	12.909
2	5.000	9.803	27.916	5.000	9.803	27.916	3.666	7.189	20.098
3	3.287	6.446	34.362	3.287	6.446	34.362	3.365	6.597	26.695
4	2.927	5.740	40.101	2.927	5.740	40.101	2.992	5.867	32.562
5	2.265	4.442	44.543	2.265	4.442	44.543	2.902	5.690	38.251
6	2.100	4.117	48.660	2.100	4.117	48.660	2.674	5.243	43.495
7	1.718	3.368	52.028	1.718	3.368	52.028	2.644	5.184	48.679
8	1.612	3.160	55.188	1.612	3.160	55.188	2.592	5.083	53.761
9	1.533	3.007	58.195	1.533	3.007	58.195	2.261	4.434	58.195
10	1.447	2.838	61.033						
11	1.300	2.550	63.583						
12	1.121	2.198	65.781						
13	1.084	2.125	67.906						
14	1.008	1.976	69.882						
15	.968	1.899	71.781						
16	.910	1.785	73.566						
17	.894	1.752	75.318						
18	.855	1.676	76.994						
19	.830	1.627	78.621						
20	.774	1.517	80.138						
21	.705	1.383	81.521						
22	.640	1.255	82.776						
23	.624	1.223	83.999						
24	.600	1.176	85.175						
25	.565	1.108	86.282						

26	.521	1.022	87.304						
27	.504	.988	88.292						
28	.472	.925	89.217						
29	.439	.860	90.077						
30	.427	.838	90.915						
31	.410	.804	91.719						
32	.376	.737	92.456						
33	.363	.712	93.168						
34	.335	.658	93.826						
35	.317	.622	94.448						
36	.309	.607	95.055						
37	.273	.536	95.591						
38	.269	.528	96.118						
39	.238	.466	96.585						
40	.231	.454	97.038						
41	.211	.414	97.452						
42	.202	.395	97.847						
43	.189	.370	98.217						
44	.171	.336	98.553						
45	.159	.312	98.865						
46	.144	.283	99.148						
47	.124	.242	99.391						
48	.106	.207	99.598						
49	.086	.169	99.767						
50	.077	.150	99.918						
51	.042	.082	100.000						

Extraction Method: Principal Component Analysis.

APPENDIX G: MATLAB programming

```
Close all;
Clear all;
load Total_Data.txt;
all1=Total_Data/100;
all165=Total_Data;
eTrust=all165(:,1);
eSatisfaction=all165(:,2);
eloyalty=all165(:,3);
p1=all1((1:165),(2:3)); p11=p1';
A =eloyalty((1:165),:);  A1=A';
% Training Session Using ANFIS
% ======   % training data
trn_data (:,1) = [p1(100:165,1);p1(1:30,1)];
trn_data (:,2) = [p1(100:165,2);p1(1:30,2)];
trn_data (:,3) = [A(100:165,1);A(1:30,1)];
% ====== training options
epoch_n        = 200;
error_goal     = 0;
ss             = 0.2;
ss_dec_rate    = 0.8;
ss_inc_rate    = 1.20;
mf_type        = 'trimf';            %member function type
mf_n           = [5 5];              %number of member function
% trnOpt(1): training epoch number (default: 10)
% trnOpt(2): training error goal (default: 0)
% trnOpt(3): initial step size (default: 0.01)
% trnOpt(4): step size decrease rate (default: 0.9)
% trnOpt(5): step size increase rate (default: 1.1)
% ====== generate the initial FIS
fismat_in      = genfis1(trn_data, mf_n, mf_type);
% genfis1(training data matrix,number of input membership function,a string
% that spcifies the membership function associated with the in/out put)

% ======   % Checking data
chk_data (:,1) = p1(30:40,1);
chk_data (:,2) = p1(30:40,2);
chk_data (:,3) = eloyalty(30:40,1);
% the name of an optional checking data set for overfitting model
% validation. This data set is a matrix in the same format as the training data set. When
you supply chkData as an input argument,
%you must also supply chkFis and chkErr as output arguments.
 % ======= ANFIS training
% The bottom two lines are the trainign routine for ANFIS with all the option
% for any option to be used as default use "nan"
%[fismat_out, error_out, stepsize, fismat_check, error_check]=...
```

```
%    anfis (trnData, fismat, trnOption, displayoption, checkdata, optionmethod)
[fismat_final, trn_error, step_size, fismat_chk5, chk_error] = ...
anfis(trn_data, fismat_in, [epoch_n, error_goal, ss, ss_dec_rate, ss_inc_rate], [1,1,1],
chk_data);
% Saving ANFIS- in the current directory make a file with this name and fis
% extention
writefis (fismat_chk5,'LOY_ANFIS');
% % ======   % Testing data 1
tst_data (:,1) = p1(1:60,1);
tst_data (:,2) = p1 (1:60,2);
% Simulation Session Using ANFIS
anfis_output   = (evalfis(tst_data', fismat_chk5));
y1 = anfis_output';
y1f= 50*y1;
Hdc1=y1f';
%ANFIS Performance
LOY_Error= (Hdc1-eloyalty(1:60))./eloyalty(1:60)*100;
%figure1
x= 1:1:60;
plot (x, LOY_Error); grid
xlabel('eloyalty');
ylabel('%Error');
title(' performance for eLoyalty');
axis([1 60 -5 5]);
%Test session
pt1=all1((61:90),(2:3));
pt11=pt1';
% % ======   % Testing data 1
tst_data2 (:,1) = pt1(:,1);
tst_data2 (:,2) = pt1 (:,2);
anfis_output2   = (evalfis(tst_data2', fismat_chk5));
yt1 = anfis_output2';
yt1f= 50*yt1;
Hdct1=yt1f';
LOY_Errort= (Hdct1-eTrust(61:90))./eTrust(61:90)*100;
%figure2
xt= 61:1:90;
plot (xt, LOY_Errort); grid
xlabel('eloyalty');
ylabel('%Errort');
title('performance eloyalty');
axis([61 90 -5 5]);
%Test session
pt3=all1((91:165),(2:3));
pt31=pt3';
% % ======   % Testing data 2
tst_data3 (:,1) = pt3(:,1);
tst_data3 (:,2) = pt3 (:,2);
anfis_output3   = (evalfis(tst_data3', fismat_chk5));
```

```
yt3 = anfis_output3';
yt3f= 50*yt3;
Ht3=yt3f';
eloyalty_Errort3= (Ht3-eloyalty(91:165))./eloyalty(91:165)*100;
%figure3
xt3= 91:1:165;
plot (xt3, eloyalty_Errort3); grid
xlabel('eloyalty');
ylabel('%Error');
```

APPENDIX H: Prototype evaluation questionnaire

Gender	Male□	Female□	
Level of study	Undergraduate□	Master□	PhD□
Work experience			
On average, how many times do you use e-Commerce per month:			

FU1	The vendor site has available all the functions required for its execution.				
	Very poor	Poor	Fair	Good	Very good
FU2	The vendor site does what is appropriate.				
	Very poor	Poor	Fair	Good	Very good
FU3	The vendor site does what was proposed correctly.				
	Very poor	Poor	Fair	Good	Very good
FU4	The vendor site is precise in executing its functions.				
	Very poor	Poor	Fair	Good	Very good
FU5	The vendor site is precise in its results.				
	Very poor	Poor	Fair	Good	Very good
FU6	The vendor site has capacity for multiuser processing.				
	Very poor	Poor	Fair	Good	Very good
FU7	The vendor site has secure access through password.				
	Very poor	Poor	Fair	Good	Very good
FU8	The vendor site has an internal backup routine.				
	Very poor	Poor	Fair	Good	Very good
RE1	The software has frequent failures.				
	Very poor	Poor	Fair	Good	Very good
RE2	The vendor site reacts appropriately when failures occur.				
	Very poor	Poor	Fair	Good	Very good
RE3	The system informs users concerning invalid data entry.				
	Very poor	Poor	Fair	Good	Very good
RE4	The system has ability of recovering data in the event of failure.				
	Very poor	Poor	Fair	Good	Very good
UE1	It is easy to understand the concept and application.				
	Very poor	Poor	Fair	Good	Very good
UE2	It is easy to perform its functions.				
	Very poor	Poor	Fair	Good	Very good
UE3	It is easy to learn how to use.				
	Very poor	Poor	Fair	Good	Very good
UE4	The software facilitates the users' data entry.				
	Very poor	Poor	Fair	Good	Very good
UE5	It is easy to operate and control.				
	Very poor	Poor	Fair	Good	Very good
EF1	The software's response time is appropriate.				
	Very poor	Poor	Fair	Good	Very good
EF2	The software's execution time is appropriate.				
	Very poor	Poor	Fair	Good	Very good
EF3	The resources used are appropriate				
	Very poor	Poor	Fair	Good	Very good

APPENDIX I: Sample of questions for prototype data gathering

Gender	Male□	Female□	
Level of study	Undergraduate□	Master□	PhD□
Nationality	Malaysian□	Iranian□	Foreigner□
Age			
Job domain: Art□ science□ engineering□ Business and Commerce□ computer Science□ Social Science□ Medicine□			
On average, how many times do you use e-Commerce per month:			

1	I feel that the quality of the vendor web system leads to a pleasurable online purchasing through the vendor website.	TS1
	□ very high □ high □ none □ low □very low	
2	The quality of information on the vendor website is sufficient to buy through this site.	TS2
	□ very high □ high □ none □ low □very low	
3	Facility of personalize web feature leads to a better feel when I work with vendor website.	TS3
	□ very high □ high □ none □ low □very low	
4	I feel convenience when I work with a vendor website that has languages option.	TS4
	□ very high □ high □ none □ low □very low	
5	Proper information about products and services satisfy my curiosity when I work with vendor website.	TS6
	□ very high □ high □ none □ low □very low	
6	Using complementary systems such as recommender system and decision support system lead to my comfort when I work with the vendor website.	TS7
	□ very high □ high □ none □ low □very low	
7	I am contented when I know that the system collect and analyse my information in order to provide better services for me.	TS8
	□ very high □ high □ none □ low □very low	
8	I enjoy when I work with a system with fast and easy payment facilities.	TS9
	□ very high □ high □ none □ low □very low	
9	Possibility of having business activities in 7 day and 24 hours is a great facility.	TS10
	□ very high □ high □ none □ low □very low	
10	Access to the customer bulletin board increases my confidence toward vendor website.	TT1
	□ very high □ high □ none □ low □very low	
11	Information security technology on the vendor website assures me about my private information.	TT2
	□ very high □ high □ none □ low □very low	
12	Review of customer feedback in the vendor website influence my confidence towards vendor.	TT3
	□ very high □ high □ none □ low □very low	

13	Complain and follow up on the vendor website lead to my reliance towards vendor.	TT4
	□ very high □ high □ none □ low □very low	
14	I have good feel when I can use search and compare facilities to find my needs.	TT5
	□ very high □ high □ none □ low □very low	

APPENDIX J: Data distribution in prototype

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
TS1	41	3	4	3.80	.401	.161	-1.598	.369	.578	.724
TS12	41	2	5	4.32	.610	.372	-.980	.369	2.551	.724
TS2	41	2	5	3.85	.573	.328	-.855	.369	2.354	.724
TS22	41	2	5	4.29	.642	.412	-.944	.369	2.634	.724
TS3	41	2	5	3.78	.652	.426	-.318	.369	.455	.724
TS32	41	2	5	4.22	.690	.476	-.798	.369	1.404	.724
TS4	41	2	5	3.85	.654	.428	-.409	.369	.761	.724
TS42	41	2	5	4.29	.602	.362	-.934	.369	2.697	.724
TS6	41	2	5	3.85	.727	.528	-.178	.369	-.140	.724
TS62	41	2	5	4.29	.642	.412	-.944	.369	2.634	.724
TS7	41	2	5	3.83	.704	.495	-.200	.369	.042	.724
TS72	41	2	5	4.24	.663	.439	-.853	.369	2.006	.724
TS9	41	2	5	3.95	.669	.448	-.472	.369	.922	.724
TS92	41	2	5	4.24	.663	.439	-.853	.369	2.006	.724
TS10	41	2	5	3.88	.714	.510	-.250	.369	.057	.724
TS102	41	2	5	4.20	.749	.561	-1.091	.369	1.970	.724
TT1	41	2	5	4.07	.787	.620	-.456	.369	-.311	.724
TT12	41	2	5	4.39	.771	.594	-1.507	.369	2.717	.724
TT2	41	2	5	4.10	.831	.690	-.464	.369	-.656	.724
TT22	41	2	5	4.49	.675	.456	-1.490	.369	3.142	.724
TT3	41	2	5	3.98	.880	.774	-.183	.369	-1.184	.724
TT32	41	2	5	4.46	.745	.555	-1.395	.369	1.778	.724
TT4	41	2	5	3.93	.755	.570	-.244	.369	-.274	.724
TT42	41	2	5	4.27	.708	.501	-.884	.369	1.263	.724
TT5	41	3	5	4.02	.651	.424	-.023	.369	-.503	.724
TT52	41	3	5	4.37	.536	.288	.061	.369	-.960	.724

Some items omitted from the model after factor analysis.

Publications:

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