

# Assessing the Effect of E-Commerce Intelligent Bots on Online Consumers' Post-adoption Behavior for Future Use

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**Abstract.** Having conducted many investigations on initial acceptance of information systems using intelligent bots by researchers recently, this study would rather research the post-adoption behavior of online consumers in the online service field. Researchers understand that acquiring a new consumer for a specific service costs five times more than retaining existing consumer. Intelligent bots are intelligent and automated software which assist customers to make the best decision by providing high quality suggestions for them. Using online consumer behavior tracking or acquire information from them, intelligent bots provide the most interesting products to consumers. Implementing intelligent bots increases sales of online retailer as well as their consumers' loyalty. The main goal of this study is to evaluate the influence of e-commerce intelligent bots on consumer's post adoption behavior to use of service in future.

**Keywords:** IS Continuance, Post-adoption behavior, ECM-IT, Intelligent bots.

## 1 INTRODUCTION

E-commerce websites provide millions of online users through internet via a diversity of chances to buy or sell product or service in addition exchange goods. Many portals worldwide like Amazon.com, eBay.com, Alibaba.com, Itunes.com and etc. are the popular instances of e-commerce websites. No need to say, those websites required to be initially accepted by online users in order to develop their business; however, the principal determinant of success of e-commerce websites is the continuance intention of users toward using that service. Regarding world sat, number of internet users has been increased more than five times in last 10 years. As a result, e-commerce websites' owners realized the value of potential customers over internet and started to attract more and more consumers to their websites. In today's hectic business environment, for online e-commerce businesses attracting new consumers to their websites is not a competitive advantage any longer; however, it is a substantial factor of successfulness and success which should follow customer's loyalty afterward. This opportunity is more valuable for those e-commerce portals and online retailers which their target customers mostly located in Asia.

Generally, when a consumer feels he or she benefits from using a portal or purchasing a product, he/she will find usage of that service easy, then customer loyalty associated with his/her usage or purchase experience with portal. One of the best methods for maximizing consumer benefits includes proposing a lot of system features like recommendations with high quality. Using a service which could provide high quality recommendations for consumers could increase user satisfaction. That's called "intelligent bot". Intelligent bots are intelligent, sophisticated and automated software which assist customers to make an ideal decision by providing high quality suggestions for them. Using online consumer behavior

tracking or obtaining information from them, they provide the most interesting products to customers, intelligent bots do (Jannach et. al, 2011). Using intelligent techniques and methods, intelligent bots try to attract user's attention to given product or service. Also by implementing an intelligent bot, sales of e-commerce portal is increased via helping consumers to find the product that meet their needs and match their criteria.

## **2 LITERATURE REVIEW**

Underestimating the importance of users' continuance intention of a service is not logical. Have e-business' owners realized the value of continuance intention they would have focused on this point much more meticulously. Viability of every online business in long term depends on its users' intention to reuse that service (Bhattacharjee, 2001). Initial adoption of a service is essential to its success; however, continual use of an IS is more important rather than initial adoption of it. Initial adoption does not guarantee continued usage. Models like UTAUT, TAM, TPB, and TRA cannot explain post adoption of usage since their primary focus is on initial acceptance. One of the most crucial theories of marketing that could forecast and explicate consumers' satisfaction with product is expectation disconfirmation theory (Patterson et al. 1997). Based on ECM, the following variables affect the user intention to continue using a service: Level of satisfaction, perceived usefulness that represents the expectation of post-adoption stage and confirmation of user's initial expectation.

There is a five-step process that explains users' behavior from expectation to repurchase intention (Bhattacharjee, 2001a). Firstly, prior to purchase of product or usage of service, consumers form an initial expectation. Secondly, after initial adoption, they use the service or product. During the initial consumption period, its performance perception was formed by them. Thirdly, a comparison between perceptions of user for performance and their initial expectation is made by consumers. In this level, the extent to which user's initial expectations are confirmed is determined. Perceived performance can be exceeds expectations that means expectations are positively disconfirmed or can be lessen than expectations that means initial expectations are negatively disconfirmed, or can be equal with initial expectations which shows that expectations confirmed. Fourthly, satisfaction feeling or dissatisfaction has been formed by consumers based on level of their disconfirmation. Finally, the intention to reuse of service was formed by users whom satisfied. Dissatisfied users discontinue reuse or repurchase of item. Based on ECT, users intention to continue using a service or repurchase an item determined by the their satisfaction level (Anderson and Sullivan, 199).

Previously, Technology Acceptance Model (TAM) has been played a prosperous role in predicting of IS acceptance (Venkatesh et al., 2000). By emersion of new technologies in IT, researchers cannot explain reason of some users' discontinuing from using specific service while they've initially adopted. This contrast is referable to prior studies which consider continuance intention as extended version of initial behavior (Karahanna et al. 1999). Putting important differences between repurchasing and initial acceptance in IS literature into consideration, Bhattacharjee suggested Expectation Confirmation Model of IT usage (ECM-IT) and examined it empirically. IS continuance model brings up decision of users to continue service similar to users' decision to repurchase an item. So, ECM-IT predicts users' intention to continue using IS with following antecedent constructs: users' satisfaction with IS, the extent of user confirmation and perceived usefulness. Although IS continuance inherits its main structure from ECM, there are some significant differences between them.

Firstly, in IS continuance model, perceived usefulness shows post-adoption expectation. This selection goes back to expectation's definition (G.A. Churchill Jr. et al., 1982). Regarding this

definition, ECM-IT considers perceived usefulness as the measure of expectation. Secondly, the main focus of IS continuance model is on post-adoption expectation. The user's expectation in expectancy-confirmation paradigm was pre-purchase expectation. The pre-purchase expectation's role is extended as a reference's frame that determines level of disconfirmation as well as satisfaction (post-purchase stage). Thirdly, perceived performance was removed in ECM-IT. IS continuance model hypothesized that perceived performance's effect is attained by confirmation already (A. Bhattacharjee, 2001). In addition Y. Yi cleared that confirmation factor mediated exclusion of perceived performance from ECM-IT (Y. Yi, 1990).

Also in intelligent bots' literature, there are many of studies that try to make intelligent bots effective and efficient but like other studies many of them have general crucial restrictions. In fact, these intelligent bots should be used as marketing tool but they used like practical sales one. In intelligent bots' literature in e-commerce context, six websites as online store examined using different intelligent bots techniques in order to increase return of investment (Schafer et al., 1999). The degree of automation, to the extent which consumer effort required by intelligent bots to generate recommendation, and insistence degree, the measurement of whether recommendations are generated by users' current session or current session with it history were classified. Some other studies, focused on initial adoption of IS by intelligent bots and analyzed the effect of intelligent bots on acceptance of technology. Also the primary relation which analyzed by investigators is relation of intelligent bot's use and other factors of decision making process like product searching time, quality of decision, duration of decision, decision effort, effectiveness of product promotion and search of product. Decision Quality for online customers is one of the main determinants that intelligent bots' use tries to impact on it. After analyze of online purchasing, decision quality refers to objective or subjective quality of user's buying decision (Xiao et al., 2007).

## 2 THEORETICAL FRAMEWORK

What this study tries to investigate is which factors impact online consumers' intention to reuse information system in their next shopping over internet. In order to find these factors prior conceptual and empirical research in intelligent bots has been reviewed. Also, an IS continuance model is also utilized in developing the conceptual model. A suggested model is presented in Figure 1.

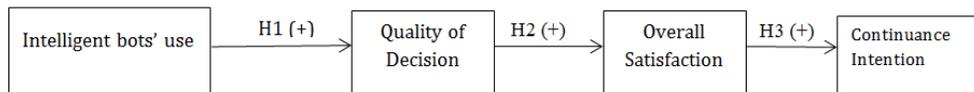


Figure. 1. Conceptual Model

Hypothesis 1: Use of intelligent bot is positively related to decision quality of user. Intelligent bots increase users' decision quality by increasing the non-dominated products in alternative subset (Haubl et al., 2000). Also, the number of users who are eager to change their opinion and purchase another item when system recommended a chance to change product is less by utilizing intelligent bots than not utilizing intelligent bots (Haubl et al., 2000). Intelligent bot helped users made better final decision than non-intelligent bots users (Hostler et al., 2005).

Hypothesis 2: User's Decision quality is positively related to satisfaction with intelligent bots.

Satisfaction in this field refers to satisfaction of user with intelligent bot's performance as a saving tool of effort, decision-making process of users helped by such system and quality of decision of the consumer as a result of intelligent bots effectiveness. In this research, factor predicted to have effect on satisfaction is decision quality of the user. Huffman & Hochster (2007) analyzed whether there is any relation between relationship of the results returned by system and user overall satisfaction. Study results have illustrated that there is strong relationship between relevance of results and user satisfaction. Also Johnson et al. (2003) found important correlation between effectiveness of system and user satisfaction. Consumers that are recommended products which match their preferences more accurately will make a better decision by selecting the more appropriate alternative and their level of overall satisfaction will increase as a result of their perceived decision quality.

Hypothesis 3: Users satisfaction level with the website is positively related to continuance intention of user.

Continuance intention of user refers to intention of user to continue using intelligent bots in their future shopping activities. Although initial acceptance of Information System is a significant factor in realizing its success, long-term success is not determined with initial usage but long-term continued use (Bhattacharjee, 2001). Among several determinants satisfaction plays a significant role in loyalty of users and continuous use of services. In the literature, it is possible to detect empirical studies illustrating the positive correlation between satisfaction of user and loyalty to provider's services (Helgesen, 2006).

## **2 RESEARCH METHODOLOGY**

### **2.1 Experimental Design**

In order to test the proposed model, data collection performed by surveying. Two e-commerce websites have been developed. The framework of implementation is ASP.NET. ASP is a server-side web application. First portal has been integrated with intelligent bot. A knowledge-based intelligent bot is selected for this website. On the other hand, second portal was not integrated to intelligent bot and utilized just basic filtering. In order to remove design effect on satisfaction of customer and their continuance intention, graphical design of both websites are same. Participants are invited by phone calls to participate in this survey. Additionally, posters are designed and installed in all of seventeen representatives. One of the URLs, intelligent bot-assisted websites and not-assisted one, are sent randomly to participants that accepted to participate in research. Before starting experiment, participants informed about goals of study. In these portals, they should buy just one truck part. All guidelines on using website have been cleared to them either by posters or directions. Participants have been guided to input their chassis number to the login page of website; they have been instructed to utilize their chassis number in questionnaire too. Prior to survey, all customers bought spare parts from this website without being helped by intelligent bots. Customer service website performed only routine basic filtering to find desired product. Also regarding to transactions performed by consumers in website after three months of implementation of website, it is hypothesized that initial acceptance was done for users so the determinants like perceived ease of use and perceived usefulness were overlooked in proposed conceptual model (Bhattacharjee 2001). Before conducting survey with customers of Tosee Fannavarihayeh Pishrafte Azarabadegan, this study has permission to be conducted at office of customer service.

## **2.2 Experimental E-commerce Website**

At doorway page of web site a brief instruction is given. Next in order, consumers were instructed to enter their chassis number as well as their passwords and then select category of spare parts which they are interested. Doorway page is same in both intelligent bot assisted website and simple one. Then, customers guided to login to portal by clicking on login button. In next page, consumers should follow some steps to complete their purchasing in intelligent bot-assisted system. Customers can navigate to any step via using site map. Participants are asked to answer six questions. The questions include guarantee duration, usage type, condition, price range, installation and manufacturer.

The developed intelligent bot in this research is constraint-based that is one kind of knowledge-based intelligent bot. Constraint-based intelligent bot generates recommendations based on explicitly rules. In his book, Jannach et al. (2011) presented constraint-based intelligent bot as a constraint satisfaction problem and can be solved in form of conjunctive queries or by constraint solver. After gathering participants' answers, it starts to search among more than 3100 spare parts which are stored in database. Then, system recommends the most up to standard item to customer. Database of both intelligent bot-assisted website and not-assisted one are same. Items are divided into 15 categories based on functionality like electric, suspension, chassis, gearbox, axles, cabin, steering, regulators and etc.

In addition to collecting customers' desired technical details for desired product, intelligent bot-assisted website tries to ask easily-understandable questions from participants in order to collect their requirements. Answers play a significant role in quality of suggestions.

Another e-commerce website does not utilize any type of intelligent bot. Menus, doorway, whole design and etc. are as same as intelligent bot-assisted portal. This e-commerce website's functionality is like most similar e-commerce websites. Prior to this study, all participants faced with this website without assist of intelligent system. They choose spare parts by using item filtering functionality that allows them to enter technical details of product they are interested in. The function of this website is just searching among database of spare parts and retrieving products based on participant's input. Consumer can sort found products using item sorting functionality.

Such websites suppose consumers have product domain knowledge. Also they supposed that customers expected to purchase appropriate product with the assist of product filtering functionality. As discussed, not all consumers have knowledge of spare part; hence, those consumers who use basic filtering systems finish up with completely wrong or inappropriate item some times.

## **2.3 Sampling**

This research has been conducted at Tosee Fannavarihayeh Pishrafte Azarabadegan's customer service located in Tehran, Iran. For testing the measures of proposed model, a pilot study has been conducted. In addition, in order to check survey instruction's comprehensibility, reliability, correctness of survey wording, validity of results and efficiency of statistical processes pilot survey has been conducted. 28 participants from company's customers participated in initial pilot survey. The return rate was 85 % (24 out of 28). The study scales are translated from English to Persian. Based on feedbacks from participants in pilot study, required modifications were made to questions and experiment procedure's instructions. Pilot survey's Questionnaires consist of all measures involved in study were distributed to consumers in

Tehran and Tabriz based on availability via e-mail. All subjects are notified about the voluntary nature of the involvement in the research, the aim and research process. It is also guaranteed all of answers will be kept private. Participants are given two weeks in order to complete questionnaire of pilot survey. Because of prerequisites of sample size factorial validity couldn't be evaluated at pilot study. In main survey, 320 customers of Tosee Fannavarihayeh Pishrafte Azarabadegan participated after removing outliers. The return rate was 90 % (289 out of 320). Treatment group consists of 153 participants and control group consists of 136 participants.

## **2.4 Variables Measurement**

The measures employed in this study are derived from decision making process and IS continuance literature then adapted into conceptual model. 15 items measures three factors, namely: decision quality, overall satisfaction and continuance intention which are extracted from Lerzan et al., 2011, Bhattacharjee, 2001b, Bhattacharjee, 2001b respectively.

## **3 DATA ANALYSIS**

Regarding to the nature of this study, structural equation modeling (SEM) method was selected for examining proposed model. SEM can incorporate prior knowledge to the analysis for confirmatory aims and it could model abstract concepts as well as unobservable constructs moreover by using SEM measurement errors can be applied in the model.

### **3.1 Results**

The research data sample, after removing missing data and outliers, was composed of 289 customers of company from different cities of Iran. Study's participants are divided into two groups: treatment and control. There are 153 participant in intelligent bot-assisted group and 136 participants in not -assisted group. Most of participants were at the age of 23 and 31 are in groups.

### **3.1 Data Cleaning**

Since outliers used to have negative impacts in the data analysis result, the first step in was removing the outliers. In statistics, an observation that is far away from residue of data numerically called an outlier. As reported in Pallant (2007), outliers were checked by boxplots.

In statistics, when participants fail in answering items of questionnaire or skip giving answer to them, missing data is occurred. The number of missing values of survey scores was small on each variable. Associated with missing values of each variable, percentage was less than 0.8 so there seems to be no problem to replace missing data with series mean value of data (Tabachnick et al., 2007).

### **3.2 Homogeneity test**

In this study two groups are involved: treatment group and control group. In order to find any differences between groups on different areas, participants should answer a pretest containing eight questions before starting the shopping process. The eight questions of pretest items asked about computer knowledge level of customers, visiting any type of e-commerce

websites frequency, frequency of shopping item from internet, use of internet level, truck spare part knowledge level, frequency of using spare parts and etc. For testing possible differences between treatment and control groups, Mann-Whitney U test is utilized. Mann-Whitney U test is a non-parametric test so data have not been needed to follow normal distribution.

Existence of one ordinal dependent variable, one dichotomous independent variable and samples independency and equal variances between groups which are the prerequisites of running the Mann-Whitney U are met. For testing equal variances between groups, Levene's test is used and the results illustrated equal variances between groups. Regarding to Mann-Whitney U test results, pretest item's p value are more than 0.05 (Asymptotic Sig. is more than 0.05). Subsequently, it could be claimed that no significance difference exists between scores of control group and treatment group.

### **3.3 Hypothesis Testing**

In order to present evidences that whether the factors of conceptual model were assessed really, the (CFA) confirmatory factor analysis was conducted. First step was to being confident about assumption which is related to descriptive statistics. Skewness and kurtosis values indicate normal distribution of all observed variables. Additionally, based on negative value of skewness values, it could be claimed that all distributions were skewed in same direction. Then, as Tabachnick et al., (2007) illustrated it can be stated that linearity assumption be met. Multivariate outliers checking were performed by the method of Mahalanbhos distance (Pallant, 2007). There is not any multivariate outlier in observed variables. The outlier cases are excluded from data. For checking the multicollinearity existence, correlations among variables should be tested. All correlations are significant and none of them is high. So multicollinearity is not the case for observed variables. So the confirmatory factor analysis assumptions are not violated.

Validity of convergent is examined for the measurement scales via using criteria suggested by Fornell and Larcker. Firstly all indicator factor loadings must be significant (more than 0.7). Secondly, constructs reliabilities should be more than 0.80. Finally, every construct's average variance should be more than variance because of error of measurement. Based on correlation matrix, all three conditions are met for convergent validity.

Every scale item was modeled as it considered latent construct's reflective indicator. All constructs were allowed to covary in CFA model. Maximum likelihood approach was used for estimation of model, with the correlation matrix as input. The model illustrated above resulted in no good fit between developed model and observed data ( $\chi^2 = 45.50$ ,  $p = 0.00$ , GFI= 0.91; AGFI= 0.81; RMSEA= 0,072; SRMR= 0.055). In conclusion, for verifying whether intelligent bot usage impress three constructs, the CFA is performed. All constructs are correlated.

The hypotheses of this study are tested collectively by using Structural Equation Modeling method. Regarding to Bentler et al., (1980) Structural Equation Modeling approach was especially appropriate for justified models theoretically examining like was the model in this research.

Like in CFA every indicator is modeled in reflective way. All constructs are linked like proposed model. The model estimation was done by maximum likelihood approach. The goodness of fit of structural model is comparable with previous CFA results. Model  $\chi^2/df$  is 1.715 ( $\chi^2 = 115.79$ ;  $df = 62$ ), NNFI is 0.94, in addition CFI is 0.95. Based on these metrics,

there is enough fit between hypothesized model and observed data. Path significance of hypothesized associations in this study and the R2 value via each path are tested too. Figure 2 illustrates significances of path and path coefficients. At  $p < 0.01$ , all paths hypothesized in model are significant.

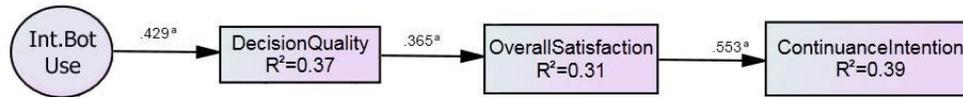


Figure. 2. Research Structural Model

### 3.3 Discussion and Conclusion

In the IS continuance literature, there are many studies which evaluate the continuance intention of consumers toward using the system. Significant percent of these studies use a simulated experimental website for examining proposed models. This study uses a real-life website. That is to say, rather than asking customers to use the simulated information systems, face them with a real-life portal. In real-life experiments, constructs of model could be measured effectively. Especially in online shopping stores, online auctions and etc. results of tests in simulated portals may be completely different from real-life portal since in later one consumers should pay for product. This study evaluated the impact of knowledge-based intelligent bot on online users' post-adoption behavior. Results of statistical tests revealed a positive relationship between intelligent bot usage and decision quality. In other word, decision quality which is determined by the users' confidence level in online purchasing is increased in intelligent bot-assisted website. Participants who assisted by intelligent bot are more confident in decision while shopping an item rather than non-intelligent bot website users. Statistical tests represent that continuance intention of customers substantially influenced by overall satisfaction level. These result also disclosed high tendency to continue system in those participants who satisfied with operation of e-commerce website integrated by intelligent bot.

Putting all above-mentioned items into consideration, the following conclusion could be drawn about the influence of intelligent bots on continuance intention of customers. Using intelligent bots increases the tendency of customers toward continues using service by increasing decision quality, overall satisfaction and continuance intention.

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