TPB for Recommender System in Iran retail sector

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Abstract: Rise of ecommerce, which followed by Internet, has created some complexities in most industries. Retail was not exempt from these obstacles. To overcome the information overload for Internet shoppers, several Recommender Systems (RS) have been developed. RS monitor the past actions of a group of customers to make a recommendation to individual members of the group to mitigate the problem of vast product information. The main issue is adoption and implementation of RS to be suitable for society and avoid wasting time, energy and cost. Therefore, we compare several models of acceptance and introduce the critical and main parameters of an acceptance model, which guarantee the result of RS employment. To verify the validity of the parameters, an extended model of Theory of Planned Behavior (TPB) acceptance has been provided for a case of the retail industry in IRAN.

Key-Words: Ecommerce, Recommender System, Collaborative filtering, Adoption, Retail, TPB

1 Introduction
The high-speed growth of internet especially in the field of customer relation and social participation has introduced ecommerce as the act of purchasing and selling goods and service over internet. The need to transfer data, sell and buy things via encoding information has strengthened the power of ecommerce in most areas [1].

The rapid growth of ecommerce and the increase of the burden of information processing, have made many complexities for customers and companies. Companies find it harder to survive due to more and more competition. In addition, the opportunity for customers to choose among more and more products that help to meet their needs is an obstacle. As a result, the need for new marketing strategies such as one-to-one marketing and customer relationship management (CRM) has been stressed both by researchers as well as by practitioners. RS is the best solution to realize these strategies. It helps customers to find products out by producing a list of recommended products for each given customer [2, 3].

The loss of energy and elapsed time are main obstacle points for searching, selecting and purchasing the right product. Many people spend over hours on the internet or even in many stores to find the right item or service for their special purpose. They lose energy and even money to find their own favorites.

To make the decision process easier and the problem simpler, RS, the recent focus of researchers, has been needed. It helps customers find the right products in the least time and best price. It has changed many things in ecommerce and solved most problems. Many scientists agree that RS is one answer to one to one marketing and customer relationship management as well [4].

Availability of wide range of information in most aspects of retail and other industries, have made hard situation for companies to survive. Most companies wish to meet their customer adequacies by tailoring the right information for the right customer. For this purpose, RS can be used for both online process like in web site and offline process like in many stores. It could pose time saving and loyalty for customers.

After acquiring user preferences, RS may adopt one of the five following filtering approaches to build right suggestions: collaborative, demographic, utility based, knowledge based and content based [5].
Adoption of RS in different industries guides to identify key factors, which lead customers to engage in recommender systems beyond the ecommerce sector. A variety of theoretical frameworks has been used to explain consumer behavior in new situation. In addition, each industry needs different models and according to that model and the usage, it requires different contributions.

Adoption of new technology also requires time, energy and cost. Most people invest large amount of money for technologies to be adopted, but make huge loss in result. For this purpose, some models are introduced that are basis for the adoption of technologies. However, for RS adoption in retail industry, an appropriate model is required that may work different for other purposes. This study has been motivated for the fundamental problem, which model and why it is better to explain the RS adoption in retail industry and joins the dialog by developing a theory based on the important factors.

The rest of the paper is organized as follow: In the second section, we present an explanation about the framework of RS, its five techniques and review some known technology acceptance models. In the third part, retail and the important factors that cause the selected model to be chosen is described. This section will be concluded by explaining the extended model for an Iranian super store. The paper is finalized by the conclusion.

2 Theoretical frameworks
The discussion about RS includes two main sections. The first one is allocated to its filtering and the second one is the models that can be used for RS adoption.

2.1 Recommendation techniques
Recommendation techniques have number of possible classification. In the current discussion, the filtering method is considered. The first, which is the most mature, familiar and widely implemented, is collaborative filtering, which considers users as the main factors. Its assumption is based on the users with similar items and generate recommendations based on the inter user comparisons [5]. Thus, recommendation is based on the opinion of customers.

Demographic filtering categorizes users based on their personal attributes and demographic classes. For instance, the recommendation to customer around one area is different from other areas. Utility based is another way of filtering which make suggestions based on the computation of the utility of each object. Knowledge based recommender works base on inferences about a user’s needs and preferences [5].

Content based filtering is the one, which is most popular after collaborative filtering. As it can extract from its name, it attempts to suggest base on the similarity between items [5]. As our case focuses on the customers as the main factor, we have chosen collaborative filtering method.

2.2 Classical adoption models:
Adoption of the technology by using intention and usage of independent variables is one of the most important focuses of researchers. The attractiveness and power of ecommerce lies in its impact on reshaping traditional value chains in different industries. Consumers have realized the benefits of shopping online, but at the same time have been impeded by factors such as security and privacy concerns, download time and unfamiliarity with the medium. For these purposes, researchers have implemented many models and schemes to overcome some difficulties facing ecommerce environment. These models are used to describe and find the factors that make customers use the ecommerce innovations. The well known of acceptance models are briefly reviewed as follows:

Technology Acceptance Model (TAM) is the most frequently used models in applying the adoption of information system. This model was proposed by Davis in 1989. It explains the potential user’s behavioral intention to accept technology innovation. TAM has two indicators. One is Perceived ease of use which is defined as “the prospective user’s subjective probability that using a specific application system will increase his or her job performance within an organizational context”, and Perceived usefulness which is explained as “the degree to which the prospective user expects the target system to be free of effort” [6].

Theory of Reasoned Action (TRA) is used in technology adoption research. According to TRA, a person’s attitude to a behavior and subjective norm affect on one’s intention to that behavior and consequently, it affects on one’s behavior about an activity. Subjective norm is defined as other people's thought about performing a behavior. TRA has developed by Martin Fishbein and Icek Azjen [7].
Theory of Planned Behavior (TPB) is the extension of TRA. This model is used in some situations where a person does not have complete control over his behavior. Therefore, TRA has been extended by Perceived behavioral control, which affects behavioral intention. Perceived behavioral control is directed to two conditions. One is facilitating condition which refers to resources required to use specific activity like time and financial resources, and self-confidence which backs to individual confidence to perform a behavior. Intention is defined as the person’s readiness to perform a behavior. As shown in Fig. 1, it is performed by attitude toward behavior, subjective norm, and perceived behavioral control. Attitude are made from people’s belief and idea about certain thing, norms are made up from normative beliefs and motives to comply and perceived behavioral control is made up from individual beliefs about resources needed to engage in a behavior. TPB also has a direct link from perceived behavioral control to behavioral achievement (Fig. 1). It means that two people with the same level of intention, the one with higher confidence in his ability, is more successful in performing that behavior. TPB as said in many articles is the basis of many internet purchasing behavior [8, 9].

3 Model selections
Technology has made many changes in retail from early days to recent time. Retailing has always taken advantage of technology. Many articles agree on that the history of retail is the history of technology. Thus, the adoption of technology is the beginning of change [11].

Adoption is a subject that getting it to work requires investing a large amount of money and getting numbers of people to work. The profit over the adoption of new technology especially in retail depends on number of people who use the new technology and the amount of their usage from technology. Therefore, it is logical and advantageous to use the models that are specially designed for adopting technology in retail in society and measure the acceptance of technology by people. Step by step through adoption of technology, make the function constructive and help to invest on the adoption correctly.

However, we have been motivated to find the best acceptance model by introducing the parametric comparison method to specify the best adoption model in a known case. For this purpose, we expand the discussion about retail and our case study, Shahrvand super store. The factors which are important in selecting the model and extending that are described respectively.

3.1 Retail
Retail is an industry that most people face it every day. The act of buying and selling is analyzed as one of the most effective activities in our society that fulfill the need of people. Store is the last place of item distribution toward consumers. With the tremendous growth in world population, the need of each product in every place, guides societies through establishing chain stores. Chain stores are two or more retail stores run by the same company, bearing the same name, and selling the same kinds of merchandise.

In Iran, asking for the famous chain store, one can conclude Shahrvand is the answer. Shahrvand is one of the chain stores, which is pioneer in grocery and home appliances in Iran. It has been found on 1993 in Tehran. Shahrvand started e-shopping about 6 years ago in 1380 through www.shahrvandonline.com.
3.2 Parametric comparison method

To justify a technology acceptance model for a special case firstly, the model factors and criteria have to be appropriate to deploy in that case. For this purpose, five criteria, which are important for a model to explain RS case in retail, are identified.

1. Encouraging customer, that is defined as factors to encourage customers to employ the new device in their shopping behavior.
2. Retail facilities as factors which create comfort in shopping.
3. Ease of system usage is described as factors that back to the system and the direction to work.
4. Customer environment which allocates to items which are in the area where customer lives and affects his choice.
5. Customers' attitude that describe the customer’s idea about the system. These are the criteria that the model must have to be useful in research for RS in retail industry.

As it has indicated in previous sections, TPB has three factors that cause intention toward a behavior. The first one is attitude toward behavior. Idea plays an important role in one’s performance toward a job. It is mentioned as one’s feeling about using that system. This feeling is some how a basis for using RS. Therefore, this factor fulfills the need of one factor of comparing table. In addition, TRA is the other model that has attitude.

Next, is subjective norm. For many customers, other people's opinion is effective in their decision to use a system. As long as RS is a recent technology, which helps people in their shopping, one factor that has huge effect on people’s intention in using RS is back to other people’s idea and their recommendation for using this recent system. Therefore, subjective norm is an important factor in one’s behavior in using RS in shopping. Thus, encouraging customers is related to subjective norms, which TRA also has this item. TAM’s factor, Perceived usefulness, is the next factor that fulfills this need.

RS is the subject of choice. In our discussion, selection in shopping is considered. Many people are seen in a shopping store that purchase things and communicate with each other about materials regarding shopping and items. This way is one method that affects people’s behavior in shopping.

Perceived behavioral control is the third factor that affects people’s choice in shopping. This concept is defined as one's perception of the difficulty of performing a behavior. In addition, it contains the meaning how a system works as well. As long as factors like time, price and traffic are the ones that are important in performing a shopping behavior, one’s perception of these resources that making the act of purchasing easier or harder by using these resources, plays an important role in accepting and using a technology. Therefore, facilities in retail and ease of system usage are back to this factor. TAM also has a factor as Perceived ease of use and UTAUT’s facility condition fulfill this factor. In addition, Perceived behavioral control explains environmental conditions, therefore, TPB has the last criteria as well, also UTAUT has the social influence factor which affect environmental factors.

<table>
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<tr>
<th>Factors</th>
<th>TAM</th>
<th>TRA</th>
<th>TPB</th>
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<tbody>
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<td>Encouraging customers</td>
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<td>Retail facilities</td>
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<td>Ease of system usage</td>
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<td>Customer environment</td>
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<td>Attitude of customer</td>
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Table 1, Comparing factors of models

As it shows in Table 1, it can be concluded that TPB is the model that contains all required factors, which have to be measured for RS adoption in retail.

3.3 Extended model

The TPB model which has been selected to explain the RS case in retail industry is not the final and completed one. For this reason, we have conducted a focus group between Shahrvand loyal customers and gathered their ideas about RS. As long as this case is related to people’s culture and habit in shopping, therefore, their opinions helped to make TPB model extended and more accuracy than the general TPB model could be expected.

The first important factor is flexibility. One’s flexibility in choosing the way of purchasing and accept to try new methods, is important in using recommender system. Flexible people have more chance to accept RS in their shopping behavior.

The other factor is loyalty to brand. In the focus group, which has been conducted, most customers mentioned that the name of
“Shahrvand” is the reason that they accept trying new methods. They are Shahrvand loyal customers and their confidence is the main reason that they deploy new technology. Therefore, “Flexibility” and “Brand loyalty” have been added (Fig.2) as the factors that affect attitude toward behavior and Perceived behavioral control.

![Diagram of TPB for RS in Shahrvand]

**Fig.2. TPB for RS in Shahrvand**

### 4 Conclusions
RS is a recent technology which is focused by many customers to select products and services in an appropriate way. Its adoption in different industries poses to employ the best acceptance models to measure the society’s reaction. Five common criteria which have influences in accepting RS in retail industry have been mentioned. The famous classical acceptance models (TAM, TRA, TPB and UTAUT) have been compared in this paper.

TPB has been concluded as the best one. Furthermore an extended model has been introduced using loyal customers’ opinion by conducting focus group in this case. The flexibility and brand loyalty factors have been added to the original TPB model. It would be an interesting research area to conduct a questionnaire among our case study, Shahrvand and expand the sample to measure huge number of customers’ idea.

**References:**


