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# **The Role of Transparency and Feedback on the Behavioral Intention to Reuse a Recommender System**

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## **Abstract**

The problem of choosing the right product that will best fit the consumers' tastes and preferences also extends even in electronic commerce. However, e-commerce was able to create a technological proxy for this social filtering process that is called online Recommender Systems (RS). RS act as personalized decision guides, aiding users in decisions on matters related to personal taste. It has the potential to support and improve the quality of the decisions consumers make when searching for and selecting products and services online. However, most previous research on RS has focused on the statistical accuracy of the algorithms driving the systems, with little emphasis on interface issues and the user's perspective. This study identified transparency and feedback as some of the possible ways to effectively evaluate recommender systems based from the users' perspective. Thus, the goal of this research wants to focus on examining and identifying the roles of transparency and feedback in recommender systems and how it affect the user's attitude towards the system.

## **Keywords**

Recommender system, transparency, feedback

# **The Role of Transparency and Feedback on the Behavioral Intention to Reuse a Recommender System**

## **1. Introduction**

One of the hardest decisions that people face in dealing with the products and services that they want to purchase is how to choose the right product that will best fit their tastes and preferences. Because of this, people tend to seek recommendations or suggestions from their friends or relatives. This problem also extends even in electronic commerce. However, e-commerce was able to create a technological proxy for this social filtering process which is called online Recommender Systems (RS). RS is a web technology that proactively suggests items of interest to users based on their objective behavior or explicitly stated preferences (Pu and Chen, 2010).

Recommender Systems act as personalized decision guides, aiding users in decisions on matters related to personal taste (Medhi and Dakua, 2005). Because of the importance and benefits being brought about by RS in the field of e-commerce, a lot of researchers are becoming interested about this topic. However, most previous research on RS has focused on the statistical accuracy of the algorithms driving the systems, with little emphasis on interface issues and the user's perspective (Swearingen & Sinha, 2002). Since studies tackling about user's perspective are very limited, this research attempts to identify two factors that could affect the behavioral intention of the users to reuse a recommender system. The study identified transparency and feedback as some of the possible ways to effectively evaluate recommender systems based from the users' perspective. Therefore, the goal of this research wants to focus on examining and identifying the roles of transparency and feedback in recommender systems and how it affect the user's attitude towards the system. Specifically, the study wants:

1. To explore how transparency will affect the users attitude to reuse a recommender system.
2. To ascertain how feedback will affect the users attitude to reuse a recommender system.
3. To identify the factors that affects the behavioral intention of users to reuse a recommender system.

## **2. Review of Related Literature**

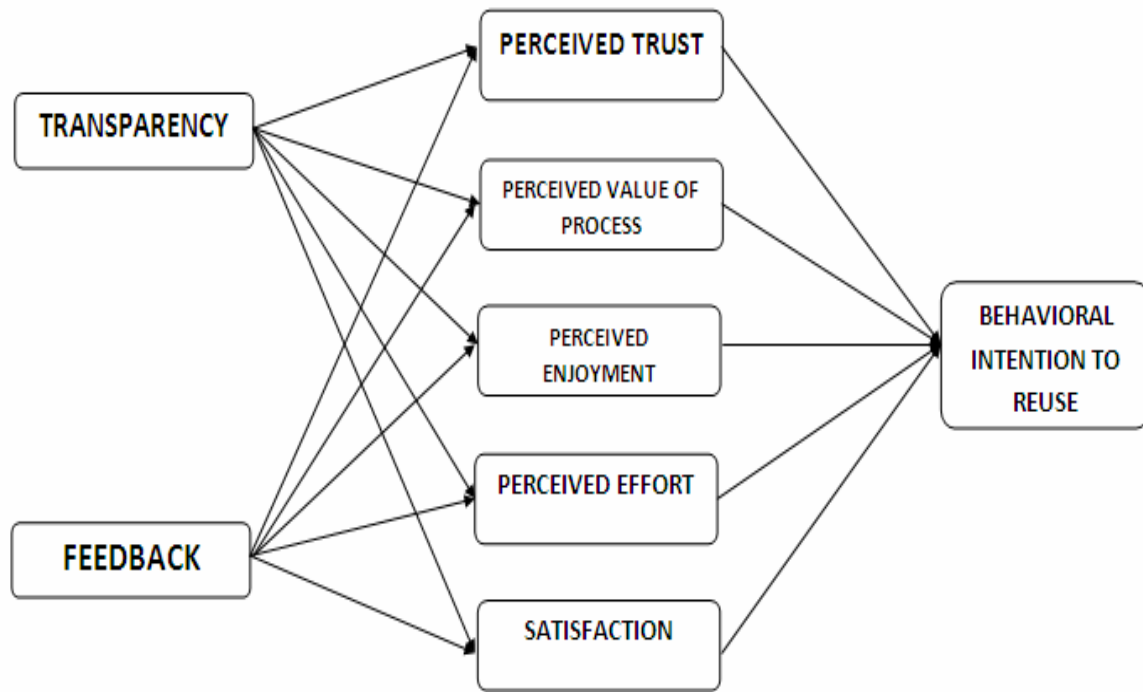
Recommender System is a kind of automated and sophisticated decision support system that is needed to provide a personalized solution in a brief form without going through a complicated search process. According to Pu and Chen (2010), a substantial number of studies to make RS more accurate and efficient has been done previously, however, most of them have common critical limitations. They stated that so far, previous research work on RS evaluation has mainly

focused on algorithm accuracy especially in examining the objective prediction accuracy of the system. Other researchers are now also investigating user experience issues such as identifying determinants that influence users' perception of RS, effective preference elicitation methods, techniques that motivate users to rate items that they have experienced, methods that generate diverse and more satisfying recommendation lists, explanation interfaces, trust formation with recommenders, and design guidelines for enhancing a recommender's interface layout. More recently, researchers began examining issues related to users' subjective opinions and developing additional criteria to evaluate recommender systems. However, none of these studies has focused on the roles of feedback and transparency. The fields mentioned above lack a general definition and evaluation framework of what constitutes an effective and satisfying recommender system from the user's perspective. Therefore, this study will attempt to provide an answer to the said limitation by identifying these two external factors: feedback and transparency as ways to effectively evaluate recommender systems based from the users' perspective.

Technology Acceptance Model (TAM) which was developed by Davis (1986, 1989) was used as a ground theory to develop the model for the research. The key purpose of TAM is to provide a basis for tracing the impact of external variables on internal beliefs, attitudes and intentions. Therefore, the study will try to identify the relationships among transparency, feedback, internal factors, and the behavioral intention of the users to reuse a recommender system.

## **Transparency**

Previous researches have shown that expert systems that act as decision guides need to provide explanations and justifications for their advice (Buchanan & Shortcliffe, 1984). In the context of recommender systems, understanding the relationship between the input to the system (ratings made by user) and output (recommendations) allows the user to initiate a predictable and efficient interaction with the system (Gretzel and Fesenmaier, 2006). In this study, we identified transparency as one of the possible ways to effectively evaluate recommender systems based from the users' perspective. In this context, transparency allows users to meaningfully revise the input in order to improve recommendations, rather than making "shots in the dark." By allowing users to review their initial ratings, they will be able to reassess their decision based from their tastes and preferences.



**Figure 1:** Research Model

Transparency aims to increase understanding and entails offering the user insight on how a system works. Lee and See (2004) state that appropriate trust depend on how well the capabilities of a system are conveyed to the user. Transparency has also been found to influence users' confidence in the recommendation provided by the system. Therefore, as the system becomes more transparent, users will perceive that the system is trustworthy.

*Hypothesis 1:* Transparency increases the user's perceived trust on the recommender system.

Bilgic and Mooney (2005) argue that a system's ability to make its reasoning transparent can contribute significantly to user acceptance of the system's suggestions. Because of this, if the user fully understands the whole procedure on how the system provides recommendations, then users will find the recommendation more reliable and trustworthy. Therefore, process transparency is believed to increase the perceived value and overall acceptance of recommender systems. Transparency will then appear as an important factor in determining whether a recommendation will be accepted and positively evaluated.

*Hypothesis 2:* Transparency increases the user's perceived value of process of the recommender system.

Many researchers have emphasized that transparency has a certain impact on other critical aspects of user's perception (Pu and Chen, 2010). And user's perception includes enjoyment in which people find the system enjoyable if they find the whole system and procedure as easy and

comfortable to use. If the user understands how a system works and can predict system actions and outcomes, the user can focus on his or her task instead of trying to figure out the system. Therefore, they will enjoy using the system.

*Hypothesis 3:* Transparency increases the user's perceived enjoyment of using the recommender system.

If the users have a complete picture and fully understand how the system works and the procedures that they should go through to come up with the results, they will then perceive that it will require more efforts (Gretzel and Fesenmaier, 2006). Since transparency will ask the users to review their initial ratings, then users will perceive that using the system will then require more efforts for them to come up with the final recommendation. Therefore:

*Hypothesis 4:* Transparency increases the user's perceived effort of the recommender system.

Pu and Chen (2010) said that perception of the recommender's competence is an issue in satisfaction. When the user cannot assess for what goal a system has been built and whether the properties used by the system match his or her criteria, the interaction will not likely be satisfactory. However, if the users fully understand the whole system, they will find its recommendations interesting and satisfying. Therefore, the study described in this paper stems from the premise that a transparency of a system that performs well will increase the users' satisfaction.

*Hypothesis 5:* Transparency increases the user's satisfaction of the recommender system.

## **Feedback**

In this study, feedback is defined as the process in which the effect or output of an action is "returned" to modify the next action. The concept of feedback in this research includes the system's ability to allow users to revise their preferences, to customize received recommendations, and to request a new set of recommendations. It is assumed that by doing the said procedure, recommendation results will be more satisfactory for the users.

According to Pereira (2000), increased user control over interaction with recommendation agents results in increased trust in the system. When users are given more control to revise their preferences at any given point in time, the user will consider its results as more useful and effective. Therefore, the user will be more confident about the results.

*Hypothesis 6:* Feedback increases the user's perceived trust of the recommender system.

The ability of the system to produce a highly personalized recommendations based from the system's capabilities to identify users' tastes and preferences is very important in the personalization processes to produce a more positive attitudes toward the services a system provides (Gretzel and Fesenmaier, 2006). If the user understands how the procedure predicts outcomes and how the whole process works and by giving them more opportunities to reassess

their initial decisions, users will find the whole process as valuable and important. Therefore, the users will have a better understanding of the reasons behind the recommendations.

*Hypothesis 7:* Feedback increases the user's perceived value of process of the recommender system.

According to Cramer et al. (2008), giving the users more control gives them more opportunities to a more entertaining and enjoyable personalized experience. Giving users more opportunity to interact with the system and providing them more chances to modify their preferences make them better understand the procedure which leads them to enjoy the whole process and better understand their tastes and preferences.

*Hypothesis 8:* Feedback increases the user's perceived enjoyment of using the recommender system.

It is often assumed that people are averse in answering too many questions in order to get a recommendation (Gretzel and Fesenmaier, 2006). Therefore, asking them to restate their preferences to improve the results of the recommendation will give them an assumption that the whole process will require more effort. Thus, it is assumed in this study that:

*Hypothesis 9:* Feedback increases the user's perceived effort in using the recommender system.

Giving users the capability to return to the preference specification stage at any given point in time and restate their preferences increased their positive responses to recommendation agents (Pereira, 2000). By allowing them to reassess their initial choices will give them a more satisfying results since it will give them more confidence about the results given by the system. Therefore, it will give a positive effect on users' decision making satisfaction.

*Hypothesis 10:* Feedback increases the satisfaction in using the recommender system.

In this study, perceived trust will be defined as users' willingness to believe in the information from a system or make use of its capabilities (Cramer, et. al., 2008). They said that the concept of trust consists of trust in the intentions of a system (goal alignment) and trust in the competence of the system. Competence is seen as the perceived skill of the system: the extent to which it is able to offer the right recommendations. The perception of the alignment of goals of the system and the user's goals, coupled with a belief that a system will perform its task competently, form the basis of trust (Cramer, et. al., 2008). Because of this, perceived trust will drive the users to reuse the recommender system. Therefore, the study assumed that:

*Hypothesis 11:* Perceived trust positively affects the behavioral intention to reuse a recommender system.

The value of process lies in its ability to identify users' tastes and preferences. Its potential to produce highly personalized recommendations is crucial, for personalization processes result in

more positive attitudes toward the services a system provides (Chau and Lai, 2003). Customization attracts customer attention and fosters loyalty and personalized content increases the user's motivation to elaborate on items suggested by a recommender system. Therefore, the evaluations of the system's capacity to capture their preferences and provide useful suggestions are expected to affect their intention to reuse the system (Gretzel and Fesenmaier, 2006). Thus:

*Hypothesis 12:* Perceived value of process positively affects the behavioral intention to reuse a recommender system.

Perceived enjoyment can be defined as the extent to which the activity of using a specific system is perceived to be enjoyable in its own right, aside from any performance consequences resulting from system use (Gretzel and Fesenmaier, 2006). According to them, there is an increasing evidence that enjoyment of one's interactions with technology has important consequences for one's perceptions and subsequent evaluations of the technology and can be manipulated by the design of the technology. On the other hand, great effort, lack of transparency, and having to answer irrelevant questions will presumably decrease a user's enjoyment. Therefore, it is assumed in this study that:

*Hypothesis 13:* Perceived enjoyment positively affects the behavioral intention to reuse a recommender system.

Effort is a critical concept in the context of decision aids because it can influence consumer preferences for product alternatives (Gretzel and Fesenmaier, 2006). Asking the user to provide information to the system for the sake of personalization is typically conceptualized as placing an undesirable burden on the user and may influence them negatively towards the system. Therefore, it is often assumed that people perceive that answering too many questions in order to get a recommendation requires more effort. Thus:

*Hypothesis 14:* Perceived effort negatively affects the behavioral intention to reuse the recommender system.

Consumers' satisfaction is a key factor for establishing long term relationships with them and acquiring their repurchase intentions (Lee, et. al., 2008). Bai, Law, and Wen (2008) suggested that in online environments, striving for satisfaction should be very significant to increase intentions for actual purchase of products online. Thus, it is assumed in this study that satisfaction of the users will greatly affect their intention to reuse a recommender system.

*Hypothesis 15:* Satisfaction positively affects the behavioral intention to reuse a recommender system.

### **3. Methodology**

Movie recommender system was selected as the context of the study. Specifically, experiment participants will be asked to rate different movies that will be presented by the movie



recommender system and evaluate the recommendations it will provide. A total of 120 respondents will be invited to participate in the study. The experiment will involve the manipulation of two factors with two levels per factor, thus leading to a 2x2 full-factorial between subjects design as shown in *Table 1*. The first treatment group (low transparency, low feedback) will be manipulated by asking the participants to rate the movies that will be presented to them just like the regular movie recommendation system. The second treatment group (high transparency, low feedback) will be manipulated by presenting the same procedure with the first group and by asking the subjects to review the ratings they initially made on the movies presented to them. The third treatment group (low transparency, high feedback) will be manipulated by asking the subjects to rate again the recommendations that will be given to them by the system based from the ratings they initially gave out after doing the procedure in the first treatment. And the last treatment group (high transparency, high feedback) will be manipulated by presenting same procedure with the first group and giving a chance to review their ratings on movies and feedback on recommendations they got.

Transparency	Feedback	Experimental Treatment
Low	Low	Basic recommendation
High	Low	Basic recommendation + review of ratings
Low	High	Basic recommendation + feedback on recommendations
High	High	Basic recommendation + review of ratings + feedback on recommendations

**Table 1:** Experimental treatments

Upon receiving the recommendations, participants will be prompted by the system to proceed to the evaluation survey. The survey will ask them to respond to questions about their evaluation of the recommendation and their perceptions of their interaction with the system.

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