# Psychological elements explaining the consumer's adoption and use of a website recommendation system: a theoretical framework proposal

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**Abstract**

**Purpose –** To understand, with an emphasis on the psychological perspective of the research problem, the consumer's adoption and use of a certain website recommendation system as well as the main psychological outcomes involved.

**Design/methodology/approach –** Theoretical modelling.

**Findings –** A conceptual model is proposed and discussed. A total of 20 research propositions are theoretically analyzed and justified.

**Practical implications –** The ideas extracted from the discussion of the conceptual model should be of help for recommendation systems designers and website managers, so that they may be more aware, when working with such systems, of the psychological process consumers undergo when interacting with them. In this regard, numerous practical reflections and suggestions are presented.

**Originality/value –**This paper is based on and adapts classical theories of consumer behaviour, integrating them into particular theories developed within the framework of computer-mediated environments.

**Research limitations** –The theoretical discussion developed here is not empirically validated. This represents an opportunity for future research.

**Keywords** Website recommendation systems, Consumer acceptance, Use, Psychological approach

**Paper type** Conceptual paper

## 1 Introduction

Individuals usually try to partially palliate their lack of understanding or experience with certain product/service categories and/or particular consumption alternatives (e.g. a specific brand) by means of recommendations passed on to them by others (Resnick and Varian, 1997). Recommendations, therefore, represent an everyday external information source which helps consumers to carry out their decision processes more efficiently (e.g.: Price and Feick, 1984; Rosen and Olshavsky, 1987). The consumer behaviour discipline has traditionally focused its attentions on the study of the influence of both personal sources (e.g.: relatives, acquaintances, WOM, etc.), which provide personalized or non-personalized recommendations, and impersonal sources, which provide non-personalized recommendations. However, as pointed out by Senecal and Nantel (2004), this discipline has not analyzed the role played by Information Technologies, an impersonal source capable of providing personalized information, in the behaviour patterns of consumers.

In the context of electronic markets, and considering the characteristic information overload online consumers might face (especially when compared to consumption processes carried out in physical markets), recommendations are particularly relevant (Gershoff, Mukherjee and Mukhopadhyay, 2003; Maes, 1994; Shih et al., 2002). We may well imagine, at first, that a greater variety of choices would be highly valued by consumers; this would, in turn, establish a positive relationship between the variety of items available to consumers and their level of buying and satisfaction with the shopping process. An excess of choice, however, can be expected to generate confusion, stress and anxiety, discouraging consumers from closing the online consumption process with a purchase (see Haynes 2009; Iyengar and Lepper, 2000; Schwartz, 2004). In light of this problem, many online businesses manage and provide services of recommendations with the support of intelligent agents, which analyze consumers' profiles, product preferences, salient attributes searched or valued, etc., to then provide accurate offers to each consumer (Benbasat and Zmud, 2003; Chen and Chen, 2005). Nonetheless, while e-commerce based recommendation systems have been a recurrent research topic in the computer science and artificial intelligence areas in recent times, scarce attention has been paid to them within the marketing domain (Ying, Feinberg and Wedel, 2006). At any rate, the idea of recommendation systems (RS) is not a product of the Internet-based e-commerce era. On the contrary, as Ansari, Essagaier and Kohli (2000) indicate, its origin dates back decades ago to the works of Negroponte (1970) and Kay (1984) or to commercial applications such as those used by the movie rental corporation BlockBuster Video in order to recommend films to its customers.

Recommendation systems represent a very useful tool to be applied in e-commerce based business-to-consumer relations. In particular, as companies are increasingly aware of the Long Tail model (Anderson, 2006) as it relates to the configuration and management of their inventories, it becomes clear that the offer of accurate item recommendations is fundamental to assuring good transaction performance and the satisfaction of every customer. RS, therefore, if well designed and applied, should contribute to the efficient application of a mass-customization approach to customer relations management. Nowadays, RS represent a very necessary support tool in the

personalization of consumers' experiences in online environments (Schafer, Konstan and Riedl, 2001). For instance, RS can respond to the consumer's individual requirements or anticipate, thanks to its proactive characteristics, such requirements as providing item suggestions which suitably match their consumption interests (Wooldridge and Jennings, 1995). Undoubtedly, the study of RS is essential. Nevertheless, research efforts have typically been characterized by a technical orientation, tending to be carried out in areas such as information systems and computer science (Xiao and Benbasat, 2007). Thus, the proposals and solutions that can be found regarding this question, though numerous and rich, have not paid enough attention to other perspectives which deserve analysis. One key perspective in particular would be that which may help to understand why consumers enter interactive processes with website recommendation systems. Reviewing the literature, a few notable attempts to model the adoption and use of these systems by consumers can be found (e.g.: Wang and Benbasat, 2005; Xiao and Benbasat, 2007). However, these attempts present diverse weaknesses; in most cases, for instance, not enough attention is paid to psychological factors, and when it is, model development is not detailed enough to explain them in a more complete manner. At any rate, the adoption and use of recommendation systems, as well as other related questions which would offer greater knowledge regarding the influence of RS on online consumption behaviours, are elements which belong to an area of research which offers many opportunities for future study in the e-marketing arena.

This paper is a theoretical attempt to model the consumer process related to the adoption and use of a website recommendation system, as well as the main psychological and buying-related outcomes associated with this process. The conceptual model we present works mainly with psychological constructs, and it is product of a reflected integration of diverse general consumption theories and makes use of specific approaches to explain the acceptation of information technologies. These are, in particular, the Technology Acceptance Model (TAM) (Davis, 1989), the integrated Trust-TAM model for online shopping (Gefen, Karahanna and Straub, 2003; Wang and Benbasat, 2005) the Theory of Planned Behaviour (Ajzen, 1985; Ajzen, 1989; Ajzen, 1991), an evolution of the Theory of Reasoned Action, and theories of Flow in online environments (Hoffman and Novak, 1996; Novak, Hoffman and Yung, 2000). A total of 20 theoretical propositions are introduced and briefly discussed.

Finally, the paper structure is as follows: First, we present diverse questions related to the general framework of the recommendation systems, paying particular attention to their interest from a marketing perspective. Next, we introduce the basis of our conceptual model and its constituent variables, as well as the relationships we pose. Finally, we close the paper with some concluding ideas.


## 2 Recommendation Systems: brief overview and typology

Senecal and Nantel (2004) recently extended Andreasen's (1968) classical typology of information sources used by consumers to computer-mediated environments. Among the four sources identified as important influences on online decision making by consumers, impersonal sources that provide personalized information, with RS as its highest expression, stands out as one of the more promising categories for consumer research in the near future. Other terms synonymous with RS (Xiao and Benbasat, 2007) are: "recommendation agents", "recommender systems", "recommendation systems", "shopping agents", "shopping bots", "comparison shopping agents", "product RAs", "e-commerce RAs" and "e-commerce products". However, the item selections provided by RS are not the only source available to consumers on the Internet; others,

such as the evaluations made by human experts and by other consumers regarding concrete items of interest are also frequently offered by online businesses (e.g.: Senecal and Nantel, 2002).

Notwithstanding, while recommendations provided by these systems may be considered to be less trustworthy or expert than other sources, they seem to exert the greatest influence on consumers' online choices (Senecal and Nantel, 2004). Besides, considering the ability of RS to articulate recommendations by offering diverse alternatives, their potential to stimulate and drive the consumers' selection of items on certain websites is evident. In particular, not only should product recommendations provided by intelligent agents be considered, collaborations with users in product assessment should be considered as well; it is in a website's best interests to maintain an RS which adequately integrates different sources in order to better assist online consumption processes (Ansari, Essegaier and Kohli, 2000). In this regard, Schafer, Konstan and Riedl (2001) point out three perspectives that should be taken into account: recommendations made by RS, user preference predictions, and the opinions of other community members. The following definition they provide for RS illustrates these points:

*"RS are used by E-commerce sites to suggest products to their customers and to provide consumers with information to help them decide which products to purchase. […] recommended based on the top overall sellers on a site, on the demographics of the consumer, or on an analysis of the past buying behavior of the consumer as a prediction for future buying behavior. The forms of recommendation include suggesting products to the consumer, providing personalized product information, summarizing community opinion, and providing community critiques" (p. 116).*

RS have been recently classified according to three main types, depending on the approach used to make recommendations (Adomavicius and Tuzhilin, 2005):

(1) Content-based filtering, which bases recommendations on the similarity of items, taking into account the items preferences demonstrated by consumers in the past (e.g.; Balabanovic and Shoham, 1997; Herlocker and Konstan, 2001; Mooney and Roy, 2000; Pazzani and Billsus, 2007).

(2) Collaborative filtering, which recommends items to the user, based on the choices made by other people who share the user's profile (e.g.: Canny, 2002; Cho and Kim, 2004; Goldberg et al., 1992; Goldberg et al., 2001; Konstan et al., 1997; Mild and Reutterer, 2003; Schafer et al., 2007).

Nevertheless, these two RS (content-based and collaborative) are clearly limited as neither the type of data they use nor their individual strengths can be combined (Ahn, 2006).

(3) To overcome these shortcomings, a hybrid approach to generating recommendations has been developed. This approach is characterized by the combination of several recommendation techniques (Burke, 2007). In the end, using both collaborative and content-based approaches together has turned out to be the optimal solution (Burke, 2007; Montaner, López and De la Rosa, 2003). Hybrid systems offer synergic benefits derived from combining the two methods and minimize disadvantages presented by each method individually. In this regard, a detailed classification of this newer approach to generating recommendations is based on seven categories (for more details, see: Burke, 2002 and 2007): feature augmentation, meta-level, witching, mixed, feature combination, weighted, and cascade.

To summarize, RS are artificial intelligence-based tools that create user profiles based on present and past consumer preferences, their characteristics or similarities between them, in order to make recommendations to their customers. So, RS should play an important role in the customization of relationships (see Ansari and Mela, 2003) and, subsequently, in generating states of loyalty in customers later on (Schafer, Konstan and Riedl, 1999, 2001; Srinivasan, Anderson and Ponnavolu, 2002).

## 3 Utility of Recommendation Systems for e-commerce

The advantages of RS are notable when applied commercially. More than mere technological devices, RS should be recognized as tools that improve conditions for both consumer and seller, tying business objectives to the interests of the consumer (Maes, 1994). Thus, regardless of whether a specific online firm is characterized by the application of a generalized relational focus (e.g.: Berry, 1983; Morgan and Hunt, 1994) to the management of its customer relations, the use of RS clearly helps to improve the value of the company's client portfolio. In fact, due to the diversity of the customer profiles usually addressed by companies, when considering electronic interchanges with a relational focus, it is more convenient to use an approach adapted to what every customer really requires (Endo and Kincade, 2008), rather than a general approach. If we consider that Customer Relationship Management (CRM) takes care of the appropriate generation of market intelligence for companies, with the aim of strengthening the construction and maintenance of a "profit-maximizing portfolio of customer relationships" (Zablah, Bellenger and Johnston, 2004, p. 481), then RS act as a pillar of support for the e-CRM on a one-to-one basis (Kim et al., 2002).

RS have been developed from a customer perspective. RS start to operate when a current or potential customer accesses a particular website for information regarding a service or product, only to find a large quantity of information that is impossible to process in its entirety. Therefore, the application of a filter process which offers the visitor the most relevant information, consumer-wise, is a worthwhile endeavour. RS are based on huge banks of data with characteristics of particular interest or items sometimes defined by the user, in order to provide a personalized list of recommended options (Haübl and Trifts, 2000). These personalized recommendations have recently become an essential element in e-commerce. Some of the main reasons offered to explain this phenomenon are (Ying, Feinberg and Wedel, 2006): (1) RS enable online firms to attend to individual preferences; (2) RS allow recommendations to be made to customers based on previous purchases and on the preferences shown by customers with similar profiles, etc.; (3) online consumption processes become more efficient as recommendations provided by RS improve in accuracy, a valuable benefit when considering the amount of information consumers have to deal with in electronic environments. In this regard, Maes (1999) remarks that the reduction of the effort in purchasing decisions is reflected in the favourable impact that the RS have on 4 of the 6 stages of consumer purchase behaviour; and finally, (4) even more interesting, RS can be, as mentioned previously, a very useful support tool in both the acquisition and retention of customers.

To summarize, RS may clearly contribute to the increase in the added value offered to customers via an improvement in the processes of mass online personalization, yielding, subsequently, a positive effect on cost reduction, assistance in retaining customers, creation of an environment conducive to profitable exchanges, etc. (e.g.: Ansari, Essegaier and Kohli, 2000; Schafer, Konstan and Riedl, 2001). All these likely uses of RS should definitively help to improve the company's competitiveness (Kim et

al., 2005). Well-known and famous examples of companies that have implemented RS to achieve improvements and consolidate products and services offered online are Amazon.com, eBay, YouTube, Rhapsody, or Netflix, among others.


## 4 Conceptual model

There is a lack of specific research with a clear user/customer orientation regarding the psychological aspects which would explain the use of a website recommendation system. A recent and notable attempt to model the effects of diverse RS aspects (e.g. use, characteristics and other factors) on consumer decision making – to the best of our knowledge the only one to date – is that of Xiao and Benbasat (2007). However, although they propose a very detailed model, there is yet a clear opportunity for future research in an analysis of the antecedents and outcomes of RS use, from a consumer's subjective (psychological variables) perspective; the aforementioned study does not cover this perspective to any great extent. Furthermore, we also pay careful attention to the relationships among the psychological outcomes of the website RS, as well as to the plausible determinants of the future use of a website RS.

In essence, regardless of other variables we consider, our proposed model is based on the adaptation and integration of several theoretical approaches developed to understand the consumer's behaviour in traditional and online shopping contexts: (1) the Technology Acceptance Model (TAM) (Davis, 1989); the integrated Trust-TAM model for online shopping (Gefen, Karahanna and Straub, 2003; Wang and Benbasat, 2005); (3) the Theory of Planned Behaviour (TPB) (Ajzen, 1985; Ajzen, 1989; Ajzen, 1991), an extension of the Theory of Reasoned Action (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975); and (4) theories of Flow in online environments (Hoffman and Novak, 1996; Novak, Hoffman and Yung, 2000). In Figure 1 we show a representation of the full model, organised in blocks which correspond to the different theories we have used to establish variables and their relationships.

Our conceptual model (see Figure 1) is composed of a total of 20 variables/constructs, whose synthetic description is shown in Table 1.


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**INSERT FIGURE 1 ABOUT HERE**

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Table 1. Description of the constructs/variables of the model

| Construct/Variable | Brief Description |
| --- | --- |
| *General Trust* | The consistent tendency to trust, across a broad variety of situations and persons (McKnight, Cummings and Chervany, 1998, p. 477) |
| *Trust Website* | The individual's belief in the trustworthiness of certain website/e-vendor (see Gefen, 2000). |
| *Trust WS-RS* | The individual's overall trust (i.e. ability, integrity, benevolence and predictability) in certain website recommendation system (hereafter WS-RS) |
| *PEOU WS-RS* | The individual's perceived ease of use of certain WS-RS |
| *PU WS-RS* | The individual's perceived usefulness of certain WS-RS |
| *Familiarity RS* | The individual's understanding of recommendation systems, based on prior and direct experiential interactions with them (Komiak and Benbasat, 2006, p. 946) |

| | |
|---|---|
| *Perceived Risk RS* | The individual's perceived risk relating to the use of recommendation systems. |
| *Attitude WS-RS* | The individual's overall opinion (affective response) towards certain WS-RS. |
| *Subj. Norm WS-RS* | The individual's perception of others' opinions regarding the use of recommendation systems in general and regarding certain WS-RS in particular. |
| *Intention Use WS-RS* | The individual's willingness to use certain WS-RS |
| *Perceived Behav. Control WS-RS* | The individual's perception of how easy or difficult it is to use certain WS-RS. |
| *Use WS-RS* | The actual use of certain WS-RS by the individual. |
| *OSL* | The degree of sensory stimulation that an individual regards as adequate for himself (Baumgartner and Steenkamp, 1996). |
| *Attention to Recommendation* | The individual's level of attention to the recommendations offered by the WS-RS |
| *Flow* | The individual's mental state of optimal experience when deeply involved in the process of navigation on the Web (Hoffman and Novak, 1996). |
| *Willingness to buy* | The individual's predisposition level to make a buy through a particular website |
| *Willingness to cross and up-selling* | The individual's predisposition level to accept and follow recommendations which respond to cross and/or add-on selling strategies from the WS-RS |
| *Satisfaction* | The individual's level of satisfaction with the performance of the WS-RS |
| *Perceived disturb Navigat. Process* | Whether the individual feels disturbed by the WS-RS during his/her navigational process |
| *Performance* | The individual's perceptions of the WS-RS level of performance |

## 5 Theoretical analysis of the relationships among variables

Here, we synthetically introduce and justify the relationships established in the conceptual model (see Figure 1) by means of propositions. In order to present a coherent sequence of analysis, this section is structured on the basis of the blocks of relationships shown in the model.

### 5.1 Adaptation of the TAM and Trust-TAM model

The TAM model was originally introduced by Davis (1989) and Davis, Bagozzi and Warshaw (1989), and later studies have successfully applied it in order to explain diverse aspects related to the adoption of the Internet. The TAM model shares similarities with the classic Theory of Reasoned Action (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975) and has proven to be more suitable to tackling the understanding of the acceptance and use of new computer-based technologies (Gefen and Straub, 2000). However, recent studies have emphasized the convenience of extending the TAM model to other constructs. In particular, trust stands out as a key factor in e-commerce-based technologies/applications (McKnight and Chervany, 2001; Urban, Sultan and Qualls, 2000; Wang and Benbasat, 2008), and its integration with Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) –the two main constructs of the TAM model– may prove to be interesting. In this regard, the general integrated Trust-TAM model proposed by Gefen, Karahanna and Straub (2003) presents a solid solution to this question.

Our conceptual model focuses on the adoption and use of particular, not general, website RS (e.g. Amazon, Alibris, eBay, Netflix, etc.). This is why most of the constructs of our model refer to a specific website recommendation system; in these cases, we add the acronym WS-RS. Also, as can be observed in Fig. 1, we adapt the key elements of the TPB to complement the central theories (i.e. TAM and Trust-TAM), thus establishing the primary basis for our explanation of the consumer's intent to use and usage of a WS-RS. This block of the model will be discussed in the next section.

But first, let us focus on the determinants, direct or indirect, of the consumer's attitude towards said WS-RS, one of the key constructs of the model.

Both the general Trust-TAM model (Gefen, Karahanna and Straub, 2003) and the particular Trust-TAM model used to explain the intention to use RS (Wang and Benbasat, 2005) do not consider the user's attitude, perhaps for simplicity's sake. However, we think it is a necessary construct which should be explicitly considered. Therefore, regardless of the direct effects Trust WS-RS and PU WS-RS have on the consumer's willingness to make use of a certain WS-RS, in our conceptual model we also consider a relationship framework for PEOU WS-RS, PU WS-RS, Trust WS-RS and Attitude WS-RS, inspired by the traditional TAM models. We propose:

*P1: The consumer's perceived ease of use of certain website recommendation system will positively influence his/her: (a) perceived usefulness; and (b) attitude toward said RS.*

*P2: The consumer's perceived usefulness of certain website recommendation system will positively contribute to his/her attitude toward said system.*

We add and work with the construct of trust WS-RS. There exist many attempts to conceptualize trust, though most of them treat it as a multidimensional concept (e.g.: McKnight, Choudhury and Kacmar, 2002; McKnight, Cummings and Chervany, 1998). There is a widely accepted psychological approach in marketing, similar in reasoning to traditional approaches, which attempts to structure the dimensions of attitude (Kenning, 2008): cognitive, affective and behavioural. Here, we focus on the cognitive dimension of trust. In particular, in our conceptual model Trust WS-RS represents the user's overall trust in certain website recommendation system. Based on previous studies on trust (e.g.: Gefen 2002; Gefen and Silver, 1999; Jarvenpaa, Knoll and Leidner, 1998), such a construct should be based ideally on a conjoint consideration of the three classic (Giffin, 1967) beliefs, held by the individual, of benevolence, integrity and ability as related to said system; this basis has served as the starting point for specific studies on e-commerce recommendation systems (e.g.: Wang and Benbasat, 2005). Furthermore, the consideration of a fourth dimension of trust, predictability, dealing with what is expected of the object of trust, has been recently demonstrated to adequately raise the individual's level of trust within an e-commerce context (see Gefen and Straub, 2004). The same logic could also be applied to the case of Website Trust (i.e. trust in the e-vendor), although, in the interests of simplicity, we suggest following solutions based on a single dimension construct (e.g. Gefen, 2000), as articulated for this construct.

If we base our argument, as previous Business-to-Consumer (B2C) studies (Jarvenpaa, Tractinsky and Vitale, 2000) have, on the sequence of TRA components, then the user's trust in a particular website recommendation system can be considered as a construct which influences his/her attitude towards said WS-RS. Thus, adapting the conclusions of previous studies which have successfully analyzed the consumer's trust-attitude relationship with online stores, websites and B2C in general (e.g.: Elliott and Speck, 2005; Lim et al., 2006; Teo and Liu, 2007), it is proposed that:

*P3: The consumer's trust beliefs in certain website recommendation system are positively related to his/her attitude towards said system.*

We also consider one construct which is usually omitted by trust-based studies in marketing: general or dispositional trust. A recent work by Kenning (2008) highlights this shortcoming, theorizing on and successfully testing the relationship between general trust and specific trust. The former represents the individual's structural willingness to trust and so relates to a psychological trait of the individual. In other words, it is the consistent tendency, across a broad variety of situations and persons, to

trust (McKnight, Cummings and Chervany, 1998). In contrast, the latter refers to a particular object of trust. In our case, this specific object of trust is a particular website, which could be also interpreted as trust in an e-vendor. In particular, an individual's level of general trust can be expected to exert more influence during the initiation of a relationship with the e-vendor, as the individual does not yet know much about the e-vendor and trusting beliefs in it have not yet been generated (see Gefen, 2000).

*P4: The consumer's general trust is positively related to specific objects of trust, as is the consumer's trust in a particular website/e-vendor.*

However, one could also argue in favour of establishing a direct link between the consumer's general trust and his/her trust in recommendations provided by a particular website (see Wang and Benbasat, 2008); this decision would imply bypassing the consumers' trust in said e-vendor. Nonetheless, in this case it may be more accurate to consider this latter construct as a mediating variable. In particular, the user's trust in a website/e-vendor can be expected to condition the set of particular objects of trust belonging to this particular electronic environment, such as the website's recommendation system. In other words, people tend to give more credibility to the content of messages provided by sources they trust in (Howard and Kerin, 2004). So, if a website is considered a source, the trust consumers place in its recommendations (i.e. recommender system's outputs) should be positively influenced by their reliance on said website. Therefore, it is proposed that:

*P5: The consumer's trust in a website/e-vendor can be expected to have a positive and direct influence on his/her trust in its website's recommendation system.*

Regarding the triangular relationship between the constructs of consumer PEOU WS-RS and PU WS-RS, on the one hand, and Trust WS-RS on the other, we base our argument on the adaptation of the hypothesized relationships successfully analyzed and tested by Gefen, Karahanna and Straub (2003) in their general Trust-TAM model for online shopping. Such relationships were later analyzed by Wang and Benbasat (2005) by means of an experimental study applied to a sample of 120 students in the context of a laboratory recommendation agent that offered advice about digital cameras.

Basically, when a consumer surfs a particular website – if behavioural patterns characterizing the process of personal interaction between people (see Blau, 1964) are extrapolated – he or she, more or less consciously, looks for cues which help to determine how reliable said website might be. In this regard, adapting the reflections offered by Gefen, Karahanna and Straub (2003), an easy to use RS should be positively valued by users and considered to be a sign that the online firm cares about its visitors, facilitating, in turn, the development of the navigational online consumption process they have initiated with the firm. Therefore, in particular we propose that:

*P6: The consumer's perceived ease of use of a website recommendation system will positively contribute to his/her trust in said system.*

Furthermore, when a consumer experiences a state of trust in certain WS-RS, it can be reasonably argued that such trust may generate more positive perceptions with respect to its utility as a support tool for his/her online online consumption process on said website. In this case, a trustworthy website recommendation system leaves the users with a more favourable perception regarding its capability to offer benefits through reliable and suitable recommendations (Wang and Benbasat, 2008). By contrast, when trust is deficient, a user will have difficulties in deriving clear benefits from the use of such website recommendation system (Wang and Benbasat, 2005). Hence, it is proposed that:

*P7: The consumer's trust in a website recommendation system will positively affect his/her perceptions about the usefulness of said system.*

The Trust-TAM model for online shopping considers several antecedents, prior to the three key constructs PEOU, PU and Trust in the online vendor. These antecedents can be grouped into the set of variables which Davis, Bagozzi and Warshaw (1989) label "external variables" and which can exert an effect on PEOU and PU. In this respect, our model is based upon the reasoning of the Trust-TAM model. Adapting this reasoning to our specific framework, we consider the user's familiarity with recommendation systems, given that, in general, this familiarity can be expected to influence his/her perception of the ease of use of certain WS-RS. So, it is proposed that:

*P8: The consumer's familiarity with recommendation systems, in general, will positively contribute to his/her perceived ease of use of a particular website recommendation system.*

Likewise, when consumers are not familiar enough with recommendation systems, they can be expected to present higher levels of perceived risk regarding their use (Wang and Benbasat, 2005), which in turn will negatively influence the inception of trust beliefs on their part toward a particular website recommendation system. Consequently, it is proposed that:

*P9: The consumer's familiarity with recommendation systems, in general, will be negatively related to his/her perceived risk regarding the use of recommendation systems.*

*P10: The consumer's perceived risk regarding the use of recommendation systems, in general, will negatively affect the initiation of his/her trusting beliefs toward a particular website recommendation system.*

### 5.2 Adaptation of the TPB

Most of the studies which have focused on the explanation of information technologies adoption and use are based on the TAM model and most recently, as mentioned earlier, on the Trust-TAM model. However, such approaches miss interesting variables which can be used to more fully explain the user's intention to use, and usage of, such technologies. The TPB (Ajzen, 1985; Ajzen, 1989; Ajzen, 1991), as an extension of the TRA, considers the consumers' subjective norms and perceived behavioural control as key elements with which to explain such intention and use. Recent studies have had good results applying the TPB model in an effort to understand and predict e-commerce adoption (George, 2004; Pavlou and Fygenson, 2006). Therefore, if we consider that recommendation systems are one of the particular tools implicated in the e-commerce framework and are, thereby, a part of it, it would be reasonable to integrate the elements and relational sequence, from attitude to use, into our conceptual model. Consequently, as a prolongation of the Trust-TAM model we have previously adapted to the specific framework analyzed, we propose that:

*P11: The consumer's intention to use certain website recommendation system will be positively influenced, on the one hand, by [Trust-TAM model elements], his/her (a) trust WS-RS and (b) PU WS-RS and, on the other hand, by [TPB elements], his/her (c) subjective norms about the use and (d) perceived behavioural control of said system.*

*P12: The consumer's actual usage of certain website recommendation system will be positively influenced by his/her (a) intention to use it, and (b) perceived behavioural control of said system.*

## 5.3 Adaptation of elements of flow in online environments

The flow concept originated in the field of psychology (Csikszentmihalyi, 1975: 1977). It refers to a mental state that individuals sometimes experience when they are deeply immersed in certain events, objects or activities. Such a concept has been adapted and widely used to describe the Web environment since the middle 90's. In this specific environment, flow state is achieved when the consumer is so deeply involved in the process of navigation that "nothing else seems to matter" (Hoffman and Novak, 1996, p. 57). So, the flow state represents a mental state experienced by an individual during the process of navigation.

In particular, we have borrowed and adapted three key constructs from the seminal paper by Hoffman and Novak (1996) on flow in computer-mediated environments for integration into our conceptual model: flow, the individual's optimum stimulation level (OSL) and his/her level of attention.

First, the OSL construct can be associated with both the cognitive and sensory stimulation that an individual considers to be adequate for him or herself (Baumgartner and Steenkamp, 1996). When individuals feel that they have not achieved their desired level of stimulation, they tend to develop exploratory behaviours, with the aim of fulfilling that mental state by increasing their stimulation (Steenkamp and Baumgartner, 1992). Hence, users of recommendation systems can be expected to perceive less difficulty in using them and can, therefore, be expected to feel less uncomfortable using them, since they need more stimulation when carrying out the online consumption process. Likewise, individuals who present higher OSL will demonstrate increased levels of curiosity, variety-seeking, risk taking and exploratory behaviour (Baumgartner and Steenkamp, 1996; Steenkamp and Baumgartner, 1992). On the other hand, individuals with low OSL can be expected to experience anxiety while navigating (Hoffman and Novak, 1996), especially when they are exposed to the variety of stimuli and information provided by recommender agents. So, individuals with high OSL should experience more benefits in the use of recommendation systems when shopping online. Thus, it is proposed that:

*P13: The consumer's optimum stimulation level will positively contribute to his/her (a) perceived ease of use and (b) perceived usefulness of a website recommendation system.*

According to psychology, an individual experiences focused attention when his/her attention is centred on a limited stimulus field (Csikszentmihalyi, 1977). In the context of computer mediated environments, this idea can be related to an individual's state of attention to online navigational process stimuli (Hoffman and Novak, 1996). Adapting this concept to our model, it refers to the consumer's attention to the recommendations made by the website recommender agent. Next, let us briefly justify its direct antecedents in the conceptual model. First, as mentioned above, higher OSL in individuals mean increased levels of curiosity and a greater need for cognitive and sensory stimuli, etc. Consequently, consumers can be expected to be more willing to accept recommendations, thereby paying more attention to them, given that they experience higher OSL, and for those with low OSL, the opposite is true. Second, it is also reasonable to think that the user's attitude toward a particular website recommendation system –as an overall opinion and affective response to said system– should also partially determine his/her degree of attention to its recommendations. Therefore, it is proposed that:

*P14: The consumer's level of attention to the recommendations of a certain website recommendation system will be positively influenced by his/her (a) need for cognitive and sensory stimuli (OSL) and (b) overall attitude toward said system.*

Let us focus on the direct antecedents and effects of flow in our model. With respect to the antecedents, two of them, the individual's OSL and his/her level of attention – based on the theoretical analyses made by Hoffman and Novak (1996) – are expected to induce a state of flow in individuals while they are navigating. Also, it is plausible to think that consumers with high OSL will present higher levels of implication in the search for consumption experiences which satisfy their desired psychological stimulation level (Martínez-López, Luna and Martínez, 2006).

With respect to the other two antecedents of flow, the consumer's perceived behavioural control – one of the particular elements of the TPB model – and the consumer's perceived challenge relating to a particular website's recommendation system, they are also presumed to positively contribute to the consumer's flow state while he/she is exploring said system. This is an adaptation of the relationships hypothesized and tested, by previous studies, for these variables in the context of human-computer interactions (Ghani and Deshpande, 1994; Ghani, Supnick and Rooney, 1991) and in Web-based environments (Hoffman and Novak, 1996; Novak, Hoffman and Yung, 2000). In essence, the idea is that when a user of a particular website recommendation system feels his/her degree of perceived control of such system is congruent with the challenge implied by its use, flow is most likely to be experienced. Furthermore, flow is more likely to be experienced when both perceived control and challenge are at high states (Ghani and Deshpande, 1994). Therefore, it is proposed that:

*P15: The consumer's state of flow when browsing certain website recommendation system will be positively influenced by his/her (a) need for cognitive and sensory stimuli (OSL), (b) level of attention to the recommendations, (c) perceived behavioural control and (d) perceived challenge relating to said system.*

Finally, flow state has been initially related to the development of exploratory (Ghani and Deshpande, 1994) and experiential behaviours (Hoffman and Novak, 1996; Korzaan, 2003). Novak, Hoffman and Duhachek (2003) recently noted, however, that flow state can generate both exploratory/experiential and goal-directed behaviours, although, of course, experiential behaviours will most likely exert a higher degree of influence. Thus, users who experience flow while carrying out an online consumption process can be expected to interact with the recommender agent. Therefore it is proposed that:

*P16: An eventual experience of flow state by a consumer involved in an online consumption process on a website will contribute to his/her interacting with the recommendation system of said website.*

### 5.4 Psychological outcomes linked to the use of a website recommendation system

In our model we consider five main psychological, subjective outcomes associated with the use of a particular website recommendation system. These are: (1) the consumer's perceived disturbance regarding the recommendations he or she encounters during the online consumption process; (2) the consumer's perceived performance regarding said system; (3) his/her satisfaction with its performance; (4) the consumer's likelihood to buy; and, finally and in particular, (5) the consumer's likelihood to buy items which are part of a cross-selling and/or add-on selling offer made by the recommender agent. We

have established a relationship framework between these five. However, and furthermore, two more variables already introduced, attitude and flow, can be expected to directly influence some of the outcome variables we have set. In particular, we propose that the flow experiences of eventual consumers, due to the positive mental state induced in them (as mentioned earlier), will influence the diversity of variables considered in our model as outcomes. Specifically, flow can be expected to heighten the consumer's feelings and perceptions with respect to performance and satisfaction, diminish his/her perceptions of perceived disturbances caused by the system and, finally, increase the likelihood of purchase while involved in the online consumption process on a particular website. Let us discuss these relationships synthetically.

One of the central outcomes we consider is the consumer's satisfaction with the recommender system. Such satisfaction should be a direct consequence of how well the perceived performance of said system matches his/her expectations. Basically, as suggested by Xiao and Benbasat (2007), this means an adaptation of the classic confirmation-disconfirmation paradigm (Oliver, 1980) to the framework of our research. Thus, a consumer should be satisfied with a particular website recommendation system if it performs as he/she expects. Likewise, we should take into account the role played by the consumer's satisfaction with a particular WS-RS in determining future visits (Schafer, Konstan and Riedl, 2001) and loyalty to said website (adapting conclusions from: Flavian, Guinaliú and Gurrea, 2006). This is why it is very necessary that website managers and recommendation systems designers be aware of the consumers' expectations regarding this question (Komiak and Benbasat, 2004), in order to develop suitable systems. Furthermore, a second direct antecedent of the consumers' satisfaction is suggested, the degree to which he/she perceives the recommendations and interaction with the system to be a disturbance while attempting to complete his/her online consumption objectives. In this regard, any perceived element of interaction, such as a set of recommendations, which is proposed to consumers by a website but makes their navigation process difficult and/or annoys and/or distracts them from their consumption interests, may erode their feeling of satisfaction (Szymanski and Hise, 2000). Thus, it is proposed that:

*P17: The consumer's satisfaction with certain website recommendation system is directly determined by three factors: (a) primarily and positively influenced by the confirmation of his/her expectations relative to its performance; (b) positively influenced by eventual experiences of flow state; and (c) secondarily and negatively influenced by an eventual perceived disturbance caused by the recommender agent during the online consumption process.*

In turn, it is proposed that such perceived disturbances are influenced by the consumer's attitude and perceived performance of the recommender system. Such relationships are logical, given that a user may be more comfortable interacting with a system if he/she has a better opinion about its use and performance.

*P18: The better the consumer's (a) attitude toward certain recommendation system, (b) confirmation of its performance expectations and (c) experienced flow state, the lower his/her perceived disturbance regarding the outputs provided by said system.*

Finally, we establish a relationship between the system's use and the likelihood that a consumer will make a purchase during the online consumption process on a particular website. Next, we briefly discuss some plausible determinants of buying on a particular website, taking into consideration the consumer's interactions with the website's recommendation system. We examine, in particular, the likelihood that a consumer will buy, on a given website, the product/service for which he or she was originally searching, as well as pay attention to offers which are the result of the system's cross-

selling and up-selling strategies. Pavloy and Fygenson (2006) recently proposed an original model, based on the TPB, to explain the adoption of e-commerce by consumers. Basically, the authors aim to predict two main online behaviours: the pursuit of information and the purchase of products from e-vendors. To this end, two parallel sub-models, one to explain information acquisition and the other to explain purchasing, are integrated into a full model. If we extrapolate their results and relate them to our research problem by establishing a reasonable parallel between information acquisition and the use of a website's recommendation system, we can predict that the use of said system should increase the likelihood that the consumer will conclude the online consumption process by purchasing the product/service he/she had initially searched for. Likewise, the likelihood of such a purchase should increase in proportion to the level of the consumer's satisfaction (e.g.: Anderson, Fornell and Lehmann, 1994; Oliver, 1980; Taylor and Baker, 1994) with the recommender agent and his/her experienced flow state during the online consumption process (Koufaris, 2002; Novak, Hoffman and Yung, 2000; Smith and Sivakumar, 2004). Therefore, it is proposed that:

*P19: A consumer is more likely to make an online purchase through a particular website if he/she (a) uses a particular website recommendation system, (b) is satisfied with the performance of said system and (c) experiences high levels of flow state during the online consumption process.*

Furthermore, recommender agents should not only increase the likelihood of the final product/service purchase when this is the primary object of search and justifies the initiation of an information search on a particular website: they are also conceived in order to foster the purchase of other products/services recommended by said system and related to the primary object of search (e.g.: Liu and Shih, 2005a, 2005b; Min and Han, 2005; Schafer, Konstan and Riedl, 2001; Senecal and Nantel, 2004). This idea suggests the significant role that recommendation systems are called upon to play in the implementation of add-on selling strategies to customers (Ahn, 2007; Bodapati, 2008); these are usually articulated by cross-selling and up-selling promotion strategies (Changchien, Lee and Hsu, 2004). Once a consumer decides to purchase the product for which he/she originally searched, the likelihood that other offers will be recommended by the system increases, influenced as well by the same factors that contributed to the primary purchase. So, it is proposed that

*P20: A consumer is more likely to respond favourably to cross-selling and up-selling offers made by a particular website recommendation system if he/she (a) uses that particular website recommendation system, (b) is satisfied with the performance of said system (c) experiences high levels of flow state during the online consumption process and (d) has decided to purchase the primary product/service for which he/she searched on the website.*

## 6 Final remarks

This research paper examines the role of aspects of psychological ordering in the behaviour of online consumers, with respect to their use of WS-RS. To this end, not only do we consider the influence of psychological factors on adoption and use decisions, we also consider the consequences, psychological and buying-related, derived from the use of these systems by consumers.

The integrated conceptual model proposed to explain decisions regarding the use and consumption of WS-RS are based on consumer behaviour theories, the validity of which has been extensively contrasted. On one hand, the now classic Theory of Planned

Behaviour (Ajzen, 1985; Ajzen, 1989; Ajzen, 1991) and the Technology Acceptance Model (TAM) (Davis, 1989), are especially adequate to explain the diffusion of technological innovations. On the other hand, our model benefits from theoretical perspectives which are more specific and recent, related to online consumer behaviour: the integrated Trust-TAM model for online shopping (Gefen, Karahanna and Straub, 2003; Wang and Benbasat, 2005) and the Theories of Flow in computer-mediated environments (Hoffman and Novak, 1996; Novak, Hoffman and Yung, 2000).

From this conceptual model we have formulated up to 20 distinct theoretical propositions which reveal the influence of psychological constructs – amongst which figure confidence, familiarity, extrinsic motivations (perceived usefulness), intrinsic motivations (perceived ease of use), subjective norms, perceived behaviour of control, OSL and states of flow – on the formation of attitudes towards WS-RS, and in the intention and use of the same. Likewise, we consider the impact previous psychological constructs and the use itself of WS-RS have on the perceptions formed by consumers towards WS-RS (performance, distortion of the navigation process, satisfaction with respect to WS-RS) and on purchasing decisions on the website.

The proposed model helps to fill the gap in existing research on WS-RS. Concretely, most research papers to date use technical approaches to tackle these systems, or, at the very least, propose models of adoption which do not pay enough attention to the role of perceptions and other psychological aspects belonging to the sphere of the consumer. Specifically, knowledge of the psychological factors relating to the consumer's use of WS-RS is especially relevant for online businesses. This is due to their influence on the image and reputation of the brand and of the online store, as well as, in this last case, on the decisions to purchase on the website.

Furthermore, the study of WS-RS is linked to academic debate, based on the literature on the economy of information (see Stigler, 1961); i.e. the contribution by e-commerce systems to greater information transparency in the markets, a reduction in search costs for consumers, and greater empowerment for consumers with respect to their relationship with businesses (e.g.: Alba et al., 1997; Bakos, 1997; Brynjolfsson and Smith, 2000). The information provided by WS-RS regarding existing offers and, more concretely, the ease they offer the consumer in defining a set of purchasing alternatives and in evaluating said alternatives, notably reduce the costs that lead him/her to identify and evaluate the purchasing alternatives. This would allow for a narrowing of that information gap which traditionally has existed, in which the business making the offer is in possession of much more information than the consumer.

Likewise, the fact that WS-RS provide personalized consumer experiences is worthy of consideration from the point of view of the possibilities they offer for online relationship marketing and CRM. And while the importance of mass personalization mechanisms to consumer loyalty has been confirmed, further analysis remains to be done, concepts and technology to make it possible must be developed (e.g.: Boulding et al., 2005), and a greater knowledge of those mechanisms must be attained.

### 7 Managerial implications

The proposals and theoretical discussions of this investigation allow us to offer some reflections on the design and management of WS-RS and to suggest handling practices for the online businesses. These suggestions are especially relevant for e-retailers, since the direction and efficient management of WS-RS which truly offer benefits to the users will end up favouring sales on the website. As we mentioned earlier, these refer not only to the sale of the products and services for which the consumer was initially searching,

but to others as well, suggested by the system as a result of cross-selling and up-selling programmes.

*a)* *Use WS-RS in order to strengthen the relationship with the consumer and offer him/her value*

The WS-RS should truly respond to the individual preferences and behaviours of the consumers visiting the website, offering each one a personalized experience and allowing him or her to get to know the products and services that fit their profile. If the recommendations are accurate and adequate for each consumer, he/she will receive greater value and will benefit, at the same time, from a reduction in costs related to the search for products and services. All this allows the consumer to reduce the effort made in the purchase decision processes, will promote their propensity to acquire products and services from e-retailer and, last, will solidify the basis for the establishment of a trusting, continuous and fruitful relationship with the e-retailer.

*b) Make use of WS-RS as a market research instrument*

WS-RS constitute a powerful market research instrument for the online business. Not only do they systematically gather and analyze information related to the tastes and preferences of potential customers and to their navigation and purchasing behaviours, but they also make it possible for the users themselves to provide information which enriches, fine-tunes or improves their profile as a customer. In this way, WS-RS present a true opportunity for the market-oriented firms, which will be able to make use of the information generated by WS-RS to continuously adapt their value offer (e.g.: the assortment composition, presentation e-merchandising, etc.) to the needs and preferences of their potential customers. With respect to the consumers, an effective response to their needs, preferences and demands will favour the e-retailer's sales.

*c) Configure WS-RS with applications and complete and reliable information*

Since today's users are still not very familiar with WS-RS – and, consequently, their level of trust in them is low – it is especially relevant that online businesses make sure that WS-RS are useful, reliable and trustworthy. To that end, these application environments (e.g.: for the generation of recommendations, the introduction of personal data and preferences whereby the users can complete their profile, requests for assistance or advice from customer attention services, etc.) should be equipped to complete their mission in a quick and efficient manner, with no errors and in accord with what the users actually need or expect. Analogous to this, the information offered to users, independently of the format or mode in which it is presented, must be complete, useful and objective. Furthermore, it will be necessary to show the online business to be an organization which is receptive to the requests made by customers and completely focused on adequately satisfying their needs. Likewise, the online business should develop and make public knowledge their policies relating to the handling and protection of personal data and which assure the correct use of all information gathered relating to the user.

*d) Design a WS-RS which is easy to manage and to use for the consumer*

A special effort is required to make sure that WS-RS, in addition to being useful, are also easy to use, in the same way that other habitual elements on the websites of e-

retailers (e.g.: shopping carts, wish lists, etc.) are easy to use for many consumers. For this reason, it is important to incorporate easily understandable information about RS; e.g.: how they work, the products and services recommended to the consumer, the way in which those recommendations are prepared, the mechanisms available to the user to complete their profile, etc. Likewise, the design of the navigation interfaces should be attractive and simple and should include instruments to assist in navigation (e.g.: sensitive maps, FAQs, etc.), especially if consumer intervention is necessary to the improvement of the recommendations.

*e) Equip the WS-RS with elements which stimulate and captivate the user*

Designing a WS-RS which is efficient, reliable, and usable, which increases its value as useful to the consumer experience – making the purchase decision process faster, more comfortable and more efficient –, cannot be considered to be sufficient. In this way, even in online consumer experiences oriented to instrumental objectives –such as the identification and evaluation of purchase alternatives –, what is relevant is the contribution of aspects intrinsically fun or entertaining for the consumer (Childers et al., 2001; Koufaris, 2002).

WS-RS should incorporate cognitive and sensory elements which challenge and captivate the consumer and which suppose challenges in line with his/her ability to exercise control over the system. These elements should re-stimulate flow states, making it possible for the consumer to explore by way of the WS-RS. However, it is necessary to adequately manage those aspects which inhibit the flow by interrupting the concentration or involvement of the user (e.g.: unwanted advertisements, on-line waiting, navigation errors due to links which have not been updated, etc.). On the other hand, excessively simple WS-RS designs – ones which do not change, which do not attract attention, which restrict the user's freedom to navigate, etc. – do not appear to be recommendable, because it then becomes difficult to inspire optimum navigation sensations in the user.

*f) Integrate WS-RS into the marketing communication programme and facilitate its promotion by the brand's virtual community*

Although the diffusion and promotion of WS-RS will have to be realized within the framework of an integrated marketing communication, as it is one of the services which can benefit the customers of the online business, the business will have to consider some aspects peculiar to WS-RS communications. In particular, it may be recommendable to invest in testimonial advertising; also, and most interesting, in facilitating the development of discourses on WS-RS in the virtual environment of the consumer community linked to the brand; as well as in rolling out mechanisms which facilitate the identification and involvement of the consumer in this virtual community. In this way, the user will be able to access the testimony given by people whose opinions are important to them (e.g.: opinion leaders, consumer's peer group), who provide positive and reliable opinions on the subjective norms related to WS-RS and evidence which supports its use.

## 8 Further research

The research carried out here has highlighted the need for study of WS-RS from a perspective which is more in line with marketing and consumer behaviour. That is because the business opportunities derived from WS-RS originate not so much in the technical or functional characteristics of the RS, which at any rate are always present implicitly, but rather in the benefits which these systems can offer to consumers. Consequently, it is necessary to conduct more studies which start out from this

perspective and which allow us to learn more about the potentials offered by WS-RS to online businesses and which contribute to explaining, among other aspects, the impact of WS-RS on purchasing decisions on websites.

Concretely, a readily-identifiable line of interest for future study is an empirical analysis of models such as those presented here, which would contemplate determined psychological factors of the consumer relating to the use or consumption of WS-RS as well as the influence of WS-RS on the purchase intention. Likewise, it would be worthwhile to consider other possible outcomes of the use of WS-RS which may be relevant for online businesses. Amongst those figure the intention to repeat the visit and consumer loyalty to the website.

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**Figure 1.** Conceptual model



*Adaptation of the TAM and Trust-TAM model for online shopping*

General Trust

Trust Website

Familiarity / RS

PEOU / RS-WS

Perceived Risk/ RS

Trust RS-WS

PU / RS-WS

Attitude RS-WS

*Partial adaptation of the Planned Behaviour Theory*

Subj. Norm RS-WS

Intention to use RS-WS

RS-WS use

Perceived behav. Control/ RS-WS

Performance

Perceived disturb Navigat. process

Satisfaction

Likelihood to buy

Likelihood to cross/add on-selling

**Psychological outcomes linked to the use of a RS-WS**

Attention to Recommendation

OSL

Flow

Challenge

*Adaptation of elements from the theories of Flow in online environments*