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Shopping Online – Determining Consumer Acceptance of Online Shops

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Shopping Online – Determining Consumer Acceptance of Online Shops

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ABSTRACT

After more than ten years of widespread use of e-commerce, there are still only a few models to specify the connection between consumer acceptance and the characteristics of an online shop. In particular, the available literature does not provide any constructs to evaluate the most basic functionality of an online shop: its search features. In this paper we describe a shopping experiment to validate a model that includes consumer characteristics as well as consumers' evaluations of a shop's search features. Results demonstrate that (i) contrary to consumer research findings, only consumer involvement influences the consumers' evaluation of the online shop, not the prior product knowledge; (ii) the relevance of search results and the evaluation of filtering mechanisms have a major impact on the perceived usefulness of the shop; and (iii) the ease of use of the shop does not affect perceived usefulness, as this relationship is fully mediated by the perceived costs of the information search process.

Keywords

Online shops, search features, consumer research, Technology Acceptance Model, IS Success Model

INTRODUCTION

Online shopping has many advantages for the consumer, e.g. cost and time savings. With more than ten years of experience in e-commerce, however, online shops are still not able to serve all consumer needs, especially with regard to the provision of product information. Disadvantages originate, among other factors, from the replacement of the sales assistant who could give recommendations by an information system (IS). Further disadvantages originate from the consumer's interaction with the online shop leading to problems in query formulation or irrelevant search results.

There are many studies and models about the success of IS, such as the IS Success Model (Delone and McLean, 2003; 2004). Furthermore, there exist many studies concerning technology acceptance. The most prominent example is the Technology Acceptance Model (TAM) (Davis, Bagozzi and Warshaw, 1989), which measures the acceptance of software in the context of organizational performance, and was also transferred and adapted to many other fields. Last but not least, there are studies evaluating the effect of interactive recommendation agents in online shops on consumer satisfaction (Häubl and Trifts, 2000; Su, Comer and Lee, 2008).

However, there is no comprehensive model that integrates findings from consumer research and evaluates the determinants of consumer information search with particular regard to their search features. Therefore, we constructed and tested a model by means of an experiment to answer the following research questions: (i) How can the TAM be extended to an e-commerce context in order to adequately evaluate an online shop? (ii) Which system-based characteristics determine a consumers' quality perception of an online shop? More specifically: How can the consumer's satisfaction with the search functionality be measured? And (iii) which consumer characteristics (antecedents) determine the evaluation of an online shop?

RELATED LITERATURE AND THE RESEARCH MODEL

In order to adequately measure the customers' perception of an online shop, different aspects of models proposed in literature come into play. However, no model proposes a holistic approach. Therefore, we include constructs from different models, as depicted in Table 1 that are able to answer our research questions. First, what are the consumers' characteristics that influence

the consumers' perception of an online shop? These characteristics will be measured by means of antecedents from consumer research. Second, how does the consumer evaluate the system and information quality? These aspects are measured by constructs from the IS Success Model (DeLone and McLean, 2003; 2004). Third, how much effort does the customer expend to search for interesting products? These aspects are measured by constructs from the model of Su et al. (2008). And last, how useful is the system to the consumer? Especially, how easy is the interaction with the system, and will the consumer reuse the system? These aspects are measured by the TAM.

Model/Antecedents	Constructs
Antecedents	Product Knowledge (Alba and Hutchinson, 1987), Consumer Involvement (Laurent and Kapferer, 1985)
IS Success Model (DeLone and McLean, 2003; 2004)	System Quality, Information Quality , Use, User Satisfaction, Individual Impact, Organizational Impact
Model of Su et al. (2008)	Perceived Cost of the Information Search Process , Perceived Cost of the Decision-Making Process, Perceived Benefit of the Information Search Process, Perceived Benefit of the Decision-Making Process, Perceived Satisfaction with the Outcome
TAM (Davis et al., 1989)	Perceived Usefulness, Perceived Ease of Use, Intention to Use

Table 1. Overview of considered Models/Antecedents for our Proposed Model. (Constructs in bold are partially adapted and included in the proposed model)

Antecedents Describing Consumer Characteristics

A consumers' evaluation of online shops does not only depend on the shop itself, but also on the consumers' characteristics. In consumer research, consumer expertise or *Product Knowledge* (PK) (Alba and Hutchinson, 1987) is a main determinant of consumer information search and influences the amount of search and the satisfaction with the outcome (Brucks, 1985). PK can be defined as the existing knowledge regarding a specific product category and can be measured by different constructs (Su et al., 2008): (i) *Elaboration*, which measures the knowledge about the product in general; (ii) *Analysis*, measuring how well new knowledge is adapted; (iii) *Memory*, which measures the knowledge about product-specific issues and brand name issues; and (iv) *Cognitive Effort*, which evaluates the awareness and loyalty about product brands (Alba and Hutchinson, 1987).

PK is considerably influencing the product information search. The more knowledge a consumer already has about the product, the less time she/he has to spend for information search, analysis, comparison of products, and finally for decision-making (Beatty and Smith, 1987).

H1a: Product knowledge negatively influences perceived cost of the information search process.

H1b: Product knowledge positively influences perceived ease of use of the online shop.

Our second antecedent, *Consumer Involvement* (CI), measures the amount of consumers' involvement regarding a specific product, and can be measured by the following constructs from Laurent and Kapferer (1985): (i) *Hedonic/Pleasure*, which quantifies the sensed pleasure while buying the product; (ii) *Symbolic*, which reflects the symbolic meaning of a product both to the consumer and to the public; and (iii) *Risk Importance*, which measures the perceived risk to buy a 'wrong' product.

According to Laurent and Kapferer (1985), the involvement of a consumer has a strong influence on her or his information search and decision-making process. A highly involved consumer uses a more complex decision-making strategy by comparing more product-specific characteristics, and therefore invests more time hoping that she/he makes the 'right' decision. Furthermore, a highly involved consumer pays less attention to system functionalities and more to products; therefore she/he might find it easier to interact with the online shop.

H2a: Consumer involvement positively influences perceived cost of the information search process.

H2b: Consumer involvement positively influences perceived ease of use of the online shop.

A System-based Evaluation of an Online Shop

The efficiency of the different search features determines how easily information is found in online shops, which influences the consumer acceptance of those shops. This aspect is measured by our self-developed constructs *Relevance of Search Results* (RSR) and *Evaluation of Filter Mechanisms* (EFM). These constructs are based on the constructs of the IS Success Model *Information Quality* and *System Quality* (DeLone and McLean 2003; 2004), where *System Quality* measures the

technical and *Information Quality* the semantic achievement. RSR measures the relevance of search results provided by the online shop, whereas EFM measures how efficiently the filtering mechanisms (product categories and filter, for a more detailed description cf. section ‘Experiment’) support the consumers during search.

According to Delone and Mclean (2003; 2004), we assume that search results with a higher relevance and a better choice of categories and filters reduce the costs of the information search (PC), increase the perceived usefulness (PU) and the usability of the shop (PEOU):

H3a: Relevance of search results negatively influences perceived cost of the information search process.

H3b: Relevance of search results positively influences perceived ease of use of the online shop.

H3c: Relevance of search results positively influences perceived usefulness of the online shop.

H4a: Evaluation of filter mechanisms negatively influences perceived cost of the information search process.

H4b: Evaluation of filter mechanisms positively influences perceived ease of use of the online shop.

H4c: Evaluation of filter mechanisms positively influences perceived usefulness of the online shop.

Search Effort

Su et al. (2008) suggest a model to measure consumer satisfaction concerning the use of recommendation agents. We adapt parts of their model, as it complements TAM with a process-oriented view. In their model, shopping process can be divided into an information search process and a decision-making process. The information search process is described by the constructs *Perceived Costs* (PC) and *Benefits of the Information Search Process* (PC), whereas the decision-making process is reflected in the constructs *Perceived Costs* (PCDM) and *Benefits of the Decision-Making Process* (PBDM). The target construct of the model is the *Satisfaction with the Outcome* (SAT).

However, as our aim is to present a generic model for online consumer information search, we exclude all constructs evaluating purchase (PCDM, PBDM and SAT). Furthermore, the constructs PBDM and the *Perceived Usefulness* (PU) are merged into the construct *Perceived Costs of the Information Search Process* (PC). It measures how time-consuming and stressful the information search process is perceived. According to Su et al. (2008), higher costs will result in lower satisfaction. The same applies for the relationship between PC and PU: the more time and effort it takes to complete the information search, the fewer times the shop will be judged as being useful.

H5: Perceived cost of the information search process negatively influences perceived usefulness of the online shop.

Technology Acceptance

There are studies transferring the TAM to an e-commerce context (e.g. Chen and Tan, 2004). However, there are no studies evaluating the search functionalities of online shops. We include three constructs from TAM (Davis et al., 1989): the *Perceived Ease of Use* (PEOU) measures the usability of an online shop; the *Perceived Usefulness of the Online Shop* (PU) is defined as the potential consumer’s subjective belief that the usage of the online shop will increase her or his performance; and the behavioral *Intention to Use the Online Shop* (IU) in the future. According to Davis et al. (1989), we hypothesize that PEOU positively influences PU (H6a) and that PU positively influences IU (H7). Furthermore, we assume that PEOU negatively influences perceived cost of information search (H6b), i.e. the easier it is to use the online shop, the lower are consumer costs for information search. Finally, we hypothesize a negative influence of PEOU to PC, i.e. the easier it is to use an online shop, the less search effort she/he has to expend (H6b).

H6a: Perceived ease of use of the online shop positively influences perceived usefulness of the online shop.

H6b: Perceived ease of use of the online shop negatively influences perceived cost of the information search process.

H7: Perceived usefulness of the online shop positively influences intention to use the online shop.

Figure 1 gives an overview of the hypothesized relationships in the proposed model. Table 2 depicts the constructs included in the proposed model, their origins, and examples of items.

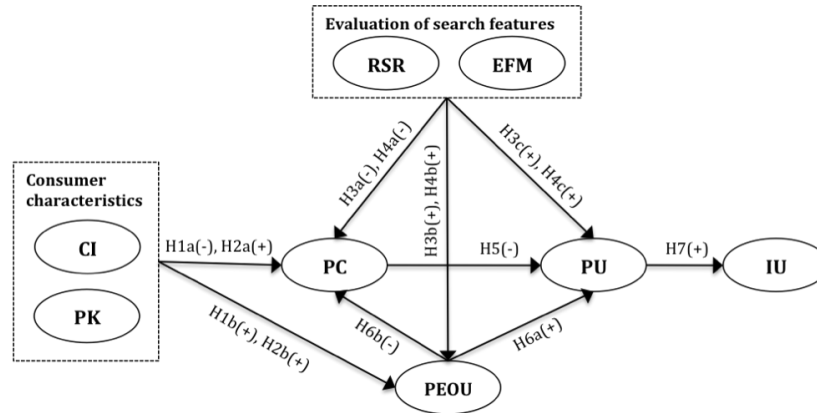


Figure 1. Conceptual Model

Construct	Examples of Items	Original Construct(s)
Consumer Involvement (CIH, CIS)	It gives me pleasure to purchase a digital camera; I attach a great importance to digital cameras.	Consumer Involvement (<i>ImpoRisk, Probability of a Mispurchase, Hedonic/Pleasure, Symbolic</i>) (Laurent and Kapferer, 1985)
Product Knowledge (PK)	I am very knowledgeable of digital camera; Friends consider me an expert when it comes to digital cameras.	Product Knowledge (<i>Cognitive Effort, Analysis Item, Elaboration Item, Memory</i>) (Alba and Hutchinson, 1987)
Evaluation of Filter Mechanisms (EFM)	The categories were useful to pre-select interesting digital cameras.	Adapted from <i>System Quality</i> (DeLone and McLean, 2003; 2004)
Relevance of Search Results (RSR)	The search functions of the online shop provided products relevant for me.	Adapted from <i>Information Quality</i> (DeLone and McLean, 2003; 2004)
Perceived Costs of the Information Search Process (PC)	Searching for information about the product required a lot of effort; Searching for information about the product was a stressful experience.	<i>Perceived Costs of the Information Search Process</i> (Su et al., 2008)
Perceived Ease of Use (PEOU)	Learning to use the online shop for searching for information will be easy for me.	<i>Perceived Ease of Use</i> (Davis et al., 1989)
Perceived Usefulness of the Online Shop (PU)	Using the online shop to acquire a product would permit me to purchase more efficiently.	<i>Perceived Usefulness of the System</i> (Davis et al., 1989)
Intention to Use the Online Shop (IU)	I intend to use the shop in the next couple of months.	<i>Behavioral Intention to Use</i> (Davis et al., 1989)

Table 2. Origins of the Constructs of the Proposed Model and Examples for Items

SURVEY DEVELOPMENT

All constructs of our model are based on constructs from literature (cf. Table 1 and 2). Antecedents were not changed. However, the remaining constructs were adapted to our context and partially extended by additional items. Therefore, we tested the reliability of the adapted constructs by means of *Category Shuffling* (Nahm, Solís-Galván, Rao and Ragun-Nathau, 2002).

	RSR	EFM	PC	PU	PEOU	IU	none
RSR	13						1
EFM	1	14					
PC			13	1			
PU	1	1		9		2	1
PEOU	1				10		1
IU						14	1

Table 3. Results from Category Shuffling

We asked four experts to assign items to the constructs (Table 3) which led to an Overall Hit Ratio (OHR) – the ratio of the number of correctly placed items and the total number of items (Landis and Koch, 1977) – of 78%. In addition, we computed

the free marginal Kappa value (K_{free}) (Randolph, 2005), which is recommended for category shuffling with more than two subjects (Brennan and Prediger, 1981). The Category Shuffling led to a K_{free} value of 76%, which is above the crucial threshold of 65%, a value defined by Todd and Benbasat (1991).

EXPERIMENT

In order to validate our model, we conducted a lab experiment. Participants were invited via the university's mailing list. The experiment consisted of three parts: Initially, the participants were asked to fill out a first questionnaire (antecedents). Then, we asked them to buy a digital camera for themselves in our online shop, which was specially designed and programmed for this purpose. It contained a very simple GUI, as we wanted to exclude layout aspects from our study. Digital cameras were chosen as purchase objects as they possess quantifiable product characteristics, and their widespread use makes it possible to ask all participants about their previous product knowledge. The shop contained approximately 200 digital camera models. The shop has two search functionalities: a *direct search*, i.e. a search slot for a query term, and *product categories* (compact camera, bridge camera, single-lens camera) to pre-select cameras according to their general design. Furthermore, it was possible to filter retrieved search results according to price and color. After the simulation, the participants were asked to evaluate the online shop by filling out a second questionnaire (PC, PEOU, PU, IU, RSR and EFM). As an incentive for participation, the participants received a 20€ voucher for an online retailer.

DATA ANALYSIS

To analyze the hypothesized model, we used Partial Least Squares (PLS) modeling, a variance-based approach to Structural Equation Modeling (SEM), and adopted SmartPLS 2 (Ringle, Wende and Will, 2005). We used PLS-SEM because it is especially robust concerning small sample sizes (Henseler, Ringle and Sinkovics, 2009). Furthermore, PLS-SEM has less stringent requirements concerning the distributional assumptions (Henseler et al., 2005) Therefore, models containing TAM constructs are usually analyzed with PLS (see e.g. Venkatesh, 2000; Venkatesh, Morris, Davis and Davis, 2003) as they tend to be skewed.

PLS-SEM assessment typically follows a two-step procedure consisting of the evaluation of the measurement model and the structural model (Hair, Ringle and Sarstedt, 2011). The measurement model determines the relationship between latent variables (constructs) and manifest variables (indicators), whereas the structural model determines the relationships between the constructs, i.e. our hypotheses. Since our model contains only reflective constructs, only reflective measurement evaluations are applied.

Demographics

The sample contained 164 participants, 57% females and 42% males. Ninety-three percent of the participants were between 18 and 34 years old as we sent the invitation to participate in the experiment via the university's mailing list, i.e. most of our participants are students or graduates. Only 6% were older than 34 years. Seventy-seven percent of the participants were from Germany. Furthermore, 83% hold a high school diploma and 31% a college or university degree.

Measurement Model

The measurement model is evaluated by determining the reliability and the validity (see Table 4):

Construct Indicators (measured on a 7-point Likert scale)	AVE	Composite Reliability	R ²
Consumer Involvement (Hedonic) (CIH)	0.63	0.87	0.00
Consumer Involvement (Symbolic) (CIS)	0.78	0.91	0.00
Relevance of Search Results (RSR)	0.70	0.92	0.00
Evaluation of Filter Mechanisms (EFM)	0.72	0.89	0.00
Perceived Usefulness of an Online Shop (PU)	0.77	0.91	0.21
Perceived Ease of Use of an Online Shop (PEOU)	0.73	0.89	0.22
Intention to Use an Online Shop (IU)	0.58	0.84	0.47
Perceived Cost of the Information Search Process (PC)	0.81	0.93	0.21

Table 4. Psychometric Properties of the Measurement Model. (We do not present antecedents that do not have significant path coefficients to PC or PEOU, as they are not relevant for our model)

- (i) Indicator reliability can be readily assumed for all indicator loadings above 0.7 (Chin, 1998), which is fulfilled in our model.
- (ii) The values for construct validity in our model, determined by the composite reliability, are all above 0.8, which is even satisfactory for more advanced stages of research (Nunnally and Bernstein, 1994).

- (iii) The convergent validity can be assessed by means of the Average Variance Extracted (AVE). The model fulfills the criterion of $AVE > 0.5$ (Chin, 1998). The discriminant validity is assessed by means of the Fornell-Larcker criterion. It postulates that a latent construct shares more variance with its assigned indicators than with another latent variable in the structural model (Fornell and Larcker, 1981). This criterion is satisfied in our model.

Structural Model

Important criteria to evaluate the structural model are R^2 , the level of the path coefficients and their significance (Hair et al., 2011). The value of R^2 of the target construct should be high, since the goal of the prediction-oriented PLS-SEM approach is to explain the variance of the endogenous latent variables (Hair et al., 2011). However, the concrete ranges for R^2 are dependent on the stage of research and on the discipline. Our target construct IU yields a value for R^2 of 47%, which is satisfactory, as we are aiming to predict behavioral intention.

The path coefficient between PU and IU is the highest in the model. This is not surprising, as this relationship has already been validated in other TAM-based models. To test the significance of the path coefficients, we used the bootstrapping procedure with 1500 samples, 164 cases, individual sign changes, and a case-wise replacement for missing values. The t-values from the bootstrapping procedures are presented in the figure above in parentheses. The relationship between PEOU and PU, and the relationship between CIS and PC turned out not to be significant. All relationships from the other antecedents (CI, and all antecedents from PK) to PC and PEOU showed no significance. Therefore, we only included those antecedents in Figure 2 that have at least one significant relationship to either PC or PEOU.

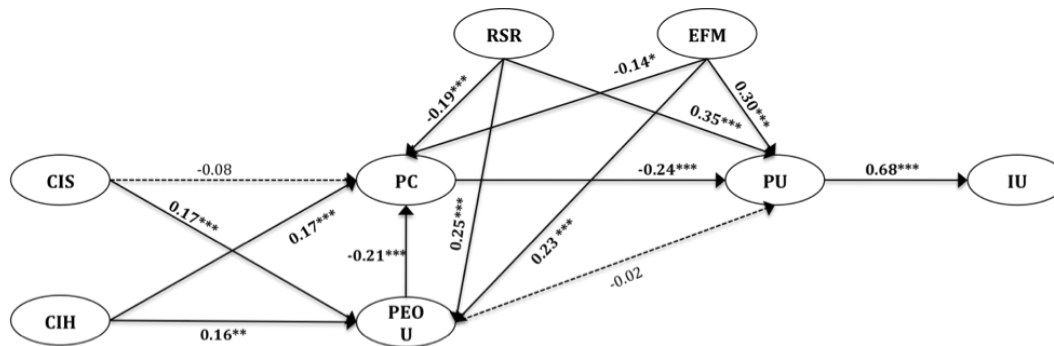


Figure 2. Structural Model (**p < 0.01; **p < 0.05; *p < 0.1)

Results

Concerning our first research question regarding the extension of TAM, our results show that the *Perceived Costs of the Information Search Process* negatively influences the *Perceived Usefulness of the Online Shop*. Furthermore, based on the results of the experiment, we assume that the relationship between the *Perceived Ease of Use of the Online Shop* and the *Perceived Usefulness of the Online Shop* is fully mediated by the *Perceived Costs of the Information Search Process*. In our model, the path coefficient between the *Perceived Ease of Use* and the *Perceived Usefulness* is not significant. A relationship between such constructs has previously been validated many times in TAM-based models. However, this does not necessarily constitute a contradiction: we assume that in our model this relationship is fully mediated by the *Perceived Costs*.

Antecedent (CI)	H2a(+): CI→PC	H2b(+): CI→PEOU
Imporisk	not supported	not supported
Probability of Mispurchase	not supported	not supported
Hedonic/Pleasure	supported	supported
Symbolic	not supported	supported

Table 5. Synopsis of Hypotheses concerning the Antecedent Consumer Involvement (CI)

Concerning the second research question, i.e. which system-based factors determine the consumers’ quality perception, our data reveals that all hypotheses, except H6a, are supported (Figure 2). That means that a consumer’s evaluation of an online shop (*Perceived Costs, Perceived Ease of Use, Perceived Usefulness*) depends on the consumer characteristic involvement (*Hedonic/Pleasure and Symbolic*), as described above. It also depends on the consumer’s evaluation of the search features. The behavioral intention to use the online shop is mediated by its perceived usefulness. Interestingly, our data shows that *Perceived Ease of Use* does not influence *Perceived Usefulness* (H6a), but only the *Perceived Costs*. The constructs *Perceived Ease of Use* and *Perceived Usefulness* and their relationship originate from the TAM (Davis et al., 1989) and have

been validated in many other models. Therefore, we assume that the relationship between *Perceived Ease of Use* and *Perceived Usefulness* is fully mediated by *Perceived Costs*.

Concerning the last research question, which investigates consumer characteristics that determine shop evaluation, results were unexpected. The experiment showed that consumer involvement has a significant influence on consumer evaluation of an online shop (*Perceived Costs* and *Perceived Ease of Use*), whereas none of the antecedents measuring the product knowledge showed significant path coefficients, neither for the relationships to *Perceived Costs* nor to *Perceived Ease of Use*. Thus, the consumer's product knowledge about digital cameras has no influence on how the consumer evaluates the shop with regard to the cost of searching for relevant products, nor with regard to the ease of use. However, our experiment revealed that some antecedents related to consumer involvement influence the *Perceived Costs* and the *Perceived Ease of Use* (Table 5). *Hedonic/Pleasure* negatively influences the costs for searching information, i.e. the more pleasure a consumer experiences when buying a camera, the less she/he feels the effort of searching for a product. The same reasoning could be applied for the relationship between *Hedonic/Pleasure* and *Perceived Ease of Use*, i.e. the more pleasure a consumer experiences when buying a camera, the easier it is for her or him to use the online shop. The other antecedent that has a significant path coefficient, *Symbolic*, only influences the *Perceived Ease of Use*, but not the *Perceived Costs*. This means that a consumer who is strongly identified with the digital camera purchased, finds system use easier. However, the degree of identification does not influence the consumer perception of the costs for searching for products.

DISCUSSION AND CONCLUSION

Contribution of this Study

In our study we investigated the consumer acceptance of online shops, thereby considering consumer characteristics (antecedents) and an evaluation of system characteristics. We investigated: (i) How can the TAM be extended to an e-commerce context in order to adequately evaluate an online shop? (ii) Which system-based characteristics determine a consumers' quality perception of an online shop? More specifically: How can consumer satisfaction with the search functionality be measured? (iii) Which consumer characteristics (antecedents) determine the evaluation of an online shop?

Based on the results of our experiment, (i) we validated an extended TAM. This was done by including the perceived costs of the information search process in the TAM. This allows including a temporal dimension, as this construct describes a process of information search. Furthermore, the relationship between the perceived ease of use and the perceived usefulness is fully mediated by the perceived costs of the information search process. (ii) The relevance of the search results and the evaluation of the filter mechanisms are those system-based characteristics that influence the consumers' evaluation of the online shop. Both constructs positively influence the perceived ease of use of the shop and its perceived usefulness. Further, they both negatively influence the perceived costs of the information search. Concerning the last research question (iii) the acceptance of online shops is influenced by two antecedents – *Hedonic/Pleasure* and *Symbolic*. However, they both describe consumer involvement. We could not find any influence of product knowledge on the evaluation of the online shop. That is an important update for consumer research, because consumer-searching behavior has changed in e-commerce environments if system characteristics are included into analysis instead of consumer satisfaction.

To sum up, we provide a model to evaluate the acceptance of online shops, which includes system-based characteristics and consumer-based antecedents. Furthermore, our model can be applied even if a consumer did not purchase anything, because we excluded constructs that measure the consumers' satisfaction with the decision-making process.

Limitations and Future Research

The results of this study are subject to several limitations. First, most online consumers use more than one website, e.g. other online shops or price comparison websites to gather information about a desired product (Brecht and Schäfer, 2010). However, to ensure that the participants were not influenced by other websites, the toolbars in the browser windows were removed. Second, our experimental online shop offers only limited functionalities, as we wanted the subjects to concentrate on the searching functionalities. However, most consumers nowadays are used to advanced online shops, e.g. with recommendation features and consumer reviews. Therefore, the limited functionalities in our shop might have had a negative influence on the shop-related constructs, even though the consumer might not have been dissatisfied with the relevance of the search results or the filtering mechanisms. Third, the sample is quite homogeneous regarding nationality, age, and educational background, as the invitation to participate in the experiment was sent through the university's mailing list. Therefore, the degree of transferability to other user groups (other countries, participants who are not students) is difficult to evaluate.

We excluded an explicit investigation of trust and risk and their relationship on consumer acceptance in our model due to the complexity of the issue (Gefen, Srinivasan and Tractinsky, 2003). Risk is implicitly included in our model by the construct *Consumer Involvement* (CI).

In future work, our study could be refined and extended to a less homogeneous group for identifying socio-cultural influence factors, such as age, education, or country of origin. Another possible extension of this study could be to validate our model with other types of products and by integrating trust and risk and moderators.

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